The effect of mood states on eating behavior among restrained and unrestrained eaters

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THE EFFECT OF MOOD STATES ON EATING BEHAVIOR AMONG RESTRAINED AND UNRESTRAINED EATERS

By

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Emotional states and eating behavior are commonly linked in eating disorder literature for both professionals and lay persons. Negative affective states usually provoke overeating among persons on a diet. Less attention has been paid to the effect of positive mood states on dieters' eating. The prominent theory of dietary restraint postulates that emotional states of sufficient intensity of either a positive or negative valence will provoke overeating in dieting individuals. However, evidence from other areas in self-regulation indicates that positive mood states often increase self-controlled behavior. This research project was designed to investigate the effects of positive and negative mood states on chronic dieters, as this group appears to be at high risk for developing eating disorders. Female subjects were recruited from the introductory psychology subject pool at the University of Montana and administered the Revised Restraint Scale (designed to measure dietary restraint). A 2 x 3 (Restraint x Mood) factorial design was used in which 102 subjects were assessed as restrained or unrestrained eaters and assigned to one of three mood induction conditions (positive, negative, or neutral). The mood induction procedure consisted of Velten (1968) self-referent statements with somatic associations in the positive and negative mood conditions. Following the mood induction, subjects participated in an ostensible taste test which was presented as an investigation of the "effects of mood on taste". The actual measure of interest was the number of crackers eaten. A standard checklist of mood adjectives was used to verify the mood manipulation, and a repeated measures ANOVA conducted on the pre- and post-manipulation mood scores was significant. The mood manipulation was effective in the negative mood condition, while showing marginal effectiveness in the positive mood condition. A two-way ANOVA performed on the mean number of crackers eaten by subjects in each condition was significant. Mood state interacted with restraint such that among restrained eaters, negative mood resulted in increased eating, relative to unrestrained eaters in the negative mood condition. There was no difference between level of consumption for restrained eaters across the neutral and negative mood groups. Implications for revision of the current boundary model of restrained eating are discussed, as are ramifications for the treatment of eating disorders.
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CHAPTER ONE

The Effect of Mood States on Eating Behavior Among Restrained and Unrestrained Eaters

It is commonly believed that emotions, obesity, and eating disorders are intimately linked, particularly among self-help groups, lay persons and professionals with interest in eating disorders (Hollis, 1985; Stoltz, 1983). Often, individuals with weight or eating disorders are seen as eating to relieve unpleasant emotional states (Miller, O'Neil, Malcolm, & Currey, 1984) or to enhance pleasant mood states (Stoltz, 1983). For example, in one self-help book written for "destructive eaters", the author (Stoltz, 1983) writes, "we Foodaholics tend to think and act as if experiencing our emotions were bad. We seek to avoid our feelings by stuffing them down or by sedating them either with lots of food or the kinds of food that cause us to feel lethargic" (p. 153). Jeffrey and Katz (1977) noted that the overweight person often "eats to soothe away the blues" (p. 25). Many self-help behavioral weight loss guides (e.g., Jeffrey & Katz, 1977) suggest that eating records contain a record of the individual's emotional state prior to and during eating episodes, further underscoring the purported relationship between eating and emotions.

In addition, much current research has begun to focus on the relationship between eating disorders,
particularly bulimia, and affective disturbances (see Swift, Andrews, & Barklage, 1986, for a review). Katzman and Wolchik (1984) compared bulimics, binge eaters, and control subjects on a variety of dimensions, including depression. Both bulimic and binge eater groups reported significantly more depressive symptoms than controls, and the mean score for bulimics on the Beck Depression Inventory (BDI) was in the moderately depressed range ($M = 19.73$). Generally, eating disordered individuals are found to evidence more psychopathology than normal subjects, including increased anxiety and depression (Miller et. al., 1984). The link between affective instability and disordered eating patterns needs further exploration and investigation, particularly in light of some evidence which suggests that anorexia and bulimia may be novel expressions of a primary mood disturbance (e.g., Cantwell, Sturzenberger, & Burroughs, 1977; Hudson, Laffer, & Pope, 1982). The consensus, however, has generally been that depression is secondary to the eating disorder (e.g., Bruch, 1973).

The proposed research project is an attempt to further delineate and empirically substantiate some of the effects of mood states on a particular population, chronic dieters. Chronic dieters appear to be a population at high risk for developing eating disorders. Some authors (e.g., Polivy & Herman, 1985, 1987; Wardle & Bienart,
argue that dietary restraint actually provokes binge eating, the cardinal symptom of bulimia (American Psychiatric Association, 1987). The role of negative emotions in usurping a dieter's resolution and precipitating binge eating has been extensively documented (cf. Ruderman, 1986) and is also reviewed in detail in this work. However, there is a paucity of studies which explore the effects of positive mood states on eating behavior among dieting individuals. The current study endeavored to ameliorate the current lack of experimental data in this area. The current project involved inducing positive, negative and neutral moods in dieters, and it was predicted that in general, pleasant emotional states would enhance dieters' ability to restrain their eating behavior in a free-eating situation.

The review of the literature first covers the psychosomatic and stimulus-binding theories of obesity, as the effects of mood states on eating have historically been explored in obese populations. The concept of dietary restraint is introduced, and the relationship of restraint to obesity and eating disorders is briefly reviewed. The restraint literature investigating the interaction of mood and restraint status is also reviewed, and further research issues are identified.

Psychosomatic theories

The effect of mood states on eating behavior has
been explored primarily in research focused on examining the concomitants of obesity. Historically, two major theories have been forwarded in the obesity literature to explain and predict the effect of emotional states on eating behavior: The psychosomatic view and the stimulus-binding or externality hypothesis.

The psychosomatic theory postulates that overeating is a learned behavior that is most typically a means of reducing anxiety and other aversive emotional states. Accordingly, the psychosomatic theory predicts that obese persons will eat more when anxious or distressed and show greater anxiety reduction after eating than non-obese persons (Bruch, 1973; Kaplan & Kaplan, 1957). Psychodynamic formulations of obesity typically purport that obese individuals are fixated at the oral stage of psychosexual development. Fixation at the oral level, or regression to that level, is due to thwarted needs and eating to compensate for these frustrated needs. The act of overeating is viewed as indicative of intrapsychic conflict. Kaplan and Kaplan (1957) reviewed the literature on the psychosomatic concept of obesity, identifying several presumed symbolic interpretations of food (overeating), such as love, sexuality and anxiety-arousing impulses. Bliss and Branch (1960), in a psychodynamic primer on anorexia nervosa, also provide a list of the symbolisms accorded to
food, including power, evil, self-indulgence and parents. The psychodynamic factors underlying overeating, and hence obesity, appear to be nonspecific, and overeating may occur as the result of a variety of emotional conflicts.

Bruch (1961), writing from a psychodynamic perspective, provides one such example of internal conflict. She proposed that naive mothering could interrupt an infant’s normal learning about and differentiating his internal states. Essentially, an "impervious" caretaker may respond to an infant's distress, whatever the cause (hunger, fear, pain, etc.), by the feeding the child. This would lead to an infant who has a unvarying interpretation of several different bodily states and consequently confuses emotional distress with hunger, eating in response to a wide variety of internal emotional cues. Other psychodynamic formulations (e.g., Bruch, 1973) pose an essential state of deprivation or conflicted nurturance substantial enough to result in a failure to develop beyond the oral phase. Overeating, and hence obesity, is seen as an attempt to rectify a primary depressive position. Some authors have speculated that this intra-psychic structure results in depression and anxiety when obese individuals are dieting because their typical method of counteracting depressive affect, overeating, is unavailable to them (Rascovsky, de Rascovsky, & Schlossberg, 1950). However, scant evidence
is available to suggest that eating directly produces reduction of uncomfortable affect in obese individuals (Wooley & Wooley, 1981).

