Emotional Distress and Disinhibited Eating: The Role of Self

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Dieters and nondieters were exposed to self-referent or non-self-referent mood induction procedures, and food intake was subsequently recorded. In Study 1, both task failure and musical mood induction led to significantly increased eating among dieters. In Study 2, dieters and nondieters were exposed to sad or neutral music and half of the subjects were told that music might make them feel momentarily sad. The addition of an attributional label to the mood induction procedure eliminated the disinhibited eating that was observed in the unlabeled condition (for dieters). Study 3 demonstrated that only self-relevant negative mood disinhibits dieters. It is concluded that only those mood states that implicate the self promote self-regulatory failure. These results are discussed within the escape from self-awareness hypothesis of binge eating behavior.

Emotional distress is a primary contributor to overeating and dietary collapse, especially for those who usually try to restrain food intake. Chronic dieters report that they often eat when they are upset, and laboratory studies have confirmed that various emotional experiences disinhibit these restrained eaters (e.g., Baucom & Aiken, 1981; Cools, Schotte, & McNally, 1992; Herman, Polivy, Lank, & Heatherton, 1987; Ruderman, 1985). A review of the literature by Herman, Polivy, and Heatherton (1993) found that not all forms of emotional distress are equally potent at triggering disinhibited eating. Their review indicates that both the type of individual and the type of distress are important determinants of eating behavior; normal-weight nondieters eat less when they experience fear (e.g., Herman & Polivy, 1975; Schachter, Goldman, & Gordon, 1968), whereas obese individuals or chronic dieters usually eat more when they experience ego threats or more general dysphoria (e.g., Baucom & Aiken, 1981; Herman et al., 1987; Ruderman, 1985; Schotte, Cools, & McNally, 1990; Slochower, 1976). Herman et al. (1993) concluded that only those distress experiences that have negative or unflattering implications for the self are linked to disinhibited eating. This manuscript reports three studies that tested the importance of self to distress-induced eating by using self-referent and non-self-referent mood induction procedures.

The proposition that different forms of emotional distress differentially affect the eating of dieters and nondieters was tested by Heatherton, Herman, and Polivy (1991). They exposed chronic dieters and nondieters (called restrained and unrestrained eaters) to three types of distress experience: fear of electrical shock, fear of having to give a speech in front of peers, or failure at a supposedly important task. Compared to a control group that did not experience distress, Heatherton et al. found that speech threat and task failure led to increased eating for dieters; the physical fear threat led to only a slight, nonsignificant increase. In contrast, only the physical fear threat led to signifi-

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cantly decreased eating among nondieters; both the speech threat and task failure led to moderate decreases in eating. Heatherton, Polivy, Herman, and Baumeister (1993) have since demonstrated that the effects of ego threats on eating are dependent on self-awareness processes. Dieters and nondieters experienced an ego threat (task failure) under conditions of high or low self-awareness. The typical disinhibition of eating restraint was observed under conditions of low self-awareness, but this effect was wiped out under conditions of high self-awareness. These two studies suggest that two preconditions are important for observing disinhibited eating among chronic dieters as a function of distress experiences. First, the manipulation needs to have negative implications about the self (i.e., only distress that is ego threatening), and second, the distress-eating relation holds only when self-awareness is low.

A theory of binge eating by Heatherton and Baumeister (1991) provides an explanation for the roles of self and self-awareness in disinhibited eating. This theory proposes that dieters hold a negative view of self that is generally unpleasant (especially concerning physical appearance) and that dieters are motivated to escape from these unpleasant feelings by constricting their cognitive attention to the immediate situation whereas ignoring the long-term implications and higher level meanings of their current actions (see Baumeister, 1991). This escape from aversive self-awareness helps dieters to forget their unpleasant views of self, but it also disengages long-term planning and meaningful thinking and weakens the inhibitions that normally restrain the dieter’s food intake.

According to the escape model, the connection between self-awareness and disinhibition is based on degree of self-monitoring. To control eating, individuals need to be aware of their personal goals and standards for consumption (i.e., their diet) as well as actual food intake. Thus, successful self-regulation depends on self-monitoring of food intake (Baumeister, Heatherton, & Tice, 1994). According to this view, when people cease to be self-aware or when they fail to monitor intake, disinhibited eating (for those who have inhibitions against eating) will probably occur. Indeed, self-monitoring has been shown to have an important influence over the eating of chronic dieters (Herman, Polivy, & Silver, 1979; Kirschenbaum & Tomarken, 1982; Pecskó & Fremouw, 1988; Polivy, Herman, Hackett, & Kuleshnyk, 1986), and self-monitoring of food intake has been called the “cornerstone” of behavioral treatment for obesity (Wadden, 1995, p. 201). A study by Fisher, Lowe, Jeffrey, Levenkron, and Newman (1982; cited in Baker & Kirschenbaum, 1993) found that weight loss clients who failed to self-monitor food intake over a 3-week holiday period gained 57 times as much weight as those who continued self-monitoring! Thus, any condition that leads to a reduction in self-awareness or self-monitoring may lead to overeating (at least for those who inhibit eating). Fortunately for dieters, most of the time people operate at moderately high levels of self-awareness and therefore they are usually able to maintain their dietary restraints.

In sum, successful self-regulation requires some degree of self-awareness. Unfortunately for dieters, spontaneous self-awareness consists of a variety of negative self-relevant thoughts, such as body image dissatisfaction (Heatherton, 1993). Thus, self-awareness simultaneously helps dieters self-regulate eating at the same time that it heightens or activates painful feelings about the self. An escape from this aversive self-aware state has a disinhibiting effect that results in increased eating among dieters (Heatherton et al., 1993).

