

Anxiety, Hunger, and Eating Behavior

C. Peter Herman, Janet Polivy, Cynthia N. Lank, and Todd F. Heatherton
University of Toronto, Ontario, Canada

In this study we examined the effects of anxiety and food deprivation on the amount of food consumed ad lib by dieters and nondieters. Eighty female college students served as subjects in an ostensible market research study in which an anxiety manipulation was embedded. Reassignment of the subjects to anxiety condition on the basis of self-reported anxiety produced a significant ($p < .02$) three-way interaction among level of anxiety, food deprivation, and dieting status. The results suggest that (a) for nondieters, anxiety suppresses hunger but has no effect when subjects are not initially hungry, and (b) for dieters, anxiety increases eating only when the subject is initially hungry. These results are interpreted in terms of Herman and Polivy's (1984) boundary model of eating.

Researchers have long viewed the effects of anxiety on eating as depending primarily on the type of person involved. Normal (nonobese, nondieting) people, who are presumably responsive to their physiological state, are expected to react to anxiety or stress by eating less. The physiological effects of stress include the inhibition of gastric contractions and the elevation of blood sugar, both of which ought to suppress hunger. Thus the normal individual, who uses such internal cues (or their correlates) as the basis for the regulation of eating, ought to eat less when stressed.

Expectations regarding the effect of stress on overweight people are more variable. Early psychodynamic views (summarized by Kaplan & Kaplan, 1957) held that eating may reduce anxiety for some people; these people, owing to their reliance on eating to assuage distress, will in all likelihood become overweight. By the same token, we may expect obese people to respond to distress by overeating. Bruch (1961) developed an interesting variation on this theme. She argued that early mislabeling may lead some people to confuse emotional distress with hunger and to respond to such distress with eating; naturally, responding to an inappropriately wide range of internal cues might well promote obesity.

In contrast, Schachter, Goldman, and Gordon (1968) posited that obese people ignore internal (physiological) cues and regulate their eating on the basis of external (environmental) cues. Exclusive dependence on such cues can promote long-term weight gain, but the manipulation of internal cues (including those induced by anxiety) alone ought to have no effect on the obese person's eating. This theory, then, suggests that obese people neither undereat (as would normal weight people) nor

overeat (as the psychodynamic formulations dictated) in response to anxiety.

Experimental Evidence on Obese and Normal Reactions to Stress

Experimental tests of the psychodynamic and externality hypotheses have not succeeded in resolving, either empirically or conceptually, the issues regarding the relation between anxiety and eating. Schachter et al. (1968) and McKenna (1972), using slightly different fear manipulations, found that normal-weight subjects ate substantially less when anxious and that obese subjects ate nonsignificantly more. Abramson and Wunderlich (1972) obtained no effect of stress on eating by obese subjects, but their stress manipulations were questionable because their normal-weight subjects reported no increase in anxiety.

In a series of studies involving manipulated and naturally occurring stressors, Slochower (1976, 1983; Slochower & Kaplan, 1980, 1983; Slochower, Kaplan, & Mann, 1981) found that obese subjects did eat significantly more when stressed, but only when certain additional conditions were present (e.g., unlabeled or uncontrollable anxiety, highly salient food cues). Finally, Reznick and Balch (1977) found that neither obese nor normal-weight subjects altered their eating in response to anxiety, but this null result may have been due, in part, to the fact that the study required subjects to unwrap candies. A recent study (Polivy, Herman, Hackett, & Kuleshnyk, 1986) has demonstrated that unless provision is made for the disposal of candy wrappers, subjects are likely to become self-conscious and eat less. In any case, half of Reznick and Balch's (1977) subjects ate nothing at all.

In summary, only Slochower's studies obtained significant increases in eating by obese subjects in response to stress, and then only when certain restrictive conditions were in effect. Two other studies (McKenna, 1972; Schachter et al., 1968), which probably did not fulfill these restrictive criteria, did not find a significant increase in eating for fearful obese subjects.

