Effects of Physical Threat and Ego Threat on Eating Behavior

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Restrained and unrestrained subjects were subjected to one of three distress manipulations prior to an ad lib taste task. The physical fear threat (anticipated electric shock) significantly decreased unrestrained subjects' eating and slightly increased restrained subjects' eating. Both ego threats (failure at an easy task or anticipating having to give a speech in front of an evaluative audience) significantly increased restrained subjects' eating but did not significantly suppress unrestrained subjects' eating. This pattern supports the proposition that physical fear differs from more general dysphoria in its effects on eating, perhaps because of the divergent effects of these two types of distress on eating control mechanisms, which in turn differ in restrained and unrestrained eaters.

On strictly physiological grounds, emotional distress ought to suppress eating, because the physiological reaction to stress mimics the internal sensations associated with feeding-induced satiety (Schachter, Goldman, & Gordon, 1968). Specifically, fear inhibits gastric motility (Carlson, 1916) and promotes the release of sugar into the bloodstream (Cannon, 1915). For some individuals, however, emotional upset has a facilitative effect on eating. This inapt response to distress forms the cornerstone of the psychosomatic theory of obesity (Bruch, 1961; Kaplan & Kaplan, 1957), which argues that individuals become obese primarily because they learn to eat in response to emotional agitation rather than in response to internal hunger cues.

A series of studies by Slochower (1976, 1983; Slochower & Kaplan, 1980; 1983; Slochower, Kaplan, & Mann, 1981) found that obese subjects did indeed eat significantly more when distressed than when calm, although only when certain additional conditions obtained (viz., diffuse or unaltered anxiety and salient food cues). Emotional distress has also been shown to trigger eating in normal-weight dieters (Baucom & Aiken, 1981; Herman, Polivy, Lank, & Heatherton, 1987; Ruderman, 1985) and in bulimia nervosa patients (Davis, Freeman, & Garner, 1988; Johnson & Larson, 1982; Kaye, Gwirtsman, George, Weiss, & Jimerson, 1986). Thus, it is now generally acknowledged that distress can produce either increases or decreases in eating, depending on the type of individual involved (Herman et al., 1987).

A recent review of the experimental literature on eating and distress (Herman, Polivy, & Heatherton, 1990) suggested that the type of distress—in addition to the type of person (dieter/obese vs. nondieter/normal-weight)—may also serve as an important moderator of eating behavior. Experimental manipulations of physical fear (e.g., threats of electrical shock or blood sampling) appreciably reduce the eating of nondieting normal-weight individuals and do not significantly increase the eating of obese or dieting individuals (Herman & Polivy, 1975; McKenna, 1972; Schachter et al., 1968). On the other hand, experimental manipulations that threaten subjects' egos or emotional tranquility (i.e., failure or mood manipulations) appreciably increase eating by obese or dieting individuals but do not significantly suppress eating by normal-weight nondieters (Baucom & Aiken, 1981; Frost, Goolkasian, Ely, & Blanchard, 1982; Herman et al., 1987; Ruderman, 1985; Slochower, 1976, 1983; Slochower & Kaplan, 1980, 1983; Slochower et al., 1981).

On the basis of their review, Herman et al. (1990) proposed that physical fear differs from more general dysphoria in its effects on eating. They speculated that physical fear manipulations suppress hunger sensations, presumably because of their effects on the autonomic nervous system (as originally proposed by Schachter et al., 1968), whereas ego-disruptive manipulations lead to increased eating—by obese and dieting individuals—mainly because of their powerful disinhibiting effects on otherwise inhibited behaviors. This proposal also dictates that physical fear manipulations do not act specifically on inhibitions and that ego disruptions—at least those that have been imposed in the lab—usually have weaker or different autonomic effects than do physical fear manipulations.

That physical fear ordinarily has stronger autonomic effects than do ego threats may be inferred from Hodges's (1968) finding that the threat of electric shock had a more powerful effect on heart rate than did task failure, even though task failure had a more profound effect on Affect Adjective Check List scores.  