The psychosomatic hypothesis has been a popular belief, and some research has focused on its application as a model for understanding obesity. Anecdotal clinical case reports (see Ruderman, 1986) as well as a questionnaire study of an obese clinical population (Leon & Chamberlain, 1973) have provided some support for the psychosomatic hypothesis. White (1973) also furnished some evidence for this theory with the finding that obese subjects ate more than normal weight individuals in the presence of three different kinds of emotionally arousing stimuli (humorous, distressing, sexual), although there was no difference between the two groups' eating behavior during presentation of a neutral stimulus. McKenna (1972) found that overweight subjects ate more under high anxiety conditions than did normal weight subjects, while normal weight subjects ate less under high than low anxiety conditions, supporting the traditional psychosomatic explanation of the role of emotional cues (in this case, anxiety) in provoking eating behavior of overweight individuals. In a series of studies, Slochower (1983) found that obese persons overate when anxious, relative to normal weight controls, but only when the source of the anxiety was ambiguous and the anxiety was unmanageable.
However, other researchers have failed to find differences in levels of consumption among obese and non-obese individuals under aversive mood conditions. Work by Abramson and Wunderlich (1972) revealed no difference between obese and non-obese subjects in eating responses after being subjected to control, interpersonal anxiety or objective fear treatments. Similarly, Schachter, Goldman, and Gordon (1968) reported that obese individuals ate approximately the same amount of food when calm as when they were subjected to experimental manipulations calculated to arouse fear of electric shock. Studies such as the latter two cited have cast substantial doubt on the widespread, sole application of the psychosomatic hypothesis as the operant etiological factor in obesity. In addition, the lack of evidence to support the often-cited clinical observation that eating reduces uncomfortable affect in the obese has been problematic for psychosomatic theorists to explain (Miller et. al., 1984).

**Stimulus-Binding Theory**

The stimulus-binding, or externality, hypothesis makes quite different predictions about the influence of emotions on eating behavior. Schachter (1968; 1971; Schachter & Rodin, 1974) explicated this view, maintaining that emotional arousal is unnecessary to prompt the eating behavior of obese individuals, nor does it inhibit eating behavior in the obese as it does in normal weight.
individuals. Schachter (1968) proposed that for the obese, eating choices are influenced by the presence of external, food-related cues, such as the sight, smell and taste of food, while the eating behavior of normal weight persons is triggered by internal physiological cues, such as gastric contractions. As Schachter's theory developed, he conceptualized the differences in the behavior of obese and normal weight persons in more global terms, but only when the environmental cues were prominent and compelling. In description of this phenomenon, Schachter (1971) wrote that "it may be useful to generally characterize the obese as stimulus bound and to hypothesize that any stimulus, above a given intensity level, is more likely to evoke an appropriate response from an obese than from a normal subject" (pp. 137-138). Several researchers have found that normal weight individuals ate less in fear or anxiety conditions than in calm conditions, while obese subjects had no significant difference in eating behavior across the two conditions (Abramson & Wunderlich, 1972; McKenna, 1972; Schachter & Gross, 1968). The former finding—that normal weight individuals eat less in fearful or anxious circumstances—is predictable in that anxiety reduces gastric motility and increases blood sugar levels, subsequently reducing hunger sensations (Herman & Polivy, 1984), an internal cue to which obese persons presumably aren't responsive.
The externality hypothesis generated a great deal of research and remained a dominant explanation of obese and non-obese differences with respect to eating behavior until the late 1970's. Though Schachter's (1971) theory provoked an impressive amount of research (see Leon & Roth, 1977, for a review), the results are not all congruent with the notion of externality. A recent reviewer (Rodin, 1981) offers compelling evidence that the external-internal dimension is overly simplistic for several reasons.

First, Rodin notes that internal and external cues are interactive with and influence each other. For example, the cue of food palatability has been particularly troublesome. Originally, palatability was conceptualized as an external cue, and the finding that obese subjects varied their level of consumption more than normals in response to taste was used as support for Schachter's (1971) theory. However, it has been increasingly recognized that palatability is influenced by individual differences and the state of the individual (Spitzer & Rodin, 1981). For instance, the nutritional status (deprivation versus satiety) of the individual determines in part the palatability of sweet taste (Cabanac & Fantino, 1977). Therefore, palatability does not seem to fit conclusively into either the internal or external cue category.
Another criticism offered by Rodin is that high and low external response sets are observed among all weight categories. High external responsiveness is actually more widespread among moderately overweight groups than among normal or extremely obese groups. Pronounced external responsiveness seems to be neither a necessary nor sufficient condition for the development of obesity, although it may predict short-term weight gain in persons placed in an environment with varied and novel food cues (Rodin & Slochower, 1976). In addition, a majority of studies have found no differences in caloric intake among obese and normal weight individuals (Wooley, Wooley, & Dyrenforth, 1979), a presupposition on which the externality hypothesis is based (Rodin, 1981). The most recent work on externality (Herman, Olmstead, & Polivy, 1983) has identified both externality and compliance variables as influences on food intake among the obese, and these researchers suggest that these two factors may comprise a more generalized tendency on the part of obese individuals to seek direction for their behavior from the social and physical environment.

Restrainted and Unrestrained Eating

An alternate view of obesity was posed by Nisbett (1972) to help account for some of the discrepant findings in the externality literature. Nisbett (1972) proposed a "set point" theory of obesity, conjecturing that the
association between obesity and external cue responsiveness is an artifact of chronic deprivation in the moderately obese. He submitted that many obese persons, because of cultural and societal proclivities for thinness, are below their biologically determined set point for body weight and so are in a state of chronic hunger. It is this state of chronic deprivation which produces their sensitivity to salient external cues. Based on the notion that dieting is the key factor producing an external orientation, Herman and Mack (1975) developed the concept of restraint. They extended Nisbett's formulation and hypothesized that the correlation between external cue responsiveness and obesity was spurious and occurred because obese people were more likely to be dieting. The concept of restraint has since been elaborated, refined and extensively researched. Based on several studies involving normal weight chronic dieters (restrained eaters) versus nondieters (unrestrained eaters), Herman and Polivy (1984) developed a boundary model for the regulation of eating. According to Herman and Polivy, food intake is mediated by the balance between physiological factors prompting appetite and cognitive efforts to resist eating. Herman and Polivy term this cognitively influenced regulation of eating "restraint". The original restraint studies were designed to test Schachter and Rodin's (1974) externality
model of obesity. The results of restraint research indicate that it is not obesity per se that is associated with regulatory failures, but dietary restraint (which is presumably higher among overweight persons). Most recently the concept of externality has been used less, and the alternative model is based on a process of disinhibition of cognitive restraint on food intake (Herman & Polivy, 1984; Polivy & Herman, 1985). Dieting subjects are thought to be able to maintain restraint in the face of a small food intake (such as a taste test), but are unable to maintain control after being "forced" to consume a high calorie, diet-breaking load. Herman and Polivy (1984) refer to this effect as "counterregulation".

The typical restraint paradigm involves administering a high calorie milkshake "preload" to the subject prior to their participation in an ostensible "taste test", and the dependent measure is typically how much of the palatable food item (usually ice cream) subjects eat during the "taste test" phase. Counterregulation seems to occur as a result of cognitive, rather than physiological (e.g. increased satiety boundaries) factors. When the restrained eater (dieter) is led to believe that the preload is high calorie, greater ad lib consumption (counterregulation) is observed, regardless of whether it is actually high calorie or not. When restrained subjects are told that the preload is low calorie, regardless of
its actual caloric content, restrained eaters tend not to overindulge (Polivy, 1976; Spencer & Fremouw, 1979).

The counterregulatory effect bears some similarity to the "abstinence violation effect" described by Marlatt and Gordon (1980) in their review of relapse predictors in addictive behaviors. In this more widely applied model, the minor violation of a strict rule (e.g. a "slip") results in a cognitive appraisal of failure which heralds a motivational collapse. Similarly, this process is consistent with Bandura's (1977) self-efficacy theory, which predicts that lowered self-efficacy for compliance to internal standards often precipitates self-regulatory failure.

Herman and Polivy (1984) reason that two classes of events may serve as disinhibitors (provoking the counterregulatory response on the part of the dieter): diet boundary transgressions and imminent stressors (e.g. emotional states). Herman and Polivy refer to the former event's disinhibiting influence as the "what the hell" effect. It is as if, from the dieter's perspective, once the daily diet quota has been surpassed, there is no point in further restraint. Recently, research in the restraint literature has begun to explore anticipated, rather than actual, diet transgressions on eating, and the typical counterregulatory effect has been found in these studies (Ruderman, Belzer, & Halperin, 1985; Tomarken &
Restraint and Obesity

Although the concept of dietary restraint was originally intended to investigate Schachter's (1971) externality model of obesity, some research indicates that uniform levels of restraint among normal weight and obese individuals produce differences in eating behavior. Ruderman and Wilson (1979) have questioned whether restraint accounts for the eating behavior of obese subjects, as most restraint studies have included only normal weight or minimally overweight subjects. Based on a replication of the standard "preload" design, and reanalysis of two earlier studies, they concluded that, for the obese, restraint did not predict disinhibited eating as it did for normal weight restrained eaters. Obese restrained eaters ate the same amount regardless of whether or not they had been preloaded. The meaning of this finding is unclear; however, as some authors have suggested, it may indicate that obese restrained eaters are less hungry as they are presumably closer to their set point for weight (Ruderman & Wilson, 1979; Wooley & Wooley, 1981), congruent with the boundary model. Alternatively, it may indicate that obese restrained subjects preserve more control in the face of normally diet disrupting circumstances than do normal weight restrained eaters.
Some researchers have also questioned the validity of the Restraint Scale when used with overweight populations, as obese subjects invariably produce higher scores on the Weight Fluctuation factor of the scale. Ruderman (1983; Ruderman & Christensen, 1983) has argued that weight fluctuations are a artifact of greater body mass, subsequently artificially raising the total restraint scores of obese individuals. For this reason, Ruderman (1983) advised other researchers to use only normal weight restrained subjects unless overweight was an additional variable of interest.