The Role of Self in Disinhibited Eating

Schotte (1992) argues that the importance of self to the distress-eating relation has been exaggerated. In contrast to the assertion that only emotional distress that is ego-involving will cause disinhibited eating (Heatherton et al., 1991), Schotte argues that a variety of mood manipulations that do not explicitly involve the self also produce disinhibited eating. For instance, work by Schotte and his colleagues (Cools et al., 1992; Schotte et al., 1990) showed that both horror movies and comedy movies lead to overeating among chronic dieters. Likewise, research by Slochower and her colleagues (Slochower, 1976; Slochower & Kaplan, 1980) demonstrated that false autonomic feedback increased eating among a group of obese women (who were presumably dieting). Although these various experiences clearly have affective consequences, Schotte (1992) argued that these experimental manipulations did not involve discernible ego threats. Heatherton, Herman, and Polivy (1992) maintained that the distress experiences described by Schotte (1992) either had components of ego involvement (such as false autonomic feedback) or were experiences that were coupled with reductions in self-awareness (such as movies). As described earlier (and based on self-awareness theory), any situation that leads to a reduction in self-awareness may promote the disengagement of eating restraints.

Mood states that do not hold implications about the self (such as a physical fear threat) should not affect self-image. After all, scary experiences or non-self-referent sad moods may affect our moods, but they should not change the way we view ourselves. The escape theory dictates that only those experiences that reflect negatively on the self will promote attempts to escape self-awareness (because only ego threats lead to increased negative self-awareness). Thus, only self-relevant distress
should produce disinhibited eating among dieters. This article reports on three studies that test the assertion that only distress that is self-relevant will lead to disinhibited eating.

**Self-Referent Versus Non-Self-Referent Mood**

Most experimental manipulations of mood are produced by casting the self in a negative light (for a review of mood induction procedures, see Martin, 1990, or Singer & Salovey, 1988). For instance, a variety of studies have used embarrassing failure or bogus negative feedback about some aspect of the self to induce temporary negative affect (e.g., Baumeister & Tice, 1985). One of the most common methods used to produce negative affect in the laboratory is the Velten mood induction procedure (Velten, 1968), in which subjects read self-referent statements that are indicative of a dysphoric mood (for a review of the Velten procedure, see Larsen & Sinnett, 1991). These various manipulations are quite robust, and it is fairly easy to produce negative affect using these self-referent procedures (Martin, 1990; Polivy, 1981).

Some experimental techniques used to induce negative mood are apparently less self-involving (Martin, 1990; Matt, Vazquez, & Campbell, 1992; Salovey & Rodin, 1985; Singer & Salovey, 1988). For example, watching a sad movie or listening to sad music can produce negative affect, and this apparently occurs without explicit reference to the self. Similarly, thinking about a good friend dying of cancer is likely to induce a negative mood even though it has very few implications about the self (Salovey & Rodin, 1985). Heatherton et al. (1992) argued that only negative moods that have some implication about the self will lead to disinhibited eating, and therefore it was expected that a self-involving mood-induction procedure would be more likely to disinhibit the eating of chronic dieters than would be a less self-involving procedure. A musical mood induction procedure was used because it minimizes the likelihood of cognitive priming of the self and because it is relatively free from demand characteristics (Blaney, 1986; Clark, 1983; Parrott & Sabini, 1990; Pignatiello, Camp, & Rasar, 1986; Singer & Salovey, 1988). We predicted that disinhibited eating would occur only in the self-relevant mood induction condition.

**STUDY 1 METHOD**

**Subjects**

Sixty-nine female undergraduates served as paid volunteers. They ranged in age from 16 to 31 (median = 18). Based on cutoffs used in previous research, subjects who scored 16 or higher on the Restraint Scale (Herman & Polivy, 1980) were classified as dieters (n = 32) and subjects who scored less than 16 were classified as nondieters (n = 37). Dieters reported weighing more (M = 130.6, SD = 14.8) than did nondieters (M = 118.8, SD = 20.0), t(66) = 2.74, p < .01.

**Procedure**

Subjects were recruited through sign-up posters and tables positioned at the entrances of some dining halls. They were told they would be participating in an experiment on personality and perception and would be filling out survey forms and doing some perceptual tasks, depending on the condition to which they were assigned. After arriving in the laboratory, subjects filled out a consent form and were randomly assigned to one of three conditions: control (neutral), task failure (self-involving threat), or musical mood-induction (non-self-involving threat). Following the mood-induction procedure, all subjects filled out mood and state self-esteem checklists and then took part in a putative taste-rating task.

**Materials**

Two compositions were chosen for the musical mood-induction. The neutral music was Common Tones in Simple Time, from John Adams’s *Chairman Dances*. The sad music was Russia Under the Mongolian Yoke, Field of the Dead, from *Alexander Nevsky* op. 78, by Prokofiev (played at half-speed). These selections have been used successfully to induce neutral and negative emotions in previous research (Clark, 1983; Wenzlaff, Wegner, & Klein, 1991). The task failure condition involved having subjects play a seemingly simple logic puzzle. The Spin Out game is a commercially available puzzle that requires the player to use binary logic to extract a center slide from a long plastic frame. Along the center slide are six wheels, that 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 within 1 minute, beginners usually require more than 30 minutes to complete the task.

Two questionnaires were used to assess subject’s affective responses to the mood-induction procedures. The mood rating scale consisted of 24 mood adjectives, of which 15 were negative (bored, distressed, nervous, jittery, anxious, annoyed, sad, depressed, hopeless, anxious, apprehensive, fearful, confused, uncertain, irritated) and nine were positive (enthusiastic, excited, elated, peppy, euphoric, lively, cheerful, happy, light-hearted). These items were based in part on research by Larsen and Ketelaar (1991) and Parrott and Sabini (1990). We included items to represent both negative and positive affect (cf. Watson, Clark, & Carey, 1988). A
total mood score was derived by adding positive mood items to reverse-scored negative mood items.

To assess momentary changes in self-evaluation, we used the State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991). The SSES consists of 20 items that tap momentary fluctuations in self-esteem. The scale has excellent internal consistency (Coefficient alpha = .92) and has been shown to measure temporary changes in self-evaluation (see Crocker, Cornwell, & Major, 1993; Ruggiero & Taylor, 1997). Psychometric studies have shown the SSES to be separable from mood (Bagozzi & Heatherton, 1994). Confirmatory factor analysis has shown the SSES to be composed of three factors: performance, social, and appearance self-esteem (Bagozzi & Heatherton, 1994). The SSES is labeled “Current Thoughts” to minimize experimental demands. This scale was included to demonstrate that the musical mood induction procedure influenced negative affect but not sense of self.