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1 The Baucom and Aiken (1981) study suggests that when dieting status is separated from obesity—so that obese nondieters are considered separately—it is dieting status and not obesity per se that accounts for the response due to stress. In most studies of obese individuals, however, no attempt is made to determine whether the subjects are dieters; one may presume that they frequently are.
Conversely, Higgins and Marlatt (1973, 1975) found that an evaluative ego threat significantly increased drinking in heavy social drinkers—whose drinking might be expected to be ordinarily inhibited in the lab—whereas physical fear (threat of electric shock) did not increase drinking.

Although the pattern uncovered by Herman et al. (1990) is perfectly consistent within the eating literature, the various suppressive and facilitative influences on normal-weight nondieters and obese dieters have never been demonstrated in the same study. Abramson and Wunderlich (1972) exposed obese and normal-weight subjects to either a physical fear (anticipated electric shock) or ego threat (“interpersonal anxiety”) manipulation, but neither manipulation affected eating, and the normal-weight subjects did not even report any elevation of distress on manipulation check measures. In the present study, we set out to test behaviorally Herman et al.’s (1990) proposal using different sorts of distress manipulations concurrently. Subjects classified as restrained (dieters) or unrestrained (nondieters) on the basis of the Restraint Scale (Herman & Polivy, 1980) were exposed to the shock threat manipulation (physical fear) used by Herman and Polivy (1975) and Schachter et al. (1968) as well as to the task failure manipulation (ego threat) used by Baucom and Aiken (1981) and Ruderman (1985).

The two distress manipulations we selected differed not only with respect to the physical fear versus ego threat distinction; in addition to the locus of the threat (physical vs. ego), the manipulations also differed in that the physical threat was anticipated, whereas the ego threat (task failure) had already been executed. We therefore decided to add another experimental condition involving an anticipated ego threat. In this condition, subjects anticipated having to give a speech before a small group of their classmates, who would also be evaluating them. This manipulation was in many respects similar to that used by Herman et al. (1987). We expected that both of the ego threats would increase the eating of restrained (dieting) subjects but would have little effect on unrestrained (nondieting) subjects’ eating. Further, we expected the shock threat to suppress the eating of unrestrained subjects but to not significantly alter the eating of restrained subjects.

We also had reason to believe that self-esteem might moderate the aforementioned effects of ego threats on eating. Polivy, Heatherton, and Herman (1988) found that it was mainly low self-esteem dieters who became disinhibited by a milkshake preload, eating more after a high-calorie preload than after no preload. High self-esteem dieters failed to show this counterregulatory pattern; instead, they ate the same amount whether they had received a preload or not. Self-esteem did not influence the eating behavior of unrestrained subjects: Both high and low self-esteem unrestrained subjects demonstrated significant caloric compensation for the preload. Accordingly, we measured trait self-esteem in the present study to examine whether the disinhibition produced by ego-related distress—like the disinhibition produced by rich caloric preloads—would occur mainly for those restrained eaters who were low in self-esteem.

Method

Subjects

Seventy-five undergraduate female students from the University of Toronto served as participants in the study in exchange for course credit. Thirty-five subjects scoring higher than 16 on the Restraint Scale were classified as restrained eaters, whereas the remaining 40 subjects were classified as unrestrained eaters. (The typical cutoff for the Restraint Scale is 15 or 16 [Polivy, Herman, & Howard, 1988].)

Procedure

Subjects arrived at the laboratory to participate in a study of perceptual processes. They were told that we were examining the interrelations between various perceptual modalities under a “theory of simultaneous perceptual processes.” Subjects completed an informed consent form that listed a wide variety of possible perceptual tasks, including taste, tactile, spatial, visual or olfactory perception, and verbal fluency. Subjects were then randomly assigned to one of four conditions (the last 10 subjects were assigned according to their previously determined Restraint Scale score, obtained from a mass testing of their introductory psychology course).

Shock Threat

Subjects were told that they had been assigned to a condition that involved comparing taste perception with tactile perception. This procedure followed the Herman and Polivy (1975) procedure as closely as possible. Subjects were told that they would taste and rate a test food; receive strong tactile stimulation, consisting of “a fairly painful” electrical shock; and then taste and rate the same food to see how the tactile stimulation affected their perception of taste. Subjects were asked to remove all jewelry, assured that there was “no real danger of permanent damage,” and told that the pain would be brief. The knob on the shock generator was then set to the second highest level and the experimenter pressed a test button to demonstrate the duration of the shock. During this demonstration the shock generator emitted a grinding electrical sound. Electrodes were then attached to the subject’s nondominant hand, and the instructions for the taste task were given.