**Dietary Restraint and Eating Disorders**

Dietary restraint has been studied almost exclusively in women, and its implication in understanding eating disorders is beginning to be conceptualized and explored (Herman & Polivy, 1984; Polivy & Herman, 1985; Ruderman & Grace, 1987). The relationship of bulimia to restraint has been conceptualized by Herman and Polivy (1984) in terms of their boundary model of food regulation. Herman and Polivy propose that the dieter imposes a "diet boundary" upon herself, and transgressions of this boundary lead to disinhibited eating. They proposed that the dieter (restrained eater) and bulimic (referred to here as a "binge eater") differ from each other primarily in that the dieter responds to physiological satiety boundaries. Herman and Polivy (1984) indicate that
restrained eaters,

... even when engaged in a bout of caloric abandon, are nevertheless still constrained, as we have seen, by the pressures of satiety. They regulate at the satiety boundary, and they experience the aversive consequences of overindulgence as sufficiently unpleasant to prevent any major transgression of the boundary. Not so the binger. The binger, for whatever psychodynamically complex reasons she may have, does transgress the satiety boundary. . . . what is most notable about bingers at the behavioral level is their apparent willingness to tolerate the discomfort of the upper aversive zone in their quest for whatever it is that eating does for them (pp. 153-154).

Herman and Polivy also compare the chronic dieter and the anorexic individual, noting that the restrained eater does not make regular forays in the aversive states below hunger or above satiety.

More recently, however, Polivy and Herman (1985) have begun to view disordered eating as occurring on a spectrum, and argue that dietary restraint causes binging eating, and subsequently increases the probability of an individual developing an eating disorder. Polivy and Herman (1985) note that diets which severely restrict caloric intake reduce the basal metabolic rate (BMR), resulting in slowed weight loss. When normal food intake is resumed, the BMR remains static for a period of time, so that even normal eating may result in weight gain. These physiological changes, in tandem with the psychological effects of dieting (e.g. having "denied"
oneself preferred foods), may trigger overeating. Indeed, it is frequently reported that the onset of bulimia often follows a period of extended dieting.

In a retrospective study of 50 bulimic patients, Lacey, Coker, and Birthnell (1986) found that in 74% of the patients, the circumstances immediately preceding the onset of bulimic symptoms included the inability to maintain a low carbohydrate diet, leading to "carbohydrate craving" and eventually binging and purging. Similarly, Smead (1984) found that chronic dieting constituted a risk factor for both bulimia and anorexia nervosa. Striegel-Moore, Silberstein, and Rodin (1986), in an extensive review of risk factors for bulimia, discuss the role of dieting in disinhibited eating and subsequent development of an eating disorder.

As might be expected, Ruderman and Grace (1987) found bulimia, as measured by the Bulimia Test (Smith & Thelen, 1984), to be significantly related to restraint scores ($r = .586, p < .001$). Similarly, Johnson and his colleagues (Johnson, Corrigan, Crusco, & Schlundt, 1986) found no difference in mean restraint scores between bulimics and obese dieters. In addition, some evidence suggests that anorexia nervosa, defined by a severely restricted chronic dieting pattern and consequent emaciation (American Psychiatric Association, 1987), occurs on a continuum of severity (Garner, Olmstead, &
Restrained eaters are most often seen as laboratory analogues of eating disordered individuals, and it is quite likely that samples of restrained eaters from college populations include a reasonably high percentage of eating disordered persons (Wardle, 1987). Research findings from dietary restraint studies are considered to be relevant in furthering understanding eating disorders by most researchers in the field (Polivy & Herman, 1985; Wardle, 1987).

Restrained Eaters and Emotion

As previously discussed, the role of emotional states in precipitating overeating in the obese has been the subject of several investigations, yielding mixed and inconclusive results (Wooley & Wooley, 1981). As Herman and Mack (1975) reason, this may be because a majority of the obese, though not all, are dieting (i.e. restrained eaters). The fact that dieting habits were not typically controlled for in these studies may account for the discrepant results reported across studies examining the influence of mood states on obese individuals (Baucom & Aiken, 1981).

Emotional responsiveness among restrained eaters has received some attention by researchers. Polivy, Herman, and Warsh (1978) compared the affective responses of dieters and nondieters to a series of projected slides,
both with and without the administration of caffeine. Dieters, like the obese in previous work (Pliner, Meyer, & Blankstein, 1974), were more extreme emotional responders. When subjects were given an internal source for arousal (caffeine), nondieters became more emotional and dieters less so. Polivy and her associates discuss their findings with regard to the hyperarousal hypothesis tentatively associated with obesity, extrapolating that set of findings to restrained eaters. However, the hyperarousability construct does not lend itself well to predicting inhibited emotionality by dieters with the use of caffeine, and Polivy et. al. (1978) discuss this finding in terms of Schachter and Singer's (1962) "external/internal" theory of emotion. Consistent with this theory, Polivy et. al. suggest that restrained eaters are more likely to seek causal explanations for their arousal (emotions), either internal or external (depending on the availability of a likely label), and make attributions about their internal state on that basis.

Other researchers have directly explored the impact of mood states on eating behavior among restrained and unrestrained eaters. Some correlational, self-report and retrospective data are available on the relationship of emotions and eating among dieting and overweight subjects. Relying on self-report data, Polivy and Herman (1976a) found that among a clinically depressed population,
restrained eaters reported weight gain when depressed while unrestrained eaters lost weight. Lingsweiler, Crowther, and Stephens (1987) investigated daily mood fluctuations during eating in normal and overweight "binge eaters". Results indicated that both overweight and normal weight binge eaters experienced more negative mood states prior to and during binge eating episodes relative to nonbinge eating episodes. This is consistent with restraint theory's disinhibition hypothesis, as binge eaters are typically restrained eaters, particularly if obese (Marcus, Wing, & Lamparski, 1985). Bowskill and Cooper (1986) conducted three naturalistic studies to investigate the effect of dysphoric mood states on eating behavior. Dysphoric mood and overeating were associated in a group of bulimic patients and currently dieting restrained eaters. However, there seemed to be little association between dysphoric mood and overeating for restrained eaters who were not currently on a weight loss diet.

Several studies have experimentally manipulated emotional states via mood induction procedures to examine the influence of dysphoric, depressed or anxious mood states on restrained and unrestrained eaters. Herman and Polivy (1975) contrasted two levels of negative affect (low versus high anxiety) among restrained and unrestrained eaters and failed to find the predicted
counterregulatory effect among restrained eaters.

Baucom and Aiken (1981) experimentally induced a depressed mood in dieting and nondieting subjects via forced failure on an insoluble concept formation task, finding that, as Restraint theory would predict, restrained eaters ate more when depressed while unrestrained eaters ate less. Similarly, Frost and his colleagues (Frost, Goolkasian, Ely, & Blanchard, 1982) induced depressed mood states in restrained and unrestrained eaters using a series of self-referent statements which became progressively more negative (to induce a depressed mood state) or positive (to induce an elated mood state) (from Veltman, 1968). During the mood induction procedure, M & M candies and crackers were available for the subjects to freely eat. High restraint individuals ate more when in a depressed mood than in an elated mood, and more than low restraint subjects in a depressed mood, as predicted by Herman and Polivy's (1984) hypotheses.

More recently, Ruderman (1985a) induced a dysphoric mood in subjects using Baucom and Aiken's (1981) insoluble concept formation task. Restrained eaters again ate more when in a dysphoric mood than when not in such a mood, while unrestrained subjects ate similar amounts in both conditions. Ruderman chose to label the mood induced by the failure experience as dysphoric because of the
difficulty associated with inducing specifically identifiable mood states in a laboratory setting. Anxiety, depression and hostility often covary and manipulations intended to produce one emotion may produce all three of these emotions (Polivy, 1981). The related literature on the impact of mood on restrained eaters' food intake is examined here given this caveat on the part of Ruderman.