This study was supported by grants from the Natural Sciences and Engineering Research Council of Canada to C. Peter Herman and Janet Polivy.

We wish to thank Clara Bradizza for her invaluable assistance, and Patty Pliner and Franco Vaccarino for their helpful suggestions.

Correspondence concerning this article should be addressed to C. Peter Herman, Department of Psychology, University of Toronto, Toronto, Ontario M5S 1A1, Canada.

Experimental Evidence on Dieter and Nondieter Reactions to Stress

Herman and Polivy (1975) examined the effect of fear on eating, classifying subjects not by weight but by their scores on the Restraint Scale, which reflects dieting status. Nondieters were expected to eat less in response to anxiety, for the usual reasons, whereas dieters—even normal-weight dieters—were expected to eat more. It was assumed that dieters normally suppress their intake, but under conditions of emotional upheaval, their normal dietary self-control may be disrupted, “releasing” normally suppressed eating. (It was further assumed that obese subjects, as dieters, would display the same effect.) Their results paralleled those of Schachter et al. (1968) and McKenna (1972): When anxious, normal-weight dieters (like obese subjects) ate nonsignificantly more, and nondieters (like normal-weight subjects) ate significantly less.

Extending the range of dysphoric emotions, Baucom and Aiken (1981) found that “depressed” dieters (i.e., those who had failed at a task) ate almost twice as much as did dieters who succeeded. Nondieters ate marginally less after failure than after success. Ruderman (1985), using the same failure manipulation as had Baucom and Aiken (1981), obtained similar results: Dieters ate substantially more after failure, whereas nondieters ate slightly less. Frost, Goolkasian, Ely, and Blanchard (1982), using the Velten (1968) mood-induction procedure, found that depressed dieters ate twice as much as nondepressed dieters and depressed nondieters ate nonsignificantly less than did nondepressed nondieters.

These experiments on dieters yielded results strongly reminiscent of earlier research on the obese: Overall, stress appears to increase eating for dieters and the obese and decrease eating for others (normals), but other factors apparently not under experimental control determine whether these effects are statistically suppressed or magnified.

Boundary Considerations

Recently, Herman and Polivy (1984) outlined a *boundary model* of eating that proposes that normal eating proceeds so as to maintain the person within a zone defined by two boundaries corresponding to hunger and satiety. A person may be in a state of hunger, satiety, or indifference (neither hungry nor sated). When hungry (deprived), the normal person will, if possible, increase food intake so as to escape the hunger zone and achieve indifference. The experience of satiety likewise operates through negative reinforcement to terminate intake and allow the person to subside into a state of comfortable indifference. When indifferent, the person is not subjected to the aversive physiological pressures that occur in the hunger and satiety zones.

These boundary considerations have implications for the analysis of the effects of stress on eating. For normal eaters, anxiety or stress suppresses the physiological (gut and circulatory) correlates of hunger; in boundary terms, stress moves the person from hunger to a state of indifference (nonhunger). Thus if the initially hungry person tends to eat a lot, stress should suppress intake. This analysis corresponds to the commonsense view that characterizes previous theorizing in all camps.

But consider the person who is not initially hungry. When indifferent, the person does not eat for reasons of internal demand. Accordingly, the imposition of anxiety or stress, which affects internal state, ought to have no strong effect on eating. (The only situation in which stress might suppress eating in a nonhungry person is if he or she is almost sated, in which case the internal effects of stress might induce satiety and thereby inhibit eating: This may have been the case for McKenna [1972].)

Previous studies, as we have seen, occasionally found that stress reduced normals' consumption (as the previous conceptualizations demanded), and sometimes it did not. Our boundary analysis suggests that intake suppression should be evident for hungry (deprived) normals, but not in indifferent (recently fed) normals. Ruderman's (1985) and Slochower's (1976, 1983) studies tended not to find suppression; these subjects were tested within an hour or two after lunch. Baucom and Aiken's (1981) subjects, who were 2½-hr deprived, showed a marginally significant suppression. Herman and Polivy's (1975) subjects, who were at least 5-hr deprived (having skipped a meal), showed a significant suppression of eating when anxious. A similar suppression was observed in Frost et al.'s (1982) normal-weight subjects, but we have no information on their degree of deprivation, which appears to have been left uncontrolled.