Failure

Subjects in this condition were told that they had been assigned to a condition that involved comparing taste perception with spatial perception, using a “symbol differentiating task.” Subjects completed the unsolvable concept-formation task used by Baucom and Aiken (1981) and Ruderman (1985). The subject received five concept-formation problems that involved examining a series of 10 cards, each containing eight features (large vs. small letter, letter A vs. T, circle vs. square, and black vs. white letter) in two stimulus figures. Each of the two stimulus figures contained four different features. For each of the five series of 10 trials, subjects were asked to identify which of the eight stimulus features was “the chosen one” for that trial. The cards were presented one at a time for 10 s. After viewing the card, the subject guessed that the figure on the left or on the right contained the correct feature; the experimenter told the subject whether her response was “correct” or “incorrect,” and then the next card was shown. This feedback would have allowed subjects to use a process of elimination to determine which of the features was correct. However, in this experiment, subjects were given random feedback on each trial so that it was impossible to arrive at a correct answer. (During debriefing, subjects were repeatedly told that a correct solution was not possible and that the task in no way reflected negatively on their true abilities.)

Speech Threat

Because shock and failure threats differed with respect to anticipation as well as the physical–ego distinction, one group of subjects was assigned to an anticipated ego threat condition. These subjects were
told that the ability to give speeches was a good measure of verbal fluency or spatial perception. Subjects were told that they would be required to give a 2-min speech on a topic that would be revealed to them following the taste perception task. (They were told that we did not want to reveal the topic in advance because it might distract them from concentrating on the taste perception task.) To create apprehension, subjects were told that they would give the speech in the presence of five of their classmates, whose role it would be to criticize the speeches for dysfluencies or ungrammatical style. (The audience would be behind a one-way mirror and were supposedly monitoring the speech as part of a different experiment in which they were participating.) The experimenter then left the subject alone to complete some questionnaires. The subject then heard some shuffling chairs behind the mirror and the experimenter speaking to imaginary people in order to make it appear as if other subjects were just arriving.

Control

Subjects were told that they were in a condition comparing taste perception with spatial perception. They were told that they would complete a concept-formation task after completing the taste task. Following each manipulation, subjects immediately completed a state anxiety questionnaire (the State-Trait Anxiety Inventory; Spielberger, Gorsuch, & Lushene, 1970) and the mood scales of the Multiple Affect Adjective Check List (MAACL; Zuckerman & Lubin, 1965). These measures (presented in random order) were given under the pretext that they would help to "tease noise" out of the taste ratings. After the questionnaires were completed, subjects proceeded to a taste task typical of those used in restrained eating studies (see Polivy et al., 1988, for exact wording): Subjects were presented with three large bowls of ice cream and asked to taste and rate the three flavors. Subjects were invited to consume leftover ice cream on the grounds that we might calculate the amount consumed.

Subjects in the failure condition proceeded immediately to fill out some final questionnaires, consisting of our self-esteem measure, the Janis-Field Feelings of Inadequacy Scale (Janis & Field, 1959) modified to include a physical attractiveness subscale (Pliner, 1986), the revised Restraint Scale (Herman & Polivy, 1980; Polivy, Herman, & Howard, 1988), and a postexperimental questionnaire. This questionnaire included a list of emotion states, from which subjects were required to identify the emotions that they had experienced during the study and indicate at what point in the proceedings they had felt that way. The questionnaire also contained items concerning dieting status. Subjects in the shock threat, speech threat, and control conditions were told that the final tasks were cancelled, either because of equipment failures (shock and control) or because some other subjects had failed to arrive (speech). These subjects then completed the final questionnaires.

Results

Manipulation Checks

One-way analyses of variance (ANOVA)s were used to examine the effect of the manipulations on self-report measures of mood. The two anxiety measures were standardized ($M = 0$, $SD = 1$) and combined additively to enhance reliability; on the combined index, the main effect of condition was significant, $F(3, 71) = 3.84, p < .02$. Follow-up post hoc tests revealed that both the speech threat (standard score, $+0.82$) and the shock threat ($0.53$) groups were significantly more anxious than was the control group ($-0.88$, $p < .05$, Duncan’s Multiple Range Test [MRT]). Similarly, on the postexperimental questionnaire providing subjects with a list of possible affective states and asking them to identify which they had experienced during the experiment, at what point, and why. 42.1% of the shock threat subjects and 23.5% of the speech threat subjects reported that the shock or speech threat made them feel apprehensive, whereas none of the failure subjects or control subjects reported feeling apprehensive.