Wardle and Beales (1988) experimentally manipulated restraint by assigning obese female subjects to a diet group (high restraint), an exercise group (low restraint) or a control group for a 7-week treatment period. The incidental food intake of all subjects was measured while they watched a stressful film, and experimentally restrained subjects (dieters) exhibited the typical counterregulatory effect.

Herman, Polivy, Lank, and Heatherton (1987) had restrained and unrestrained subjects serve in an experiment under the guise of a market research study. Embedded within the market research paradigm was an experimental manipulation of anxiety (high versus low). They also added hunger as a variable by instructing subjects not to eat for four hours prior to the experiment and administering a preload to one-half of the subjects. Subjects' compliance with this request was assessed by having them complete a brief questionnaire reporting
their current hunger level and the time they had last eaten. Their results indicated that for restrained subjects, anxiety resulted in increased eating only when the subject was initially hungry. This result was consistent with previous findings; however, the preliminary analysis of variance (Anxiety x Restraint) yielded nonsignificant results, due to variability in reported anxiety levels within the two anxiety conditions. It was necessary to make a posthoc regrouping of subjects according to their reported anxiety level. Herman et. al. (1987) acknowledge the relative weakness of their anxiety manipulation in producing the desired effect, and discuss the ethical difficulties inherent in traditional attempts to produce anxiety (e.g., threat of electric shock, threat of blood, urine, or stool sampling). Further support for the ineffectiveness of the anxiety manipulation seems evident in that restrained eaters did not differ from unrestrained eaters in level of reported anxiety, somewhat in contrast to the finding that restrained eaters are more extreme emotional responders (Polivy et. al., 1978).

A second problem with Herman et. al.'s study concerns the timing of the administration of the restraint measure, the Revised Restraint Scale (RRS) (Herman, Polivy, Pliner, Therkeld, & Munic, 1978). Individuals vary in the amount of restraint they exercise, and individual levels are assessed by the 10-item scale (shown in Appendix A).
Factor analytic studies of the RRS have yielded two distinct factors which comprise the scale, the Concern with Dieting (CD) factor and the Weight Fluctuation (WF) factor (Blanchard & Frost, 1983; Ruderman, 1983). Generally speaking, the CD factor appears to be most associated with the cognitive elements of restraint, the topic of interest in the disinhibition phenomenon (Heatherton, Herman, Polivy, King, & McGree, 1988). The RRS was given to subjects after the experiment had been completed (just prior to debriefing). According to Self-Perception theory (Bem, 1972), individuals come to "know" their internal attitudes and states partially by inferring them from observations of their own overt behavior. It may be that subjects in Herman et. al.'s (1987) study inferred their concern with dieting from their behavior in the experimental situation. For instance, a normally unrestrained eater may respond to the RRS question "How conscious are you of what you are eating?" by reflecting on their behavior in the experimental session (e.g. eating a lot of ice cream) and make some inferences about their normal awareness level from that limited behavioral sample.

Alternatively, heavily eating subjects' concern with dieting may have been activated by their observation of their behavior in the experimental situation. Some evidence suggests that the construct of restraint is a
relative rather than absolute phenomenon; that is, some degree of restraint, or potential for restraint, may exist in all persons. Using a anticipated consumption manipulation (anticipating a very high or low calorie dinner) and a taste test dependent measure (after a uniform preload), Tomarken and Kirschenbaum (1984) found that unrestrained eaters (nondieters) ate more food in the taste test when anticipating a high calorie meal. Tomarken and Kirschenbaum concluded that the restraint dimension is more continuous than dichotomous, and that unrestrained eaters may simply have a higher threshold for exhibiting the counterregulatory response than restrained eaters. Those subjects that ate more in Herman et. al.'s (1987) study may simply have reached their threshold for counterregulation and invoked some degree of cognitive restraint prior to their responding to the RRS. Restraint is theoretically a function of dieting (Polivy & Herman, 1985) and can be manipulated experimentally (Wardle & Beales, 1988), suggesting that it is more of a state (situational variable) than a trait (stable variable). This lends support to the alternative explanation that the heavily restrained eating subjects in Herman et. al.'s study could have had their concern with dieting activated as an unintended result of the experimental situation. However, the amounts of ice cream consumed (120-220 grams or 4.2-7.7 ounces) would not seem to indicate that
normally unrestrained eaters would have hit their "threshold" for counterregulation.

Restraint and Emotion: Further Research Issues

Several other issues need to be addressed in the further study of restraint and emotion; two such issues are briefly reviewed here. The role of positive affect, and the need for effective and ethical mood induction procedures are discussed, and improvements over previous studies exploring the interaction of mood and restraint are identified.

The Role of Positive Mood States. The impact of positive affective states on restrained and unrestrained eaters has remained largely unexplored in the restraint literature (Ruderman, 1986). Although several studies induced at least a mild degree of positive affect in subjects (Baucom & Aiken, 1981; Frost et. al., 1982; Ruderman, 1985a), no study has compared the effect of positive affect to a baseline neutral mood condition to determine whether elevated mood increases control and decreases disinhibited eating among restrained eaters. In these studies, restrained eaters ate less when induced into a mildly elevated mood than they did in the negative affect conditions. However, whether positive affect increases self-regulation and decreases eating among restrained eaters has not been established. Herman and Polivy (1984) argue that powerful emotional states of
either valence provoke the counterregulatory response on the part of the restrained eater (Ruderman, 1986).

Contrary to Herman and Polivy's (1984) boundary model, some research suggests that induced positive moods facilitate children's self-regulated behavior while negative moods disrupt self-regulated behavior, relative to control subjects (Fry, 1977). Kirschenbaum, Tomarken and Humphrey (1985) reported that positive affect increased self-regulated behavior in adults involved in problem solving tasks. Regarding eating, Mayo (1978) found that positive mood states and self-confidence predicted successful weight loss among overweight women in a behavioral weight loss program. Similarly, Polivy, Heatherton and Herman (1988) recently found that high self-esteem among restrained eaters negated the disinhibiting effect of a milkshake preload.

Problems in Mood Induction Procedures. A second area of concern in the restraint and emotions literature concerns the difficulty of inducing discrete emotional states in the laboratory (Polivy, 1981), as well as the ethical problems inherent in designing effective mood induction procedures (Herman et. al., 1987). Frost, Graf and Becker (1979) used a Velten (1968) mood induction procedure that consisted of self-referent statements focussed on the somatic dimension of depression (e.g. fatigue, sleepiness). They found that somatic self-
statements led to more depressed moods compared to self-referent statements that focussed solely on self-depreciation (e.g. "I am discouraged and unhappy about myself"). Similarly, Kirschenbaum, Tomarken and Humphrey (1985) found that Velten positive somatic inductions (e.g. "I'm full of energy") enhanced both mood and self-regulation (performance) in solving difficult math problems, relative to positive self-evaluation (e.g. "I know I've got what it takes to succeed"), neutral, negative somatic and negative self-evaluation induction procedures. Clearly, utilization of positive and negative somatic self-referent Velten statements produces a pronounced mood state and has implications for self-regulatory behaviors such as restraint. However, this procedure has not been applied to restrained eaters in the restraint and emotions literature, and may solve some of the problems associated with ineffective manipulations (Herman et. al., 1987) and nonspecific mood inductions (Polivy, 1981; Ruderman, 1985a).

**Purpose and Hypotheses**

In summary, no studies have explored the effect of positive mood states, relative to a neutral baseline mood, on the eating behavior of restrained eaters. In addition, effective and ethical mood induction procedures are not typically used in the restraint literature. Thus, the present study sought to address some of these issues. The
current study proposed to assess the relationship among two variables in examining the influence of affective states in producing disinhibition and counterregulatory eating behavior among restrained eaters and unrestrained eaters under uniform conditions of hunger (food deprivation). A 3 x 2 factorial between subjects design was used, and the examined variables were induced mood (positive somatic versus neutral versus negative somatic) and restraint (restrained versus unrestrained eaters). It was predicted that negative mood would result in greater disinhibited eating among restrained eaters than unrestrained eaters. Neutral mood was anticipated to result in no differences in level of consumption between restrained and unrestrained eaters. In the positive mood condition, restrained eaters were predicted to eat less than their unrestrained counterparts. For restrained eaters, the lowest consumption was expected to be found under positive mood conditions and the highest consumption was expected to be observed in the negative mood condition, with the neutral mood resulting in a consumption level between the two. For unrestrained eaters, depressed mood was expected to result in suppressed eating relative to the neutral mood condition, and elated mood was expected to cause their consumption to increase relative to the neutral mood condition.
CHAPTER 2
Method

Overview

Female subjects were recruited from the Psychology 110 subject pool at the University of Montana. Subjects were administered the Restraint Scale prior to their participation in the study in a screening session during the first week of the quarter in introductory psychology classes. Subjects were weighed and measured and only those individuals whose weight fell within 20% of ideal weight based on the Metropolitan Life Insurance Company (1959) norms for desirable weights for women were used. These norms are reproduced in Appendix B. Significantly overweight or obese subjects were not be used because previous research has indicated that the use of the Restraint Scale is questionable in an overweight population (Ruderman & Christensen, 1983; Ruderman, 1983). Subjects were randomly assigned to negative, neutral and positive mood conditions and classified as restrained or unrestrained eaters on the basis of their scores on the RRS. The number of three different varieties of crackers consumed ad lib served as the dependent measure and was assessed in an ostensible market research project exploring the effects of mood on taste. Subjects participated in one of the three mood
manipulation conditions. A check on the mood manipulation was used to allow for post-hoc regrouping of subjects on the basis of self-reported mood if necessary.