Finally, the Restraint Scale (Herman & Polivy, 1980) was used to assess chronic dieting status. This scale consists of 10 questions that ask about current and habitual dieting habits, weight fluctuation history, and excessive concern about eating. Subjects completed the Restraint Scale as well as a postexperimental questionnaire at the end of the experiment.

**Control Condition**

Subjects were told that before proceeding to the perceptual task, everyone needed to have the same mental state. Subjects were asked to wait in a room in which music was playing (Common Tones in Simple Time). There was also a simple puzzle that subjects were invited to play with if they liked (the puzzle was quite easy so as not to induce a failure experience). Subjects were left in the room for 8 minutes, at which point the experimenter returned and asked them to fill out the mood and state self-esteem scales. Subjects were told that the forms were used to measure what they were thinking before doing the next task.

**Failure Condition**

The experimenter introduced the Spin-Out game 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 moves involved in the game, showing that it is almost possible to solve the problem in less than 60 seconds. Subjects were told that the fastest anyone had solved the puzzle was 3 minutes and that the slowest subject had taken just more than 8 minutes, but that almost everyone finished in about 5 minutes. Subjects were left on their own to solve the puzzle.

The experimenter returned after 8 minutes and said, “Aren’t you done yet? I just came in because I was surprised that you hadn’t finished yet. I thought that there might be a problem with the game or something.” The experimenter proceeded to solve the problem in less than a minute, and said, “The game seems to be fine, you just must be really bad at this sort of logic. Do you have problems with things like math?” The experimenter dismissed any excuses that the subject might have made, and finally stated, “Well, I’m not sure what to do with you. Most people are finished by now. Why don’t you fill out these forms and then we’ll try another task and see if you don’t do better at that.” Subjects were told that the forms were to control for what they were thinking before doing the next task.

**Musical Mood-Induction**

Subjects were seated in a waiting room and told that the perceptual task would begin in a few minutes. Subjects were then informed that it was important that all subjects had the same mental state and that music would be played to counteract any strong perceptual experiences that the subject might have had before arriving in the laboratory. Subjects listened to 8 minutes of Russia Under the Mongolian Yoke played at half-speed. The experimenter returned to the room and asked the subject to complete the mood and state self-esteem scale, again with the explanation that it was used to measure subjects’ current thoughts.

**TASTE-RATING TASK**

Following the mood-induction procedure, subjects were taken to a room for the perceptual task, that was a taste-rating task. The experimenter asked the subjects to taste and rate three flavors of ice cream using the rating sheets provided. Ice cream was presented in very large bowls so that subjects would not believe that intake could be monitored by the experimenter. The ice cream was weighed before and after the taste-rating task to measure consumption. Subjects were given 10 minutes for the rating task and were invited to help themselves to extra ice cream if they finished their taste ratings early. This taste-rating paradigm has been used in several studies (e.g., Schachter et al., 1968) and provides an excellent method of unobtrusively measuring food consumption in the laboratory.

Because the manipulations used in this study had the potential to cause momentary dysphoria, a careful debriefing was conducted for all subjects. Participants in the failure condition were assured that the task was nearly impossible, and we discussed with them the need for the temporary deception. No participant reported being unduly distressed by the experimental manipulations.
STUDY 1 RESULTS

Manipulation Checks

Mood and state self-esteem responses were assessed using 2 (dieter/nondieter) x 3 (condition) analyses of variance (ANOVAs) on each composite score. As may be seen in Table 1, both the failure task and the musical mood induction led to predicted differences in affect. Specifically, there were main effects of condition on total mood, $F(2, 63) = 6.92, p < .002$, negative mood, $F(2, 63) = 4.80, p < .02$, positive mood, $F(2, 63) = 6.90, p < .004$, performance state self-esteem, $F(2, 63) = 8.04, p < .001$, social self-esteem, $F(2, 63) = 3.63, p < .04$, and physical appearance state self-esteem, $F(2, 63) = 3.43, p < .04$.

Task failure. The task failure condition differed from the control condition on all the measures except for physical appearance state self-esteem. Specifically, task failure was related to lower overall mood, $t(63) = 3.89, p < .0005$, lower positive affect, $t(63) = 3.67, p < .0005$, increased negative affect, $t(63) = 3.22, p < .002$, decreased performance self-esteem, $t(63) = 3.97, p < .0002$, and decreased social self-esteem, $t(63) = 2.75, p < .008$. There was no effect of task failure on physical appearance self-esteem, $t(63) = 1.41, p > .10$.

Sad music. The music condition differed from the control condition in total mood, $t(63) = 1.90, p < .06$, positive mood, $t(63) = 2.42, p < .02$, and physical appearance self-esteem, $t(63) = 2.34, p < .03$, but not in negative mood, $t(63) = 1.08, p > .10$, performance self-esteem, $t(63) = 1.54, p > .10$, or social self-esteem, $t(63) = 1.80, p > .10$.

Restraint and condition. Interestingly, a look at the overall pattern of results indicates that musical mood manipulation had a greater effect on dieters than on nondieters, whereas the task failure seemed to have a greater effect on the nondieters than on dieters. In terms of total mood scores, an interaction between restraint and condition, $F(2, 63) = 3.66, p < .05$, reveals that for dieters, only sad music was related to lower total mood compared to the control condition, $t(63) = 2.07, p < .05$; the task failure condition did not differ significantly from the control group, $t(63) = 1.46, p > .10$. In contrast, the sad music did not lead to a significant drop in total mood for the nondieters, $t(63) = 1.66, p > .10$, although the task failure led to a significant decline in total mood, $t(63) = 3.91, p < .0005$.