The most compelling data in support of this analysis come from Schachter et al.'s (1968) study, which was the only study in which deprivation was manipulated independently of anxiety. Those subjects who had skipped a meal ate 28.28 crackers when not anxious and 15.89 crackers when anxious (a 44% suppression), whereas those subjects who had been preloaded with two roast beef sandwiches ate 16.98 crackers when not anxious and 13.78 when anxious (a 19% suppression). Thus anxiety suppresses eating in subjects who are initially hungry, but not in those who are indifferent.

The foregoing analysis, of course, applies to normal (non-obese, nondieting) eaters. With respect to dieters, the boundary model proposes that their behavior is largely under the control of a third and somewhat unnatural boundary, the *diet boundary*, which is located within the zone of indifference. Dieters attempt to restrict their intake so as not to exceed this boundary, which is dictated by diet calculations. Once the diet boundary has been breached, however, eating may proceed in a disinhibited way, often in defiance of normal considerations of hunger and satiety. As for the obese, the boundary model proposes that they be considered as dieters (probably a majority of the obese) or nondieters, with no separate influence of body weight per se.

Thus we must consider the effects of hunger/indifference as well as anxiety itself on the diet boundary, which is the key to predicting dieters' eating. The effect of anxiety, according to our original analysis (Herman & Polivy, 1975), was to disinhibit the dieter; emotional agitation disrupts the self-control represented by the diet boundary. Thus dieters should eat more when anxious/stressed (disinhibited) than when calm (diet intact). The effect of deprivation is likewise opposite from its effects on nondieters; the deprived dieter's diet is still intact, which promotes further dieting, whereas the dieter who has been forced to exceed his or her dietary quota may go on to overeat in a disinhib-

ited way (Herman & Mack, 1975). Combining these two factors, we can make the following predictions: In the deprived dieter, anxiety ought to increase eating because it threatens an otherwise intact diet boundary; in the preloaded dieter, however, anxiety ought not to increase eating because the preloading itself should break the diet boundary and increase eating. Anxiety cannot disinhibit a dieter who is already disinhibited.

Unfortunately, the prior studies cannot be evaluated in terms of this analysis because subjects were never disinhibited by a forced, diet-breaking preload; those who received an explicit preload (McKenna, 1972; Schachter et al., 1968) ate roast beef sandwiches ad lib.

The Present Study

This study was designed to test the predictions of the boundary model with respect to the joint effect of hunger/preloading and stress in nondieters and dieters. We expected stress to suppress eating in deprived nondieters, but not in preloaded (indifferent) nondieters. Stress was expected to increase (disinhibit) eating in deprived dieters, but not in preloaded (already disinhibited) dieters.

Method

Overview

Female subjects were randomly assigned to high- or low-anxiety conditions, and orthogonally to deprived or preloaded conditions. The amount of ice cream consumed ad lib was assessed in an ostensible market research taste-rating context. Anxiety was assessed immediately before eating. Subjects were retrospectively designated as *restrained* (dieters) or *unrestrained* (nondieters) on the basis of their scores on the Restraint Scale administered at the end of the experiment.

Subjects

Subjects were 80 female students at the University of Toronto who received credit toward their introductory psychology experiment requirement. Subjects were tested individually from 12:00 noon to 4:00 p.m. at hourly intervals. Subjects were asked not to eat for 4 hr preceding the experiment because the study involved the sense of taste.

Procedure

A female experimenter asked subjects upon arrival to complete a brief questionnaire stating when and what they had last eaten and to indicate on a 7-point scale how hungry they felt. Subjects were then informed that they were participating in a market research study designed to test two products—a rich, creamy, gourmet milkshake and a new line of gourmet “yuppy” ice creams.