**Subjects**

Subjects were 102 (17 subjects per treatment cell) female undergraduate students at the University of Montana who received experimental credit for their undergraduate psychology class. Subjects were tested individually by female experimenters blind to their treatment condition and restraint status. All subjects were instructed not to eat for two hours prior to participating in the experiment, because the study ostensibly involved the sense of taste.

**Measures**

**Revised Restraint Scale (RRS).** In normal weight samples this measure has been found to be both reliable and valid (Herman et. al., 1978). Test-retest reliability over a one week period for the original scale was .93 (Kickham & Gayton, 1977). Ruderman (1983) reported an alpha coefficient, a measure of internal consistency, of .86 in a normal weight sample. Herman and Polivy (1980) review the RRS's successful prediction of the eating behavior of normal weight individuals in a variety of situations. Subjects were classified as restrained and unrestrained eaters on the basis of a split-half median procedure, with those falling below 15 being designated
unrestrained subjects and those scoring above 15 labeled restrained subjects. This instrument is reproduced, along with its scoring key, in Appendix A. Scores for both factors identified in factor analytic studies (the Concern with Dieting [CD] factor and the Weight Fluctuation [WF] factor) (see Heatherton et. al., 1988, for a review) were also calculated.

Multiple Affect Adjective Checklist (MAACL). The MAACL (Zuckerman & Lubin, 1965) served as the check on the mood manipulation. This instrument is reproduced, along with the written instructions given to subjects, in Appendix C. The MAACL contains three subscales tapping the mood states of depression, anxiety, and hostility. Subjects were administered the MAACL twice: once prior to the mood manipulation and once afterward, and the within subject changes from pre- to post-manipulation were used in the data analysis. Subjects responded to 131 adjectives by checking each mood adjective which corresponds with how they feel "right now". Strickland, Hale, and Anderson (1975) used Velten's (1968) mood induction technique to induce depression in their subjects and measured affective changes using the MAACL, finding that their depressed subjects reported more depressed mood on the MAACL relative to controls. Zuckerman, Lubin, Vogel, and Valerius (1964) used the MAACL to measure responses to several situations (e.g., stressful film,
"surprise exam", and induced failure), finding that although the MAACL often lacked descriminative validity across the three subscales (anxiety, depression, and hostility), the scales did show sensitivity to affect inducing situations and were differentially sensitive in some situations.

**Affect Induction Procedure** (Velten, 1968). The three mood induction conditions followed previously described procedures (Frost et. al., 1979; Kirschenbaum et. al., 1985). The Velten statements used are attached in Appendix D. Two of Frost et. al.'s (1979) groups were replicated. The neutral group received neutral Velten statements (e.g. "Many states provide milk for grammar school children"), while the negative somatic group received statements associated with lethargy, fatigue and sleepiness, such as "I can feel my body sagging when I walk". For the remaining group (positive somatic mood), the statements developed by Kirschenbaum et. al. (1985) constituted 7 of the statements and the remaining 38 were Velten "elation" statements. The positive somatic statements were the converse of the negative somatic condition and pertained to physical sensations associated with elation, invigoration, and feeling refreshed (e.g. "I feel a great surge of vitality welling up inside of me"). In all cases, subjects received a total of 45 self-referent statements presented individually. Subjects used
headphones to listen to taped recordings of the mood induction statements (from Miranda & Persons, 1988). Subjects were asked to feel each statement as intensely as possible and to remember past events in their lives when they felt similar emotions.

Procedure

Two hundred and three female students enrolled in introductory psychology at the University of Montana during Winter quarter 1989 were administered the Revised Restraint Scale (Appendix A) and a brief form eliciting their name and phone number during the first week of classes in an experimental screening period. Subjects whose self-reported weight and height indicated they were over 20% overweight, whose Restraint scores fell on the median (15), or who did not provide sufficient information for contact were eliminated from this initial pool. A split-half median procedure was conducted on scores on the Revised Restraint Scale, with the median score falling at 15. Fifty-eight restrained and fifty-four unrestrained subjects were contacted by phone and agreed to participate in a study investigating the "effects of mood on taste perception".

Upon arrival, subjects were greeted by a female experimenter who had subjects read and sign an informed consent form (Appendix F. See also Institutional Review Board Proposal, Appendix G). Subjects were then
administered a brief questionnaire detailing when and what they had last eaten, as well as having them rate their current hunger level on a 7-point Likert scale (Appendix H, from Preston, 1982). Subjects were then informed that they were participating in a research project to test the effect of mood on taste. They were asked not to reveal their particular mood induction condition to the experimenter. A complete text of the experimenters' script can be found in Appendix I.

The subjects were then informed of the study's ostensible goal: to obtain prospective consumers' opinions, under varying mood conditions, in a setting where they would not be influenced by marketing "gimmicks" such as advertisements, packaging, etc. At this point, subjects in all conditions received the MAACL (Appendix C), and were told that mood can affect subjective ratings of taste. In addition, the experimenter explained that this information would be valuable in her market research because advertising typically involves the manipulation of people's emotions.

After the administration of the MAACL, the mood manipulation procedure was introduced. Subjects were assigned consecutively to one of the three mood induction procedures, and the experimenter remained blind to each subject's mood and restraint condition. Subjects accompanied the experimenter to a separate room. The
experimenter instructed subjects to listen to the tape provided, and to try carefully to concentrate upon each statement. A second MAACL questionnaire was on a desk in the room and subjects were instructed to fill out the questionnaire immediately after the tape had ended. The subject was instructed to leave the room after completing the requisite tasks to participate in the "taste test" portion of the study.

Upon the subject's return to the original experimental room, all subjects were treated identically. The experimenter explained that the study was concerned with people's sensitivity and liking for different kinds of tastes, and presented the subject with three bowls of crackers labeled Type A, Type B and Type C, consisting of three types of commercially available crackers. The subject was told that she had 10 minutes to taste and rate the three types of crackers on three separate questionnaires. The taste rating questionnaires (see Appendix J) were brief enough so that subjects could easily complete them and eat more crackers in the 10 minutes before they expected the experimenter to return. Subjects were instructed to taste the crackers in a specified order -- first Type B, then Type C, and Type A, ostensibly in order to control for the effects of one taste on another. Each bowl contained 60 crackers. The experimenter stressed that the subject needed to complete
rating one cracker type before continuing on to the next cracker. Also, the subject was told that after she had made all the ratings, she could help herself to any of the remaining crackers, but that she should not change her initial ratings. The experimenter then left the room for 10 minutes. Upon returning, the experimenter gave the subject a postexperimental questionnaire (Appendix K), which asked the subject what she thought the purpose of the study was, and whether all of her questions had been answered adequately. Finally, subjects were questioned to determine whether they had any suspicions or prior knowledge of the study. They were fully debriefed and asked not to discuss the experiment. An outline of the debriefing is contained in Appendix L. All subjects received 20 positive Velten statements on 3" x 5" cards with the same instructional set as the original mood induction to counteract any lingering effects of the negative mood manipulation. Prior to dismissing the subject, the experimenter weighed and measured each subject on a standard balance scale. In addition, a pair of calipers was used to measure the distance between the two prominent bones on the elbow in order to determine frame size of each subject (Christian & Greger, 1985). After dismissing the subject, the experimenter counted and recorded the number of remaining crackers in each bowl, then added the number of crackers consumed from each bowl.
in preparation for the next subject. The number of crackers eaten by each subject was calculated for use in the data analysis.
CHAPTER 3
Results

A total of 203 subjects from the introductory psychology subject pool at the University of Montana were screened. Forty-one subjects were screened out on the basis of their RRS scores falling on the median (15), a percentage of overweight that deviated more than 20% from the midpoint of their desirable weight, or supplying inadequate information for contact. Of the remaining subjects, 112 individuals were contacted by phone, agreed to participate in the study, and were ultimately participants in the study. Two subjects were dropped from the data analysis because their percentage overweight exceeded the maximum allowed by the study. An additional subject was dropped because she verbalized substantial suspicions about the study in the debriefing interview. Seven additional subjects were dropped, at random, to balance the number of subjects in each cell. Data analyses were performed on the remaining 102 subjects' data, with 17 subjects in each of the six conditions.