The failure group did not differ from the control group with respect to anxiety, nor with respect to MAACL depression or hostility. However, on the post-experimental questionnaire, 63.2% of the subjects in the failure condition reported “feeling bad about themselves” owing to the failure experience, whereas only 5.9% of the speech threat subjects felt bad owing to the impending speech; no shock threat or control subjects reported feeling bad about themselves. Evidently, although the failure experience did not induce an emotion specifically identifiable as anxiety, depression, or hostility, it did induce a more nebulous dysphoria.

Ice Cream Consumption

A 2 (Restraint) × 4 (Condition) ANOVA on grams of ice cream eaten revealed that restrained subjects ate more than did unrestrained subjects, $F(1, 67) = 4.82, p < .05$. This effect was qualified by the significant interaction between restraint status and condition, $F(3, 67) = 4.58, p < .006$. As can be seen in Figure 1, the pattern of results was close to what was predicted. Post hoc Duncan’s tests revealed that restrained subjects in the failure group ($M = 124.9, SD = 49.9$) and the speech threat group ($M = 146.7, SD = 83.4$) ate more ($p < .05$, Duncan’s
MRT) ice cream than did those in the restrained control group (M = 73.4, SD = 26.7), whereas restrained subjects in the shock threat group ate only slightly (and nonsignificantly) more (M = 88.3, SD = 33.3) than did those in the control group. By contrast, unrestrained subjects in the shock threat group ate significantly (p < .05, Duncan’s MRT) less ice cream (M = 55.5, SD = 27.5) than did the unrestrained control group (M = 115.1, SD = 37.1), whereas the speech threat (M = 68.2, SD = 63.7) and failure (M = 93.0, SD = 55.8) groups ate nonsignificantly less. When these results were analyzed using more powerful planned comparisons (based on our initial predictions), the only change was that the unrestrained speech threat group now differed significantly from the unrestrained control group, F(1, 67) = 4.41, p < .05.

To assess the effect of self-esteem on the restraint-distress interaction, trait self-esteem was included as an independent variable in a three-way ANOVA using a median split on the Janis–Field scale. This analysis yielded a three-way interaction, F(3, 59) = 3.44, p < .03. Essentially, the role of self-esteem was to modify the nature of the restraint-distress interaction such that only the low self-esteem restrained subjects altered their eating in response to the distress conditions (see Table 1); the high self-esteem restrained subjects were unaffected by the distress manipulations. For unrestrained subjects, self-esteem had a more complex effect. Although shock threat suppressed eating for unrestrained eaters in general (relative to control subjects), the effect was significant (p < .05) only for those high in self-esteem; the suppressive effect of the ego threats was not significant overall for unrestrained eaters (compared with control subjects), but the speech threat alone did significantly suppress eating for those low in self-esteem.

**Discussion**

The results of the present study strongly support the proposal that the type of distress is an important determinant of eating patterns in both restrained and unrestrained eaters (Herman et al., 1990). As predicted, ego-threatening manipulations—regardless of whether the negative event was anticipated or had already occurred—significantly increased restrained subjects’ eating and did not significantly decrease unrestrained subjects’ eating; also as predicted, the physical fear manipulation significantly decreased unrestrained subjects’ eating and did not significantly increase restrained subjects’ eating. This complex pattern was detected in Herman et al.’s (1990) review of the prior literature, but has never previously been obtained (or sought) in a single study.2 Henceforth, attempts to predict eating in response to distress must take into account both the type of individual (obese/restrained vs. normal-weight nondiet) and the type of distress (physical vs. ego threat) involved.3

Physical fear presumably exerts its suppressive effect on eating through physiological (peripheral/autonomic) channels, to which normal-weight nondieters are especially responsive. Although the present study did not examine the physiological substrate of behavior, neither the proposal that fear has hunger-inhibiting physiological effects nor the proposal that normal-weight nondieters are particularly responsive to such effects (see Heatherton, Polivy, & Herman, 1989, for a closer examination of the latter proposal) is especially controversial.