The subjects were informed that the study had two goals: First, we wanted to obtain potential consumers' opinions of the products in a context where they would not be biased by packaging, ads, or salespeople. The experimenter described herself as blind to the products and therefore unlikely to sway subjects' opinions. Second, the study involved a search for original advertising ideas. At this point the anxiety manipulation was introduced. In the low-anxiety condition, subjects were told that after they had completed their taste ratings they would be asked to think about those aspects of the products that should be highlighted in an advertising campaign. In the high-anxiety condition, subjects were told that after they had completed their taste ratings they would be given

time to compose an advertising jingle. They would then be taken to a filming room where they would be videotaped while performing the jingle. The videotape would be kept on file to be examined by a panel of marketing experts. The high-anxiety manipulation was strengthened by the presence of a video camera, which the experimenter adjusted and fiddled with while describing the procedure. The camera remained in full view of the subjects for the duration of the experiment. While the subjects were signing a consent form (which restated the procedure), the experimenter called out the door asking an imaginary person not to use the filming room because she would be needing it shortly.

At this point, subjects in both conditions received the Spielberger State Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) as a manipulation check on anxiety. They were told that mood can affect subjective ratings of taste and that the scale was necessary to tease out extremes in their ratings. The experimenter explained that this kind of information was valuable in market research because much advertising involves the manipulation of people's emotions.

At this stage, the preload manipulation was introduced. In the preload condition, subjects were asked to drink a 250-ml chocolate milkshake and complete a nine-item taste-rating questionnaire about the milkshake. The questionnaire consisted of items dealing with flavor, aftertaste, overall appeal, and likelihood of purchase. In the no-preload condition, the subjects were left deprived.

From this point on, all subjects were treated identically. Three containers of ice cream—one chocolate, one vanilla, and one strawberry—were presented to the subject. Subjects were told that they would have 15 min to rate the three flavors on three taste-rating scales. They were instructed that it was essential that they taste the flavors in a specific order—chocolate, then vanilla, then strawberry—to control for the effect of one taste on another. The experimenter emphasized that subjects must complete the rating for one flavor before going on to the next. Subjects were told that we had “ice cream coming out our ears,” so they could taste as much as they liked and were free to go back and have as much of any flavor as they liked so long as they did not change any of their prior ratings. Subjects were then left alone for 15 min to taste and rate the ice cream. Each container contained approximately 500 g of ice cream, enough to make it unlikely that the experimenter could tell how much had been eaten. The questionnaires were sufficiently short so that the subject could easily complete them in 15 min with plenty of time to eat more ice cream before the experimenter returned.

After the 15-min taste-rating period, the experimenter returned and administered the Eating Habits Questionnaire (the Restraint Scale) under the pretense of interest in potential consumers' general eating habits. This 10-item scale assesses the extent to which people exhibit behavioral and attitudinal concern about dieting and keeping their weight down. Because the degree of restraint was not determined until the end of the session, the experimenter was blind to subjects' dieting habits.

Finally, subjects were questioned in order to uncover any suspicions or previous knowledge of the study. They were then completely debriefed and asked not to discuss the experiment. The experimenter then weighed the ice cream and determined the amount eaten by subtracting the final weights from the weights of the containers before they were presented to the subject.

Results

Classification of Subjects

Following established procedure (Herman & Polivy, 1980), we classified subjects as dieters or nondieters on the basis of their scores on the revised Restraint Scale. In accordance with empirical precedent, those subjects scoring 15 or more ($n = 34$)

were classified as dieters, and subjects scoring below 15 ($n = 46$) were classified as nondieters.

Manipulation Check

The effect of the anxiety manipulation on Spielberger State Anxiety Inventory scores was significant, $F(1, 78) = 4.00, p < .05$. Scores ranged from 20 to 65 (possible range: 20–80), with low-anxiety subjects reporting a mean anxiety score of 33.7 and high-anxiety subjects reporting a mean of 37.3. Thus the anticipation of being videotaped while performing an advertising jingle led subjects to report significantly more anxiety. (Dieters and nondieters did not differ in their anxiety reactions: Group means were 35.12 and 35.83, respectively; nor was there a main effect for preloading or any interaction effects on the state anxiety variable.)