Subject characteristics

Restraint scores of study participants ranged from 0 to 27, with a mean of 14.62 and a standard deviation of 6.0.
Subjects ranged in age from 17 to 44 years old, with a mean of 21.3. Subjects ranged from -14.4% to 20% overweight, with a mean percentage overweight of 4.7. Overall, subjects had an average score on the CD factor of the RRS of 8.59, with a standard deviation of 2.65. On the WF factor of RRS, the mean score was 6.03, with a standard deviation of 2.61. There was no significant difference between the age of restrained (M = 22.1) and unrestrained subjects (M = 20.4; \( t (100) = -1.63, p > .05 \)). Further, there were no differences in the hunger ratings of restrained (M = 3.73) and unrestrained subjects (M = 3.77; \( t (100) = .03, p > .05 \)), nor in the hours of food deprivation reported by restrained (M = 7.55) and unrestrained subjects (M = 7.06; \( t (100) = -.46, p > .05 \)). However, subjects did differ with respect to percentage overweight; restrained subjects (M = 8.2) were significantly more overweight than unrestrained subjects (M = 2.4; \( t (100) = 3.17, p < .05 \)). There was no difference between subjects on the discrepancy between their self-reported and actual weight; both restrained (M = 8.25) and unrestrained subjects (M = 7.81; \( t (100) = .29, p > .05 \)) had an equivalent tendency to underestimate their weight.

As expected, restrained subjects had significantly higher scores on the CD factor of the RRS (M = 11.55; \( t (100) = 11.31, p < .001 \)) than did unrestrained subjects (}
M = 5.63). Restrained subjects also had higher WF (M = 8.06; t (100) = 7.93, p < .001) and total RRS scores (M = 19.61, t (100) = 15.24, p < .001) than did unrestrained subjects (WF: M = 4.00; RRS: M = 9.63). Subject characteristics are summarized in Table 1.

Insert Table 1 about here

Manipulation check

To determine whether the mood induction procedure affected subjects' mood, one-way analyses of variance (ANOVAS) were conducted across the three mood induction groups on the pre- and post-manipulation difference scores on each of the three subscales of the MAACL, Anxiety, Hostility, and Depression. All three of these analyses were significant, with subjects in the negative mood induction group reporting greater increases in anxiety, F(2,99) = 7.98, p < .001; depression, F(2,99) = 19.05, p < .001; and hostility, F(2,99) = 12.39, p < .001. Subsequent pairwise comparisons by Tukey's HSD test (Tukey, 1953, cited in Ott, 1984), revealed that for the Depression subscale, all three mean mood change scores (post-pre) were significantly different from each other, indicating that the three mood induction conditions had all induced different amount of mood change in subjects. For the Anxiety subscale, all three mean mood change
scores were also significantly different from each other, indicating that the three mood conditions had all induced different amounts of mood change in subjects. On the Hostility subscale, the mean mood difference scores in the negative mood condition differed significantly from the means in the neutral and positive mood conditions, although the latter did not differ significantly from each other. As a whole, these results verify the effectiveness of the mood manipulation, and the negative mood induction in particular. The mean mood change scores on each of the MAACL subscales across the three mood conditions are displayed in Table 2.

Insert Table 2 about here

In order to emphasize post manipulation differences, one-way analyses were also conducted across the three mood induction groups using only the post-test scores of each of the three MAACL subscales. This analysis and the first one are partially redundant, but the emphasis may be useful. All three of these analyses were significant, with subjects in the negative mood induction group reporting more depression ($F(2,99) = 22.35, p < .001$), anxiety ($F(2,99) = 6.63, p < .01$), and hostility ($F(2,99) = 7.24, p < .001$). Pairwise comparisons by Tukey's HSD test indicated that for all three MAACL subscales, the
negative mood condition resulted in post-test mood scores that were significantly different from the positive and neutral mood conditions, although on none of three MAACL subscales did the positive and neutral mood conditions result in significantly different mean post-test mood scores. These findings indicate that the mood induction procedure was most effective in inducing a negative mood state, and relatively ineffective in inducing a positive mood state that was significantly different from the neutral mood condition. Mean post-test mood scores by subscale are displayed in Table 3.

Insert Table 3 about here

To determine whether level of restraint influenced subjects' reactions to the mood manipulation, three repeated measures 3 x 2 x 2 (Mood x Restraint x Time) ANOVAS were conducted on the pre- and post-manipulation scores of each of the three MAACL subscales (Anxiety, Hostility, Depression). Again, there is some redundancy between this analysis and previous two, but it is hoped that it provides an emphasis the other two do not. For the Depression subscale, no significant main effect was found for restraint ($F(1,96) = .2$, $p > .05$), indicating that Depression subscale scores were not related to level of restraint. Significant main effects were found for
mood condition ($F(2,96) = 10.8, p < .05$), and time ($F(1,96) = 32.95, p < .05$), indicating Depression subscale scores varied as a result of mood condition as well as time. Significant interactions of Restraint x Time ($F(1,96) = 5.84, p < .05$), Mood condition x Time ($F(2,96) = 21.06, p < .05$), and Restraint status x Mood Condition x Time ($F(2,96) = 3.83, p < .05$) were also noted. The analysis of variance table is displayed in Table 4. Because the highest order interaction was significant, only it will be interpreted.

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Insert Table 4 about here

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Figures 1-3 depict the change in depression subscale scores for each of the three mood conditions for restrained and unrestrained subjects as a function of time. Post hoc analyses (Tukey's HSD test) showed that restrained subjects' Depression scores in the Negative mood condition did not change significantly from pre to post-testing, though the change was in the predicted direction. Unrestrained subjects, on the other hand, showed a significant shift in Depression scores from pre to post-testing in the Negative mood condition. None of
the remaining means differed significantly from each other. Mean Depression subscale scores, by Restraint status, Mood condition, and Time, are displayed in Table 5.

Insert Table 5 about here

For the Anxiety subscale, time exerted a significant main effect ($F(1,96) = 4.21, p < .05$), indicating that anxiety scores changed over time. In addition, the Restraint x Time factor yielded a significant interaction effect ($F(1,96) = 9.988, p < .05$), showing that restrained and unrestrained subjects scored differently across time. The Mood condition x Time factor also resulted in a significant interaction ($F(2,96) = 8.95, p < .05$), indicating that Anxiety subscale scores changed in different amounts across the three Mood condition groups. The analysis of variance table is shown in Table 6. Post hoc analyses (Tukey's HSD test) of the Restraint x Time interaction showed that restrained and unrestrained eaters differed in their pre-test Anxiety subscale scores, with restrained subjects reporting more initial anxiety than unrestrained eaters. This interaction is depicted in

Insert Table 6 about here

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Figure 4.

Insert Figure 4 about here

Mean Anxiety subscale scores by time and restraint status are displayed in Table 7.

Insert Table 7 about here

Post hoc analyses, by Tukey's HSD test, of the Mood condition x Time interaction, indicated that the mean Post-test Anxiety subscale score in the Negative mood condition was significantly different from all other means. These means are displayed in Table 8. The Mood condition x Time interaction is shown in Figure 5.

Insert Table 8 about here

Insert Figure 5 about here

For the Hostility subscale, Mood condition exerted a significant main effect ($F(2,96) = 3.46, p < .05$), as did time ($F(1,96) = 29.59, p < .05$). In addition, Mood condition x Time yielded a significant interaction effect ($F(2,96) = 12.44, p < .05$), indicating that Hostility
subscale scores changed in different amounts across the three Mood condition groups over time. The analysis of variance table is displayed in Table 9.

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Insert Table 9 about here

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Post hoc analyses (Tukey's HSD test) of the Mood condition x Time interaction, depicted in Figure 6, showed that the mean Post-test Hostility scores in the Negative mood condition differed significantly from all other means. The means are displayed in Table 10.