A two-way ANOVA on physical appearance self-esteem revealed a marginal interaction between dieting status and mood condition, $F(2, 63) = 2.30, p < .10$. Somewhat unexpectedly, the sad music led to a significant drop among dieters, $t(63) = 3.22, p < .005$, although it did not significantly affect the nondieters, $t = .41, p > .10$.

TABLE 1: Manipulation Checks for Mood and State Self-Esteem for Study 1

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Task Failure</th>
<th>Sad Music</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total mood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dieters</td>
<td>116.2</td>
<td>102.0</td>
<td>96.5*</td>
</tr>
<tr>
<td>Nondieters</td>
<td>124.0</td>
<td>89.2b</td>
<td>118.2</td>
</tr>
<tr>
<td>Negative mood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dieters</td>
<td>121.9</td>
<td>129.5</td>
<td>131.7</td>
</tr>
<tr>
<td>Nondieters</td>
<td>113.6</td>
<td>133.9*</td>
<td>114.5</td>
</tr>
<tr>
<td>Positive mood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dieters</td>
<td>46.1</td>
<td>39.5</td>
<td>36.5*</td>
</tr>
<tr>
<td>Nondieters</td>
<td>45.7</td>
<td>31.2*</td>
<td>40.7</td>
</tr>
<tr>
<td>SSSEs performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dieters</td>
<td>28.5</td>
<td>23.0a</td>
<td>26.2</td>
</tr>
<tr>
<td>Nondieters</td>
<td>29.5</td>
<td>23.3a</td>
<td>27.3</td>
</tr>
<tr>
<td>SSSEs social</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dieters</td>
<td>26.7</td>
<td>24.4</td>
<td>24.2</td>
</tr>
<tr>
<td>Nondieters</td>
<td>28.7</td>
<td>22.4a</td>
<td>25.3</td>
</tr>
<tr>
<td>SSSEs appearance</td>
<td></td>
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</tr>
<tr>
<td>Dieters</td>
<td>19.7</td>
<td>17.4</td>
<td>14.6*</td>
</tr>
<tr>
<td>Nondieters</td>
<td>22.0</td>
<td>20.7</td>
<td>21.4</td>
</tr>
</tbody>
</table>

NOTE: SSSEs = State Self-Esteem Scale.
*a. Mean is significantly different from the control condition.

![Figure 1: Effects of dieting status and distress condition on eating behavior (ice cream in grams).](image)

As may also be seen in Table 1, task failure seemed to affect positive mood and negative mood equally, whereas the sad music seemed to have its effects mainly by attenuating positive affect rather than by increasing negative affect. Such separation of the effects of negative and positive affect are not unusual in mood research (Clark & Watson, 1988).

Eating Behavior

A two-way ANOVA (Dieting x Condition) was used to assess eating behavior. As expected, there was a significant interaction between dieting status and mood condition, $F(2, 63) = 8.15, p < .001$. As may be seen in Figure 1, compared to the control condition dieters ate more following task failure, $t(63) = 2.91, p < .005$, and following sad music, $t(63) = 2.46, p < .008$. In contrast,
nondieters ate less following task failure, \( t(63) = 2.40, p < .01 \), and following sad music, \( t(63) = 2.05, p < .05 \).

**DISCUSSION**

The results of Study 1 replicate previous findings that task failure (i.e., self-referent distress) disinhibits eating among chronic dieters. However, an apparently non-self-referent procedure also disinhibited dieters; dieters who listened to sad music ate much more ice cream than did dieters who listened to neutral music. Nondieters ate less ice cream after the task failure or sad music, that was also consistent with past research (although the reduction in eating in this study was somewhat greater than has been found in previous studies; see Herman et al., 1993). Although the disinhibited eating that followed task failure was expected, we were surprised that a less self-involving manipulation also produced disinhibited eating among dieters.

An examination of the affective reactions to the musical mood-induction provides a possible explanation for this effect. Although sad music did not lead to a decrease in performance or social state self-esteem, it did lead to diminished appearance self-esteem and less positive mood. Apparently listening to sad music made dieters feel more negatively about their body weight and physical attractiveness, thus turning a non-self-referent mood induction into a self-referencing procedure.

Dysphoric moods have multiple effects on cognitive processes. They initiate a search for the source of the mood (Salovey & Rodin, 1985; Schacther & Singer, 1962), they intensify self-focus (Salovey, 1992; Wood, Saltzberg, & Goldsamt, 1990), and they increase the accessibility of negative cognitions (Blaney, 1986; Gilligan & Bower, 1984; Singer & Salovey, 1988). Considered together, it seems plausible that an ambiguous negative mood leads dieters to dwell on their characteristic negative view of self. Because dieters are preoccupied with body-weight and body-image issues, it seems possible that any ambiguous negative mood will enhance feelings of unattractiveness and heighten body dissatisfaction.

Of course, it is quite possible that the mood and state self-esteem results in Study 1 were completely spurious. Because we did not have a baseline measure of mood or state self-esteem, it is not clear whether mood dropped following the sad music or whether some unanticipated selection bias led to a greater number of those low in appearance state self-esteem to be assigned to the sad music condition. Moreover, the pattern of results for the mood and self-esteem scales was not exactly as anticipated. Thus, it seemed important to replicate these findings and to measure mood on multiple occasions to ensure that mood and state self-esteem actually changed as a result of the music manipulation.

To recapitulate, we are proposing that sad music led to disinhibited eating because it was an ambiguous mood-inducer that increased self-attention, that for dieters was a negative experience. Thus, the ambiguous nature of the mood-induction procedure may have had the unintended consequence of turning it into a self-involving mood manipulation. Research by Schwarz and colleagues has demonstrated that labeling ambiguous mood states reduces the generalizability of that emotional state. Thus, for example, a mood induction affected overall life satisfaction to a greater extent when no obvious source for the mood was provided compared to a condition where subjects could misattribute their sad feelings to the weather (Schwarz & Clore, 1983). Thus, in Study 2 we provided labeled and unlabeled sad music to examine its effects on dietary restraints.