Effects of Anxiety, Dieting Status, and Preloading on Eating

The results of a preliminary three-way (Anxiety \times Dieting Status \times Preloading) analysis of variance (ANOVA) revealed no significant effects or interactions, but the pattern of means was generally as expected.

As we noted earlier, the manipulation of anxiety was effective, but not particularly strong. Inspection of the distribution of anxiety scores revealed considerable variability within the high- and low-anxiety conditions and considerable between-conditions overlap. Accordingly, an internal analysis was performed to examine the effects of anxiety as determined by self-report, regardless of experimental condition. Subjects were reassigned to high- or low-anxiety conditions on the basis of a median split of the Spielberger scale anxiety scores. Subjects scoring 35 and above ($M = 41.2$) were classified as *high anxious* ($n = 42$), and those scoring below 35 ($M = 29.3$) were classified as *low anxious* ($n = 38$). This reassignment procedure resulted in a shift of 15 subjects from the manipulated low-anxiety condition to the self-report high-anxiety condition, and 13 subjects from the manipulated high-anxiety condition to the self-report low-anxiety condition. A three-way ANOVA (Anxiety \times Dieting Status \times Preloading) revealed a significant three-way interaction, $F(1, 72) = 5.76, p < .02$. (See Figure 1 for a graphic depiction of these results.)

Effects of Anxiety and Restraint as a Function of Preloading

To investigate further the three-way interaction, tests of the simple two-way interactions for preloaded and deprived subjects were performed. In the deprived condition, there was a significant Dieting Status \times Anxiety interaction, $F(1, 72) = 6.56, p < .05$. Deprived (hungry) dieters ate more when anxious than when calm, $t(72) = 2.16, p < .05$. Deprived nondieters, by contrast, ate slightly less when anxious than when calm, $t(72) = 1.45, p < .2$. The corresponding analysis for preloaded subjects revealed no significant interactions or main effects. When preloaded (indifferent), neither dieters ($t = .77, ns$) nor nondieters ($t = .39, ns$) were affected by anxiety (see Figure 1). Thus it is

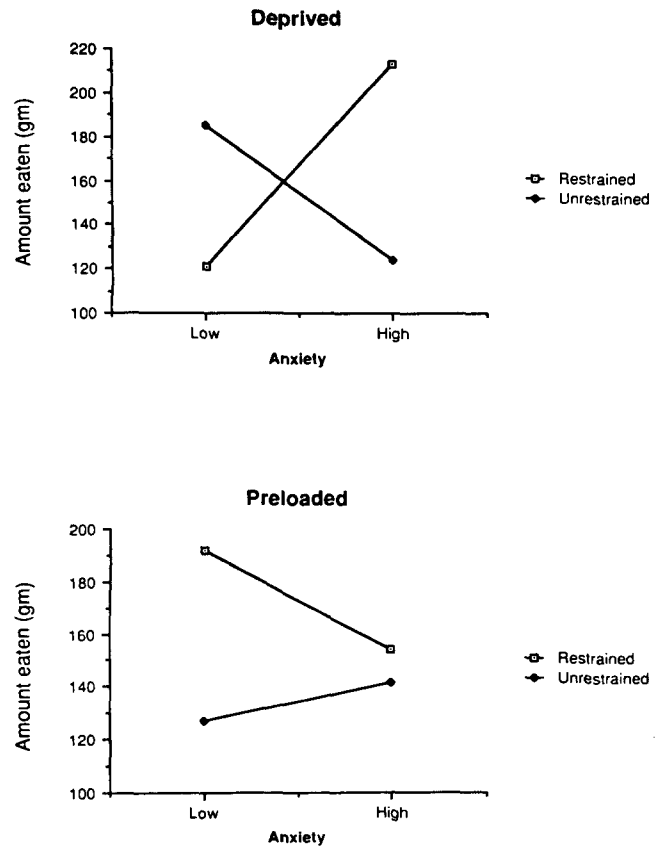


Figure 1. Effects of anxiety and restraint (dieting) as a function of preloading.

evident that the effects of anxiety are much more pronounced on deprived than on preloaded subjects.