As a disinhibitor of eating in restrained subjects, physical fear was not particularly potent. Although we initially argued (Herman & Polivy, 1975) that any stressor should disinhibit the restraint of a chronic dieter, it now appears that the threat must be ego related. Our results are congruent with Higgins and Marlatt’s (1973, 1975) findings that only ego threat—and not physical fear—disinhibits otherwise inhibited behavior. Although it may no longer be a question of whether ego threats (rather than physical threats) are required to disinhibit eating, researchers are not much closer to an answer to the question of precisely how ego threats achieve their disinhibiting effect. Various researchers have offered opinions on this matter, but no proposal has received definitive support. The fact that only those dieters deficient in self-esteem displayed disinhibition in the present study suggests that low self-esteem (or a correlate thereof) ought to be considered as integral to an eventual explanation of the effect. This analysis, however, was based on very few subjects per experimental condition. Definitive conclusions regarding the mediating effects of self-esteem on distress-induced disinhibition will require replication with larger samples. We have nevertheless included these results because they indicate that self-esteem may be as important in mediating the behavioral response of dieters to distress as it is in mediating dieters’ responses to preloads (Polivy, Heatherton, & Herman, 1988).

Brockner and Hulton (1978) showed that low self-esteem subjects are likely to become negatively preoccupied with

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2 Abramson and Wunderlich (1972) attempted to demonstrate that ego threat—but not physical fear—would significantly increase eating by the obese, but these researchers made no corresponding differential prediction regarding the effects of the two sorts of distress on their normal-weight subjects.

3 Herman, Polivy, Lank, and Heatherton (1987) suggested that the internal state of the individual (initially hungry vs. not hungry) must be taken into account as well.
themselves and their deficiencies following failure. Heatherton (1990) found that restrained subjects are also generally more negatively self-focused on the Exner sentence completion task (Exner, 1973) than are unrestrained subjects. Combining these two findings, one might conclude that dieters low in self-esteem are especially likely to dwell on their negative performance and failure expectations. This negative view of self may generalize to other abilities, such as the ability to resist attractive, forbidden foods (such as ice cream). Thus, the failure experience might lower restrained individuals—especially low self-esteem restrained individuals—level of expectations for (dieting) performance and correspondingly raise the likelihood of their capitulating to dietary temptation.

Alternatively, Herman and Polivy (1988) have suggested that overeating might serve a masking function for the dieter, with the distress resulting from overeating occluding the more long-term threatening ego distress; concentrating on the distress that results from overeating may help the dieter to cope with the more damaging implications of the task failure. This tactic would presumably be especially attractive to the low self-esteem dieter, because an ego threat is more damaging to individuals whose self-esteem is weak to begin with.

Finally, Heatherton and Baumeister (in press) have proposed that disinhibited eating may result from a motivated shift in attentional focus. Ego threats or failures make self-awareness particularly painful, especially for those low in self-esteem; the individual is motivated to “escape the self” by shifting to low (concrete) levels of thinking or awareness, immediate or proximal goals, and, most pertinent in the present context, disinhibition. This lifting of inhibition combines with disattention to the long-term consequences of diet breaking to undermine dietary restraint.

One other aspect of the results demands scrutiny. The speech threat task, which was quite effective at eliciting self-reported dysphoria, also produced a marginal decline in eating in unrestrained eaters; further analysis indicated that this effect was confined to low self-esteem unrestrained eaters, on whom the emotional impact of the speech threat might be expected to be particularly profound. This result suggests that some especially powerful ego threats may induce autonomic arousal of sufficient magnitude to suppress hunger and eating in nondieters. This hypothesis gains plausibility from the myriad real-life anecdotal accounts of individuals in whom grief and other major forms of ego-related distress have virtually anorexic effects; most laboratory manipulations of ego threat have presumably (and understandably) been too weak to elicit a powerful autonomic reaction. Thus, the distinction between ego threat and physical fear must not be regarded as an absolute one; still, it appears that ego involvement is a prerequisite for disinhibition (in dieters), whereas physical fear manipulations appear to be more effective than most laboratory ego threats at inducing the physiological suppression of eating (in nondieters).

References


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