**STUDY 2 METHOD**

**Subjects**

Ninety female students, ranging in age from 16 to 26, served as paid volunteers. As in Study 1, subjects who scored 16 or higher on the Restraint Scale (Herman & Polivy, 1980) were classified as dieters \((n = 37)\) and subjects who scored less than 16 were classified as nondieters \((n = 53)\). Dieters reported weighing more \((M = 133.4, SD = 18.0)\) than did nondieters \((M = 124.5, SD = 15.4)\), \(t(88) = 2.5, p < .02\).

**Procedure**

Subjects were recruited at sign-up tables positioned at the entrances of four dining halls for a study on personality and perceptual processes. At the time of sign-up, each subject filled out the State Self-Esteem Scale (SSES; Heatherton & Polivy, 1991) and the mood scale used in Study 1 so that we could obtain baseline measurements in a neutral setting. We considered giving the baseline measures at the beginning of the study, but we were concerned about whether this might influence subjects' subsequent answers on these items. Given that state self-esteem fluctuates only slightly around a stable baseline (Heatherton & Polivy, 1991), we expected that subjects in a neutral setting would report state self-esteem that was close to their trait self-esteem. Thus, differences from these baselines could be taken as suggestive of the successful manipulation of these states in our laboratory. At worst, conducting the measurement this way would increase noise in the measurement and therefore provide a more conservative test of the effects of the manipulations. This was deemed to be more desirable than risking subject reactivity. The experiment took place a few weeks later. When subjects arrived at the laboratory, they were randomly assigned to one of two music conditions: sad music (Russia under the Mongolian Yoke) or
neutral music (Common Notes in Simple Time). Half of the subjects in each group were randomly assigned to the label condition, in which they were told that the music might make them feel slightly sad.

Subjects were told that we were using music to create an equal perceptual set in all the subjects, and they were left alone to listen to music for 8 minutes. Some of the subjects were told, as the experimenter was leaving the room, “Oh, some people have mentioned that the music made them feel sort of down. You might find the music does this to you, too, but it’s nothing to worry about, and it shouldn’t affect the perceptual tasks.”

After listening to the music, they were asked to fill out the SSSES and mood questionnaire as they pertained to them at that particular moment. Subjects then completed the same taste-rating task as in Study 1 and finally filled out the Restraint Scale and a postexperimental questionnaire.

RESULTS

Manipulation Checks

Mood and state self-esteem responses were assessed using 2 (dieter/nondieter) × 2 (sad vs. neutral music) × 2 (labeled/unlabeled) ANOVAs on each composite score. A difference score was calculated by subtracting mood and state self-esteem following the manipulation from the baseline measurement. Positive scores for mood and self-esteem represent improvements. As may be seen in Table 2, the sad music produced affective changes that were largely as expected. For instance, compared to baseline, overall mood was worse following the sad music (M = –13.5) than following the neutral music (M = –2.41), F(1, 82) = 8.15, p < .01. However, this effect was qualified by an interaction between the music and label conditions, F(1, 82) = 5.34, p < .03. In the unlabeled condition, sad music lowered overall mood (M difference = –21.4) more than did neutral music (M difference = –0.80), t(82) = 3.75, p < .0003. However, there were no differences between sad music and neutral music in the labeled condition, t = .23, p > .10. Moreover, unlabeled sad music was associated with a greater drop in mood than was labeled sad music (M difference = –5.64), t(82) = 2.87, p < .005. Thus, in terms of overall mood, telling subjects that the music might make them feel bad seemed to attenuate the mood effect.

A similar pattern of results can be observed if we selectively examine either positive or negative affect. For instance, there was an interaction of label condition and music type on positive mood, F(1, 82) = 5.47, p < .03. Sad unlabeled music led to lower positive affect (M = –12.4) than did neutral unlabeled music (M = –4.36), t(82) = 2.59, p < .01, whereas the change following the sad labeled music (M = –6.23) did not differ from the change following the neutral labeled music (M = –8.57), t = 1.03, p > .10. As may be seen in Table 2, this effect is largely attributable to the dieters subjects. Specifically, sad unlabeled music differed from neutral unlabeled music for dieters, t(82) = 2.73, p < .05, but not for nondieters, t(82) = 1.14, p > .10.

For negative mood, the interaction between label condition and music type was quite weak, F(1, 82) = 2.14, p < .15, but the same pattern obtained. Note that sad music seemed to affect nondieters to a greater extent than it did dieters, in that the change in mood is significant for nondieters, t(82) = 2.70, p < .05, but only marginally so for dieters, t(82) = 1.80, p < .10.

As expected, neither the labeling condition nor music type affected performance or social state self-esteem (there were no significant main effects or interactions). However, based on the results from Study 1, we expected that sad music would lead to a drop in appearance self-esteem, especially in the no label condition. Indeed, an interaction between dieting status and music type, F(1, 82) = 6.33, p < .02, revealed that dieters developed worse appearance state self-esteem following sad music (M = –1.65) than following neutral music (M = 1.18), t(82) = 3.12, p < .003. As predicted, this effect occurred mainly in the unlabeled condition, t(82) = 2.52, p < .01, and to a lesser extent in the labeled condition, t(82) = 1.61, p > .10 (for means, see Table 2). Nondieters did not experience any significant changes in appearance state self-esteem.
Eating Behavior

As predicted, dieters appeared to be disinhibited by sad music in the unlabeled condition, but not in the labeled condition (this pattern may be seen in Figure 2). A $2 \times 2 \times 2$ ANOVA revealed a significant three-way interaction between dieting status, music condition, and label condition, $F(1, 82) = 5.25$, $p < .03$. Dieters in the unlabeled sad music condition ate more ice cream ($M = 224.2$, $SD = 135.6$) than did dieting subjects in the unlabeled neutral condition ($M = 69.9$, $SD = 56.1$), $t(82) = 4.18$, $p < .0001$, dieting subjects in the labeled sad condition ($M = 126.9$, $SD = 82.0$), $t(82) = 2.79$, $p < .008$, or dieting subjects in the labeled neutral condition ($M = 137.8$, $SD = 84.3$), $t(82) = 2.42$, $p < .02$. Note that dieters in the labeled sad condition actually ate slightly (though nonsignificantly) less ice cream than dieters in the labeled neutral condition, $t(82) = .31$, $p > .10$. Interestingly, dieters in the labeled neutral condition ate somewhat more than dieters in the unlabeled neutral condition, $t(82) = 1.80$, $p < .10$.