Effects of Hunger and Dieting Status as a Function of Anxiety

Just as one may analyze the effects of anxiety on dieters and nondieters as a function of the moderating variable of preloading, so one may use the same data conversely to examine the moderating effects of anxiety on the effects of preloading on dieters and nondieters. The boundary model predicts that the disinhibiting effect of a forced preload on dieters should be evident when they are calm (not already disinhibited by stress). By the same token, the suppressive effect of a forced preload on nondieters should be evident when they are calm (i.e., in the absence of a prior suppressive effect of stress). The anxious dieter should exhibit no further disinhibition by preloading, anxiety-induced disinhibition having already occurred; and the anxious nondieter should exhibit no further suppression by preloading, anxiety-induced suppression having already occurred. Thus the classic (Herman & Mack, 1975) differential effects of preloads on dieters and nondieters should be evident when subjects are calm, but not when they are anxious.

A test on the simple interaction for self-report low-anxiety

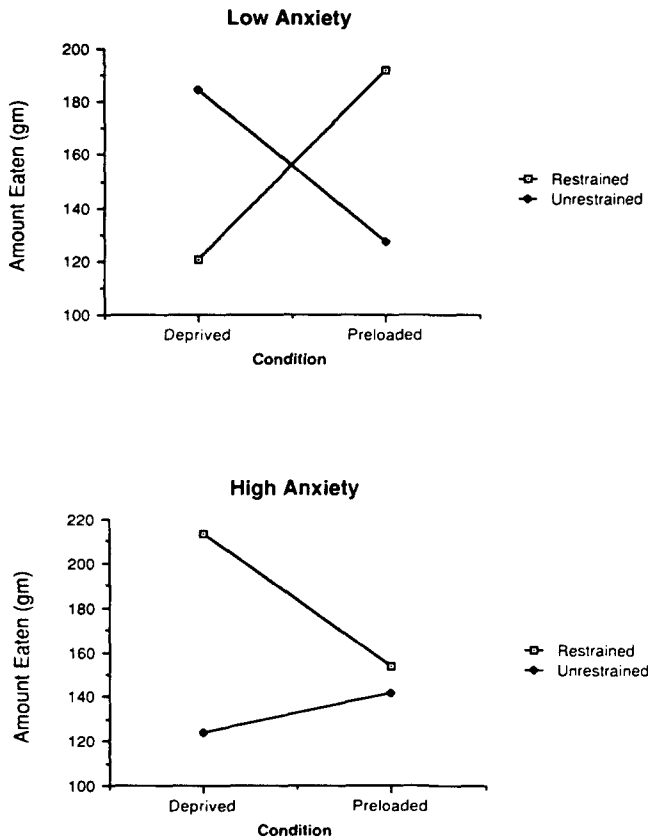


Figure 2. Effects of hunger and restraint (dieting) as a function of anxiety.

subjects revealed a significant Dieting Status \times Preload interaction, $F(1, 72) = 4.63, p < .05$. Simple effects tests indicated that the effect of preloading was to increase the amount eaten by dieters, $t(72) = 1.63, p < .1$, and decrease the amount eaten by nondieters, $t(72) = 1.35, p < .2$, though not significantly. The self-report high-anxiety subjects, in contrast, displayed no significant interaction or main effects. (See Figure 2 for a depiction of these results.)

Discussion

The results of the present study provide substantial support for the hypothesis derived from Herman and Polivy's (1984) boundary model of eating, that food consumption will vary as an interactive function of dieting status, level of anxiety, and degree of repletion.