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Insert Figure 6 about here

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Insert Table 10 about here

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None of the Restraint x Mood interactions were significant for any of the three repeated measure ANOVAS, indicating that mood condition and restraint status did not interact in producing the different response on the Depression subscale to the Negative mood condition between restrained and unrestrained subjects. Taken together, these results verify the effectiveness of the Negative mood manipulation, which produced significantly more hostility, depression, and anxiety in subjects than either the
Positive or Neutral mood conditions. However, these results do not support the effectiveness of the Positive mood manipulation.

**Food Consumption**

The mean number of crackers consumed by each group is displayed in Table II. The restrained-negative group ate an average of 13.83 crackers, the restrained-neutral 10.62, and the restrained-positive 7.76 crackers. Among unrestrained eaters, those in the negative group ate an average of 9.72 crackers, while the unrestrained-neutral group averaged 8.73, and the restrained-positive 9.22 crackers.

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**Insert Table II about here**

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An initial two-way analysis of variance (ANOVA) (Restraint x Mood) performed on the mean number of crackers eaten by subjects in each of the six conditions was significant, yielding a significant main effect for restraint ($F(1,96) = 4.52, p < .05$), and mood ($F(2,96) = 4.39, p < .05$). The analysis also revealed a significant interaction for Restraint x Mood ($F(2,96) = 4.57, p < .05$). This interaction is depicted in Figure 7.

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**Insert Figure 7 about here**

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Subsequent multiple comparisons, using Tukey's HSD test, indicated that the Restrained-Negative group ate more crackers than any other group, except for the Restrained-Neutral group. None of the remaining means differed significantly from each other. Since restrained and unrestrained subjects differed in mean percentage overweight, these results must be interpreted cautiously, as percentage overweight may have played a role in determining these differences. Analyses of variance using mood condition and CD or WF as factors were not possible because of unequal cell sizes and heterogenous variance across groups.

Regression Analyses

Univariate regression analyses were performed on the number of crackers eaten to determine which variables most accurately predicted level of consumption. Irrespective of mood condition, cracker consumption was predicted from total restraint scores (R-sq(adjusted) = 3.6%, $F(1,100) = 4.74$, $p < .05$), and the Weight Fluctuation (WF) factor of the RRS (R-sq(adjusted) = 4.8%, $F(1,100) = 6.1$, $p < .05$), though not by the Concern with Dieting (CD) factor ($F(1,100) = 1.54$, $p > .05$). The addition of other predictor variables did not enhance the predictive capability of any of the regression equations, with the exception of the Depression subscale difference score, which resulted in a slight increase in the $R^2$ squared.
(adjusted) when associated with the WF factor ($F(2,99) = 4.93, p < .05$), accounting for some 7.2% of the total variance.

Three regression analyses were conducted for each of the three Mood Induction groups (Positive, Negative, Neutral) to determine which variables predicted cracker consumption in each mood induction condition. For the neutral mood condition, the most powerful predictor of number of crackers eaten was the subject's percentage of overweight, $F(1,32) = 11.2, p < .05$, accounting for some 23.6% of the variance. Restraint scores also predicted cracker consumption in the neutral mood condition, $R^2(adjusted) = 12.6%, F(1,32) = 5.74, p < .05$, as did scores on the Weight Fluctuation (WF) factor of the RRS, $R^2(adjusted) = 10.3%, F(1,32) = 4.8, p < .05$.

In the Negative mood condition, total cracker consumption was predicted by restraint scores ($R^2(adjusted) = 6.9%, F(1,32) = 4.74, p < .05$), and the $R^2$ squared (Adjusted) was increased substantially when percentage overweight was added to the regression equation ($F(2,31) = 5.78, p < .05$), such that 22.5% of the variance was accounted for. Percentage overweight alone did not accurately predict cracker consumption in the Negative mood condition. Neither the CD or WF factors accurately predicted food consumption in the negative mood condition.

In the Positive mood condition, total cracker
consumption was not predicted at a significant level by any of the predictor variables. Mood difference scores on each of the three MAACL subscales did not significantly predict cracker consumption in any of the within Mood condition regression analyses. The regression lines for total restraint scores versus crackers consumed for the Negative and Neutral mood conditions can be seen in Figure 8.

Correlations between Scale factors and percentage overweight

Correlation coefficients between total restraint scores, the 2 factors of the Restraint Scale (CD and WF) and percentage overweight were calculated to allow further comparison to previous studies. These correlations are displayed in Table 12.
Table 1
Subject Characteristics by Level of Restraint

<table>
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<th>Unrestrained</th>
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<td></td>
</tr>
<tr>
<td>Hours deprivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>7.55</td>
<td>7.06</td>
<td>-0.46</td>
</tr>
<tr>
<td>SD</td>
<td>5.63</td>
<td>5.22</td>
<td></td>
</tr>
<tr>
<td>Percentage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>8.86</td>
<td>1.92</td>
<td>3.81***</td>
</tr>
<tr>
<td>SD</td>
<td>8.96</td>
<td>9.42</td>
<td></td>
</tr>
<tr>
<td>Self-report-Actual weight discrepancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>8.25</td>
<td>7.81</td>
<td>0.29</td>
</tr>
<tr>
<td>SD</td>
<td>8.87</td>
<td>6.68</td>
<td></td>
</tr>
<tr>
<td>CD factor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>11.55</td>
<td>5.63</td>
<td>11.31***</td>
</tr>
<tr>
<td>SD</td>
<td>2.8</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>WF factor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>8.06</td>
<td>4.00</td>
<td>7.93***</td>
</tr>
<tr>
<td>SD</td>
<td>2.7</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>RRS total score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>19.61</td>
<td>9.63</td>
<td>15.24***</td>
</tr>
<tr>
<td>SD</td>
<td>2.9</td>
<td>3.7</td>
<td></td>
</tr>
</tbody>
</table>

*** p < .001 (df = 99).
### Table 2

Mean difference scores (post-pre) for MAACL subscales by Mood Induction Condition

<table>
<thead>
<tr>
<th>MAACL subscale</th>
<th>Mean difference score</th>
<th>Mood Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>-.94(a)</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>2.18(b)</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>.62(c)</td>
<td>Neutral</td>
</tr>
<tr>
<td>Depression</td>
<td>-1.27(a)</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>8.85(b)</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>3.38(c)</td>
<td>Neutral</td>
</tr>
<tr>
<td>Hostility</td>
<td>.12(a)</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>4.03(b)</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>1.24(a)</td>
<td>Neutral</td>
</tr>
</tbody>
</table>

Note: Different subscripts for means within each subscale denote that the means differ significantly from each other (df = 2,99; p < .05).

### Table 3

Mean post-test scores for MAACL subscales by Mood Induction Condition

<table>
<thead>
<tr>
<th>MAACL subscale</th>
<th>Mean post-test score</th>
<th>Mood Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>6.18(a)</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>9.03(b)</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>6.56(a)</td>
<td>Neutral</td>
</tr>
<tr>
<td>Depression</td>
<td>11.85(a)</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>22.06(b)</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>13.88(a)</td>
<td>Neutral</td>
</tr>
<tr>
<td>Hostility</td>
<td>8.21(a)</td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>11.06(b)</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>7.59(a)</td>
<td>Neutral</td>
</tr>
</tbody>
</table>

Note: Different subscripts within each subscale indicate that means differ significantly from each other (df = 2,99; p < .05).
Table 4
Analysis of variance table for 3 x 2 x 2
(Mood condition x Restraint status x Time)
ANOVA with repeated measures
for Time on Depression subscale scores

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>MS</th>
<th>df</th>
<th>Error term</th>
<th>df</th>
<th>F ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restraint(R)</td>
<td>11.77</td>
<td>11.11</td>
<td>1</td>
<td>1</td>
<td>96</td>
<td>0.20</td>
</tr>
<tr>
<td>Mood(M)</td>
<td>1273.53</td>
<td>636.77</td>
<td>2</td>
<td>1</td>
<td>96</td>
<td>10.80***</td>
</tr>
<tr>
<td>R x M</td>
<td>7.68</td>
<td>3.84</td>
<td>2</td>
<td>1</td>
<td>96</td>
<td>0.07</td>
</tr>
<tr>
<td>Time(T)</td>
<td>682.01</td>
<td>682.01</td>
<td>1</td>
<td>2</td>
<td>96</td>
<td>32.95***</td>
</tr>
<tr>
<td>R x T</td>
<td>120.83</td>
<td>120.83</td>
<td>1</td>
<td>2</td>
<td>96</td>
<td>5.84*</td>
</tr>
<tr>
<td>M x T</td>
<td>872.04</td>
<td>436.02</td>
<td>2</td>
<td>2</td>
<td>96</td>
<td>21.06***</td>
</tr>
<tr>
<td>R x M x T</td>
<td>158.39</td>
<td>79.19</td>
<td>2</td>
<td>2</td>
<td>96</td>
<td>3.83*</td>
</tr>
<tr>
<td>Error 1</td>
<td>5659.35</td>
<td>58.95</td>
<td>96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error 2</td>
<td>1987.23</td>
<td>20.70</td>
<td>96</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>10772.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.
***p < .001.