As seen in Figure 2, there were no significant effects of the mood manipulations on the eating of nondieting subjects. Specifically, sad music led to a slight decrease in eating in both the labeled condition, $t(82) = .54$, $p > .10$, and the unlabeled condition, $t(82) = .20$, $p > .10$.

Figure 2  Effects of labeling and mood condition on eating behavior (ice cream in grams).

DISCUSSION

The results of Study 2 provide support for the assertion that dysphoria from an ambiguous source disinhibits restrained eating. In both Study 1 and Study 2, unlabeled sad music disinhibited eating among dieters. In Study 2, when dieters were told that the music might make them feel sad, there were no differences in eating behavior between sad and neutral music conditions. For nondieters, the effect of sad music was to slightly, though nonsignificantly, suppress eating. This replicates previous findings that ego threats (or general dysphoria) do not significantly attenuate eating in nondieters.

The mood and state self-esteem results in Study 2 support the contention that ambiguous mood is converted into negative self-feelings by dieters. That is, being in a sad mood, when the source of the mood is not completely obvious (or labeled) leads to less positive affect and decreased appearance self-esteem for individuals who are chronic dieters. Possible mechanisms for this process will be considered later.

Telling subjects that the music might cause them to feel sad attenuated the affective consequences of the sad music. Some might argue that this is surprising because, if anything, adding an experimental demand should have increased the effectiveness of the mood induction. For instance, Polivy and Doyle (1980) found that specific instructions to feel the mood increased the influence of

the Velten procedure on mood. However, note that subjects in Study 2 were not asked to try to feel sad. If anything, they were warned that the music might have an unintended consequence of making them feel sad, and subjects might have guarded against actually feeling sad or actively counteracted any sad feelings that did arise. In any case, the affective responses were in the right direction, although not significant at the conventional level. Unfortunately, although these findings are suggestive, the lack of significant affective responses in the labeled mood condition precludes definitive conclusions about whether it was a lack of self-relevant distress or the lack of any type of distress that was responsible for the absence of the disinhibition effect. Study 3 uses a more powerful mood induction procedure that was expected to induce negative affect for both self-relevant and non-self-relevant conditions.

STUDY 3 METHOD

Subjects

Forty-one female dieters, ranging in age from 18 to 22, served as paid volunteers. Subjects were recruited from a student recreation center by means of a screening questionnaire that asked about many aspects of their daily lives. Embedded in this questionnaire were items that assessed frequency and intensity of dieting. Only
those subjects who reported frequent and chronic diet-
ing were invited to participate.

**Procedure**

**OVERVIEW**

Subjects believed they were participating in an experiment on thinking style and perception. After filling out a consent form, subjects completed an initial mood questionnaire and the state self-esteem measure (described as measures of current thoughts). Subjects were then randomly assigned to one of four conditions: neutral mood (self-relevant), neutral mood (non-self-relevant), sad mood (self-relevant), sad mood (non-self-relevant). Subjects then completed mood and state self-esteem manipulation checks and subsequently took part in the taste test task used in the earlier studies.

**Measures.** We used the same mood and self-esteem measures as in Studies 1 and 2. The negative affect scale was divided into measures of dysphoria (distressed, hopeless, sad, depressed, and uncertain), anxiety (fearful, apprehensive, jittery, anxious, and nervous), and hostility (annoyed, confused, irritated, and bored), because we hypothesized that our manipulation would mainly affect feelings of dysphoria.

**Mood manipulation.** A negative mood was induced using a procedure developed by Wenzlaff, Wegner, and Roper (1988), in which individuals were asked to imagine themselves in an extremely negative situation. We used the exact situation described by Wenzlaff et al., in which subjects imagine themselves rushing to an important job interview and causing an accident as they rush through a red light: “The next thing you are aware of is a group of people standing over you. One of them tells you not to move, that help is on the way. As you turn your gaze you see the driver of the other car with a small infant in her arms. You hear her cry out, ‘She’s dead! She’s dead! My baby is dead!’” (p. 884). In the neutral condition, we asked subjects to imagine they were driving to the library to meet some friends and they became delayed because of a flat tire.

**Self-relevance.** To manipulate self-relevance, we altered the protagonist in the story. In the self-relevant condition, subjects were asked to imagine themselves as the main characters in the situation. In the non-self-relevant condition, they were asked to imagine a person named Jon as being the main character. We chose a male name to minimize the extent that our female participants identified with the protagonist.

Subjects were asked to write a brief essay on how they or Jon would be feeling following such an event. They were asked to imagine themselves (or Jon) in the situation and described how they were feeling. Subjects were given 10 minutes to read the scenario and write their essay. Subjects then completed the manipulation checks and performed the taste rating task (described in earlier studies).

**RESULTS**

**Mood and Self-Esteem Measures**

A 2 (story theme) × 2 (self-relevance) × 2 (pre/post manipulation) repeated measures ANOVA was used to examine changes in relevant affect. As expected, there was an overall decrease in positive affect following the manipulation, $F(1, 38) = 19.0, p < .0001$. As may be seen in Table 3, this effect occurred primarily in the tragic story condition, as evidenced by the significant interaction between story theme and time period, $F(1, 38) = 8.3, p < .007$. Note that self-relevance did not moderate this effect, $F(1, 38) = 1.9, p > .10$. The same pattern obtained for the dysphoria component of negative affect. Overall, subjects experienced an increase in dysphoria following the manipulation, $F(1, 38) = 6.6, p < .01$, and the interaction between story theme and time period revealed that this was primarily in the tragic story condition, $F(1, 38) = 5.7, p < .02$. Again, self-relevance did not affect self-reports of dysphoria, $F < 1$. Although subjects reported increased anxiety following the manipulation, $F(1, 38) = 15.2, p < .0001$, this did not differ as a function of story theme or self-relevance. There were no changes in self-reported hostility as a function of mood condition. There were also no significant effects on any of the factors of the state self-esteem measure (all $p$s > .10; see Table 3).