Specifically, the boundary model dictates that the effects of variables that nominally control eating depend on the state of the organism. Thus for normal eaters, a variable that reduces hunger will reduce eating only in people whose eating is being driven by hunger. If the subject is not initially hungry, reducing hunger should have little impact, eating being minimal to begin with. Thus in the present study, anxiety, which allegedly reduces hunger, had a marginally suppressive effect on hungry nondieters, but not on nondieters who had been preloaded and were

already eating minimally. Likewise, preloading had a marginally suppressive effect on calm nondieters, but not on anxious nondieters, in whom hunger had presumably been eliminated by the physiological sequelae of anxiety.

For dieters, the effects of preloading and anxiety depend on whether the diet is still intact or whether disinhibition has already occurred. Thus the effect of anxiety was to increase (i.e., disinhibit) eating in hungry dieters; calm hungry dieters, in contrast, continued to adhere to their diets. For preloaded dieters, though, anxiety did not increase eating at all, presumably because eating had already been disinhibited by the preload. Indeed, for preloaded dieters, anxiety seemed to have an insignificant suppressive effect, suggesting that the combination of preloading and anxiety might have shifted the dieters toward satiety. Looking at the data from a different angle, the effect of preloading was to increase (i.e., disinhibit) dieters' eating only when they were calm (and otherwise in control). In anxious dieters, who had already been disinhibited (by anxiety itself), preloading had no further disinhibitory effect; if anything, the effect of preloading, added to that of anxiety, may have begun to produce feelings of satiety in dieters, who ordinarily are sluggish in responding to internal satiety cues.

It is evident from the results of this study that generalizations about the effect of a variable on eating require severe qualification. Both anxiety and preloading have virtually opposite effects in dieters and nondieters. Anxiety cannot be said simply to suppress eating because (a) it increases eating for hungry dieters and, (b) even in nondieters, it produces no further suppression following preloading. By the same token, preloading cannot be said simply to reduce eating, because (a) it increases eating for calm dieters, and (b) even in nondieters, it produces no further suppression beyond that produced by anxiety.

A major limitation of the present study stemmed from the relative weakness of the anxiety manipulation, which in turn required reassignment of subjects on the basis of self-reported (rather than manipulated) anxiety levels. Remember that our experimental manipulation of anxiety was a new one, designed to induce anxiety without contravening current ethical guidelines. It was intended as an improvement over prior anxiety-induction techniques such as threat of electric shock (Abramson & Wunderlich, 1972; Herman & Polivy, 1975; Reznick & Balch, 1977; Schachter et al., 1968) and threat of blood, urine, and stool sampling (McKenna, 1972). Although these manipulations were generally effective in arousing anxiety, their very effectiveness rendered them unsuitable if we wished to avoid undue stress on our subjects for ethical reasons. In effect, we had to try to achieve a compromise between a manipulation that was effective but not too effective, and we erred on the conservative side. Future researchers concerned with the effects of anxiety on human subjects face the challenge of devising an anxiety manipulation that is both effective and ethically sound.

In the present case, fortunately, the anxiety measure that provided the basis for subject reassignment (i.e., the manipulation check) was obtained before eating occurred, so self-reported anxiety was at least not contaminated by eating behavior per se. The absence of dieter/nondieter differences in reported anxiety suggests, further, that the anticipation of eating did not contaminate self-reported anxiety either.

Limitations notwithstanding, this study makes clear the value of taking the initial hunger/repletion state of the subject into consideration. The complexities introduced by the dieter's attempt to restrain her eating ensure that the foregoing conclusion is not equivalent to arguing that hungry subjects will eat more. And when a variable such as anxiety, which suppresses hunger in some cases and produces disinhibition in others, is considered, the need for systematic conceptual analysis becomes acute.

Just as it now seems worth taking hunger/repletion into account when assessing the effect of anxiety/stress on eating, so it may prove worthwhile to take anxiety/stress into account when assessing the effects of preloads on eating. Some of the discrepant findings within the preloading literature may conceivably be attributable to variations in initial (but unmeasured) anxiety/stress levels of the subjects. The boundary model, by drawing attention to the interplay of these various factors, may help to reconcile some of these discrepancies.