**Eating Behavior**

As predicted, subjects ate more ice cream in the sad story condition ($M = 128.0, SD = 79.6$) than in the neutral story condition ($M = 85.3, SD = 67.9$), $F(1, 37) = 3.8, p < .06$. However, this effect was qualified by the expected interaction between story theme and self-relevance, $F(1, 37) = 4.5, p < .05$. As may be seen in Figure 3, disinhibited eating occurred only for self-relevant negative affect. Specifically, subjects in the self-relevant condition ate more ice cream after reading the sad story than did subjects who read the neutral story, $t(37) = 2.83, p < .01$, whereas there were no differences between sad and neutral stories for the non-self-relevant condition, $t < 1$. Moreover, subjects in the self-relevant distress condition ate marginally more ice cream than those in the non-self-relevant distress condition, $t(37) = 1.86, p < .08$. Finally, the difference between the self-relevant neutral story and the non-self-relevant neutral story was not significant, $t(37) = 1.18, p < .10$. 
TABLE 3: Manipulation Checks for Mood and State Self-Esteem for Study 3

<table>
<thead>
<tr>
<th></th>
<th>Non-Self-Referent</th>
<th>Self-Referent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Neutral</td>
<td>Sad</td>
</tr>
<tr>
<td>Positive mood</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>43.7</td>
<td>40.6*</td>
</tr>
<tr>
<td>Post</td>
<td>42.6</td>
<td>30.5*</td>
</tr>
<tr>
<td>Dysphoria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>17.2</td>
<td>15.6*</td>
</tr>
<tr>
<td>Post</td>
<td>17.5</td>
<td>20.1*</td>
</tr>
<tr>
<td>Anxiety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>18.7</td>
<td>15.8*</td>
</tr>
<tr>
<td>Post</td>
<td>22.0</td>
<td>19.8*</td>
</tr>
<tr>
<td>Hostility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>13.5</td>
<td>12.3</td>
</tr>
<tr>
<td>Post</td>
<td>14.9</td>
<td>13.2</td>
</tr>
<tr>
<td>SSES performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>24.0</td>
<td>27.1</td>
</tr>
<tr>
<td>Post</td>
<td>24.9</td>
<td>25.2</td>
</tr>
<tr>
<td>SSES social</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>22.5</td>
<td>25.7</td>
</tr>
<tr>
<td>Post</td>
<td>21.8</td>
<td>24.6</td>
</tr>
<tr>
<td>SSES appearance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>16.4</td>
<td>17.5</td>
</tr>
<tr>
<td>Post</td>
<td>16.6</td>
<td>18.0</td>
</tr>
</tbody>
</table>

*p < .05, significant difference pre-post for this measure.

It could be argued that if our manipulation was truly self-relevant, we should have observed decreases in state self-esteem. On reflection, however, there is little apparent connection between the negative self-feelings that arise from imagining causing grievous bodily harm (e.g., shame and guilt) and those that occur because you have failed at a task, made a poor impression, or don't like the way you look (cf. Morris, 1992). Thus, the state self-esteem scale was perhaps an inappropriate choice for measuring self-relevant affect in the current study. Indeed, measures of shame or guilt might have been useful for our purposes, especially because both of them have been implicated in binge eating behavior (Grilo & Shiffman, 1994; Heatherton & Baumeister, 1991). In any case, our findings provide clear evidence that self-relevant negative affect interferes with self-regulation, whereas non-self-relevant affect does not.

GENERAL DISCUSSION

The results of these three studies provide further evidence about the type of emotional experiences that disinhibit the eating of chronic dieters. We found that ambiguous dysphoria or self-relevant dysphoria (e.g., inferior task performance, imagining personal responsibility for tragedy) disrupted the self-regulation of eating for chronic dieters. For nondieters, the effects of dysphoria (whether ambiguous or not) were to decrease food intake slightly. Overall, these studies suggest that any dysphoric mood experience that leads to an increasingly negative or unflattering view of the self will promote disinhibited eating among chronic dieters.

Schotte (1992) argued that any type of negative affective experience would disinhibit chronic dieters. Our data contradict his claim by showing that only self-relevant negative affect induced disinhibited eating. We hasten to add that Schotte is correct in suggesting that there are some situations in which emotional experiences that do not threaten the self may lead to disinhibited eating. In these cases, however, eating is disinhibited by the loss of self-awareness rather than because of distress or negative mood. Conditions that lead to complete loss of self-awareness (i.e., deindividuation) are well-known disinhibitors, primarily because successful self-regulation depends on being able to monitor and adjust ongoing behavior to match personal goals and standards (Carver & Scheier, 1981; Diener, 1979). Thus, any condition that absorbs attention (such as watching an engaging film) may disinhibit eating among dieters. But, this has little to do with affective aspects of the situation. Heatherton and Baumeister (1991) argued that emotional distress promotes disinhibited eating because of a motivated shift in levels of self-awareness, and the current findings are consistent with that hypothesis. People who feel badly about some aspect of the self are motivated to
escape from those unpleasant feelings either through active distraction or through more subtle cognitive mechanisms (such as cognitive narrowing, see Heatherton & Baumeister, 1991). The resultant shift in self-awareness attenuates negative affect, but it also interferes with successful self-regulation by disengaging self-reflection on personal goals and standards.

From Ambiguous Dysphoria to Disinhibited Eating

Our findings in Studies 1 and 2 suggest that ambiguous dysphoria may promote disinhibited eating among chronic dieters. Recent research has provided a number of compelling explanations for this effect. For example, cognitive processing of affective states can result in a misattribution of the origins of moods. When no obvious explanation is available for why we feel the way that we do, we are motivated to seek out possible explanations (Salovey & Rodin, 1985; Schachter & Singer, 1962; Sedikides, 1992; Wegner & Giuliano, 1980). The behavioral consequences of the mood states subsequently depend on our interpretation of the mood source (Martin, Ward, Achec, & Wyer, 1993). Attributing a bad mood to a transient environmental situation carries no implications about self (Schwarz, 1990), and this circumstance does not lead to disinhibited eating for dieters. However, when there is no apparent situational explanation for mood, the effects of music on eating resemble those associated with self-relevant distress. Thus, some consideration must be given to how ambiguous mood states become self-relevant.

Perhaps as a byproduct of the motivated search for self-understanding of emotional states, sad moods apparently increase self-focused attention (Ingram, 1990; Salovey, 1992; Sedikides, 1992; Wood et al., 1990). Thus, individuals will become more introspective and they may look to characteristic self-feelings to explain their current affective state. Given the considerable evidence for mood-congruency effects (e.g., Blaney, 1986; Isen, 1984; Matt et al., 1992; Mayer, Gaschke, Braver, San, & Evans, 1992; Singer & Salovey, 1988), it seems likely that dysphoric moods would guide self-attention to negative rather than positive aspects of the self. Because restrained eaters are chronically high in self-awareness (Heatherton, 1993), they might be especially vulnerable to interpreting ambiguous negative affect as self-relevant.

Brown and Mankowski (1993) have shown that people with low self-esteem are especially prone to negative self-evaluation following mood-induction procedures. For dieters, who are typically low in self-esteem (Polivy, Heatherton, & Herman, 1988), self-awareness is particularly unpleasant because of their customary preoccupation with the negative aspects of their bodies (see Heatherton, 1993). For dieters, it seems possible that body dissatisfaction is so closely linked to identity that negative thoughts about the body are highly accessible and highly prone to activation through mood congruent biasing (i.e., a strong associative linkage). Indeed, Taylor and Cooper (1992) have reported evidence that negative mood states lead those concerned with body shape to overestimate body size to a greater extent than did those who did not have body shape concerns. Thus, to the extent that sad music produces general and ambiguous dysphoria, that in turn increases self-focus and self-reflection about one’s negative characteristics, it makes sense that such music led to a specific decrease in appearance state self-esteem for dieters in both studies. Heatherton and Baumeister (1991) proposed that disinhibited eating results because dieters are motivated to shut out such painful awareness of self. Thus, the results of the current studies are well in accord with the escape from self-awareness theory of binge eating.

It is also possible that the negative feelings that arose from the sad music caused dieters to believe they were farther from their dietary goals. Feelings of dysphoria signal us that something is problematic, that some action needs to be taken (Schwarz, 1990). Martin et al. (1993) speculate that negative moods may inform the person that they are not successfully attaining their goals. Negative moods may also be related to increased pessimism about personal resources for dealing with situational demands (Morris, 1992). Salovey and Birnbaum (1989) found that a sad mood led subjects to be less confident that they could carry out behaviors that alleviated a medical condition, that implies that sad moods might make dieters less confident of their abilities to lose weight successfully. Carver and Scheier (1990) propose that metamonitoring results in negative affect when we perceive that we are failing to make progress toward goal reduction. Thus, to the extent that negative moods provide information about the extent to which we are achieving our goals, general dysphoria might lead dieters to dwell on the discrepancy between their current and ideal body weight (this discrepancy motivates dieting in the first place), and it might decrease self-efficacy for resisting temptations or staying on a diet. Thus, a sad mood may indicate to the dieter that continued restraint will be unsuccessful in achieving or maintaining weight loss. Staying on the diet subsequently doesn’t seem worth the effort, and binge eating is released. Understanding the precise mechanisms responsible for distress-induced self-regulatory failure is an important goal for future research.

Summary

Self-regulatory difficulties are among the most important and perplexing problems facing behavioral researchers (e.g., drinking and driving, unprotected sex
for people with AIDS, domestic violence, binge eating). Negative emotional states are associated with self-regulatory difficulties across a wide variety of behaviors, including alcohol and drug abuse relapse, overeating, gambling, spending, aggression, and many other impulsive behaviors. The three studies reported in this article confirm the hypothesis that non-self-relevant distress is less likely than self-relevant distress to produce self-regulatory failure, in this case disinhibited eating by dieters. Taken as a whole, our studies demonstrate that self-relevant negative affect is an important cause of self-regulatory collapse.

NOTES
1. In this manuscript, we use the terms restrained eater and chronic dieter interchangeably. In all cases, we are referring to individuals who chronically diet in an attempt to lose weight or avoid weight gain. These individuals may differ from those who diet very infrequently or only on a single occasion. However, the majority of individuals who identify themselves as dieters are likely to display the sorts of behaviors that we describe. There is some controversy over the use of various dieter descriptions; those interested in this issue should consult Heatherton, Herman, Polivy, King, and McGree (1989) for a full discussion of these issues.

2. The Restraint Scale is given at the end of the experimental session so as not to sensitize subjects to the eating aspects of the study (that would therefore focus attention on eating—that would certainly reduce eating). The only alternative would be to conduct a mass testing of potential subjects in a different context, that was not possible for this study. We have previously assessed whether restraint scores differ between lab sessions and mass testing. We found that scores seldom changed by more than 1 or 2 points, and we have demonstrated that the same results obtain whether one measures restraint before or after the study (Heatherton, Polivy, & Herman, 1989). Thus, it seems preferable to measure dieting status following the experimental manipulation so as not to confound the effects of the manipulation with knowledge that eating is a concern of the study. An ANOVA indicated that there were no differences in restraint scores across the different condition, demonstrating that the conditions themselves did not affect restraint scores (F < 1).

3. For ethical reasons, we included an item in our prescreening materials that asked subjects to indicate if they or someone they knew very well had ever been in an accident where someone was seriously injured or killed. We excluded any potential subjects who indicated such an experience.

4. Given that Study 3 is a direct replication, one might argue that a one-tail test would be appropriate, in which case the comparison is significant. We have chosen to report the more conventional two-tail significance level.

5. We thank one of the reviewers for this insightful suggestion.

REFERENCES


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