References

- Abramson, E. E., & Wunderlich, R. A. (1972). Anxiety, fear, and eating: A test of the psychosomatic concept of obesity. *Journal of Abnormal Psychology, 79*, 317-321.
- Baucom, D. H., & Aiken, P. A. (1981). Effect of depressed mood on eating among obese and nonobese dieting and nondieting persons. *Journal of Personality and Social Psychology, 41*, 577-585.
- Bruch, H. (1961). Transformation of oral impulses in eating disorders: A conceptual approach. *Psychiatric Quarterly, 35*, 458-481.
- Frost, R. O., Goolkasian, G. A., Ely, R. J., & Blanchard, F. A. (1982). Depression, restraint and eating behavior. *Behavior Research and Therapy, 20*, 113-121.
- Herman, C. P., & Mack, D. (1975). Restrained and unrestrained eating. *Journal of Personality, 43*, 647-660.
- Herman, C. P., & Polivy, J. (1975). Anxiety, restraint and eating behavior. *Journal of Abnormal Psychology, 84*, 666-672.
- Herman, C. P., & Polivy, J. (1980). Restrained eating. In A. J. Stunkard (Ed.), *Obesity* (pp. 208-225). Philadelphia: Saunders.
- Herman, C. P., & Polivy, J. (1984). A boundary model for the regulation of eating. In A. J. Stunkard & E. Stellar (Eds.), *Eating and its disorders* (pp. 141-156). New York: Raven.
- Kaplan, H. I., & Kaplan, H. S. (1957). The psychosomatic concept of obesity. *Journal of Nervous and Mental Diseases, 125*(2), 181-201.
- McKenna, R. (1972). Some effects of anxiety level and food cues on the eating behavior of obese and normal subjects: A comparison of the Schachterian and psychosomatic conceptions. *Journal of Personality and Social Psychology, 33*, 311-319.
- Polivy, J., Herman, C. P., Hackett, R., & Kuleshnyk, I. (1986). The effects of self-attention and public attention on eating in restrained and unrestrained subjects. *Journal of Personality and Social Psychology, 50*, 1253-1260.
- Reznick, H., & Balch, P. (1977). The effects of anxiety and response cost manipulations on the eating behavior of obese and normal-weight subjects. *Addictive Behaviors, 2*, 219-225.
- Ruderman, A. J. (1985). Dysphoric mood and overeating: A test of restraint theory's disinhibition hypothesis. *Journal of Abnormal Psychology, 94*, 78-85.
- Schachter, S., Goldman, R., & Gordon, A. (1968). Effects of fear, food deprivation, and obesity on eating. *Journal of Personality and Social Psychology, 10*, 91-97.
- Slochower, J. (1976). Emotional labeling and overeating in obese and normal weight individuals. *Psychosomatic Medicine, 38*, 131-139.
- Slochower, J. (1983). Life stress, weight, and cue salience. In J. Slochower (Ed.), *Excessive eating* (pp. 75-87). New York: Human Sciences Press.
- Slochower, J., & Kaplan, S. P. (1980). Anxiety, perceived control and eating in obese and normal weight persons. *Appetite, 1*, 75-83.
- Slochower, J., & Kaplan, S. P. (1983). Effects of cue salience and weight on responsiveness to uncontrollable anxiety. In J. Slochower (Ed.), *Excessive eating* (pp. 68-74). New York: Human Sciences Press.
- Slochower, J., Kaplan, S. P., & Mann, L. (1981). The effects of life stress and weight on mood and eating. *Appetite, 2*, 115-125.
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Velten, E. (1968). A laboratory task for induction of mood states. *Behavior Research & Therapy, 6*, 473-482.

Received October 17, 1986

Revision received March 6, 1987

Accepted March 11, 1987 ■