Table 5
Mean Depression subscale scores by Restraint status, Mood condition, and Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Mood Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restrained</td>
<td>12.76(a)</td>
<td>11.29(a)</td>
</tr>
<tr>
<td>Unrestrained</td>
<td>13.47(a)</td>
<td>12.41(a)</td>
</tr>
<tr>
<td>Negative Mood Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restrained</td>
<td>15.24(a,b)</td>
<td>20.06(b)</td>
</tr>
<tr>
<td>Unrestrained</td>
<td>11.18(a)</td>
<td>24.06(b)</td>
</tr>
<tr>
<td>Neutral Mood Condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restrained</td>
<td>10.41(a)</td>
<td>13.41(a)</td>
</tr>
<tr>
<td>Unrestrained</td>
<td>10.59(a)</td>
<td>14.35(a)</td>
</tr>
</tbody>
</table>

Note: Different subscripts indicate that means differ significantly from each other (p < .05).
Table 6

Analysis of variance table for 3 x 2 x 2
(Mood condition x Restraint status x Time)
ANOVA with repeated measures
for Time on Anxiety subscale scores

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>MS</th>
<th>df</th>
<th>Error term df</th>
<th>F ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restraint (R)</td>
<td>5.34</td>
<td>5.34</td>
<td>1</td>
<td>1</td>
<td>96</td>
</tr>
<tr>
<td>Mood (M)</td>
<td>106.36</td>
<td>53.18</td>
<td>2</td>
<td>1</td>
<td>96</td>
</tr>
<tr>
<td>R x M</td>
<td>28.68</td>
<td>14.34</td>
<td>2</td>
<td>1</td>
<td>96</td>
</tr>
<tr>
<td>Time (T)</td>
<td>19.46</td>
<td>19.46</td>
<td>1</td>
<td>2</td>
<td>96</td>
</tr>
<tr>
<td>R x T</td>
<td>46.12</td>
<td>46.12</td>
<td>1</td>
<td>2</td>
<td>96</td>
</tr>
<tr>
<td>M x T</td>
<td>82.62</td>
<td>41.31</td>
<td>2</td>
<td>2</td>
<td>96</td>
</tr>
<tr>
<td>R x M x T</td>
<td>23.01</td>
<td>11.50</td>
<td>2</td>
<td>2</td>
<td>96</td>
</tr>
<tr>
<td>Error 1</td>
<td>2151.53</td>
<td>22.41</td>
<td>96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error 2</td>
<td>443.29</td>
<td>4.62</td>
<td>96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2906.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.
**p < .01.
***p < .001.

Table 7

Mean Anxiety subscale scores
by Restraint and Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7.27(b)</td>
<td>6.94(a,b)</td>
</tr>
<tr>
<td>Restrained</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unrestrained</td>
<td>6.00(a)</td>
<td>7.57(a,b)</td>
</tr>
</tbody>
</table>

Note: Different subscripts indicate means that differ significantly from each other (p < .05).
Table 8

Mean Anxiety subscale scores by Mood condition and Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative Mood condition</td>
<td>6.85(a)</td>
<td>9.03(b)</td>
</tr>
<tr>
<td>Positive Mood condition</td>
<td>7.12(a)</td>
<td>6.18(a)</td>
</tr>
<tr>
<td>Neutral Mood condition</td>
<td>5.94(a)</td>
<td>6.56(a)</td>
</tr>
</tbody>
</table>

Note: Different subscripts indicate means that differ significantly from each other (p < .05).

Table 9

Analysis of variance table for 3 x 2 x 2 (Mood condition x Restraint status x Time) ANOVA with repeated measures for Time on Hostility subscale scores

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>MS</th>
<th>df</th>
<th>Error term</th>
<th>df</th>
<th>Error term</th>
<th>F ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restraint(R)</td>
<td>.59</td>
<td>.59</td>
<td>1</td>
<td>1</td>
<td>96</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Mood(M)</td>
<td>147.07</td>
<td>73.53</td>
<td>2</td>
<td>1</td>
<td>96</td>
<td>3.46*</td>
<td></td>
</tr>
<tr>
<td>R x M</td>
<td>49.77</td>
<td>24.89</td>
<td>2</td>
<td>1</td>
<td>96</td>
<td>1.17</td>
<td></td>
</tr>
<tr>
<td>Time(T)</td>
<td>164.16</td>
<td>164.16</td>
<td>1</td>
<td>2</td>
<td>96</td>
<td>29.59***</td>
<td></td>
</tr>
<tr>
<td>R x T</td>
<td>7.46</td>
<td>7.46</td>
<td>1</td>
<td>2</td>
<td>96</td>
<td>1.34</td>
<td></td>
</tr>
<tr>
<td>M x T</td>
<td>138.03</td>
<td>69.01</td>
<td>2</td>
<td>2</td>
<td>96</td>
<td>12.44***</td>
<td></td>
</tr>
<tr>
<td>R x M x T</td>
<td>11.21</td>
<td>5.60</td>
<td>2</td>
<td>2</td>
<td>96</td>
<td>1.01</td>
<td></td>
</tr>
<tr>
<td>Error 1</td>
<td>2039.47</td>
<td>21.24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error 2</td>
<td>532.65</td>
<td>5.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3090.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05.

***p < .001.
Table 10
Mean Hostility subscale scores by Mood condition and Time

<table>
<thead>
<tr>
<th>Time</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative Mood condition</td>
<td>7.03(a,b)</td>
<td>11.06(c)</td>
</tr>
<tr>
<td>Positive Mood condition</td>
<td>8.09(b)</td>
<td>8.21(b)</td>
</tr>
<tr>
<td>Neutral Mood condition</td>
<td>6.35(a)</td>
<td>7.59(a,b)</td>
</tr>
</tbody>
</table>

Note: Different subscripts indicate means significantly from each other (p < .05).

Table 11
Mean Number of Crackers Eaten as a Function of Mood Condition and Restraint Status

<table>
<thead>
<tr>
<th>Mood Condition</th>
<th>Positive</th>
<th>Neutral</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restrainted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>7.76(a)</td>
<td>10.62(a,b)</td>
<td>13.83(b)</td>
</tr>
<tr>
<td>SD</td>
<td>3.2</td>
<td>3.8</td>
<td>5.0</td>
</tr>
<tr>
<td>Unrestrained</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>9.22(a)</td>
<td>8.7(a)</td>
<td>9.72(a)</td>
</tr>
<tr>
<td>SD</td>
<td>3.9</td>
<td>4.1</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Note: n = 17 per cell.

*Different subscripts indicate means that differ significantly from each other (p < .05).
Table 12
Correlation matrix between total restraint scores (RRS), CD, WF, and percentage overweight

<table>
<thead>
<tr>
<th></th>
<th>WF Factor</th>
<th>Overweight</th>
<th>CD Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight</td>
<td>.38***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD Factor</td>
<td>.36***</td>
<td>.19</td>
<td></td>
</tr>
<tr>
<td>RRS</td>
<td>.79***</td>
<td>.33**</td>
<td>.86***</td>
</tr>
</tbody>
</table>

**p < .01.
***p < .001.
Figure 1. Depression subscale scores as a function of Restraint status and Time in the Negative Mood Condition.
Figure 2. Depression subscale scores as a function of Restraint Status and Time in the Neutral Mood Condition.
Figure 3. Depression subscale scores as a function of Restraint status and Time in the Positive Mood Condition.
Figure 4. Anxiety subscale scores as a function of Restraint Status and Time.
Figure 5. Anxiety subscale scores as a function of Mood Condition and Time.
Figure 6. Hostility subscale scores as a function of Mood Condition and Time.
Figure 7. Number of crackers consumed as a function of Mood Condition and Restraint Status.
Figure 8. Regression lines with total restraint scores for Negative and Neutral Mood Conditions.
CHAPTER 4

Discussion

Herman and his colleagues (e.g., Herman & Polivy, 1984) proposed that certain cognitions, emotions, and physiological states, called disinhibitors, interfere with restrained eaters' self-control, temporarily leading them to overeat. Dysphoric or negative mood has been hypothesized to be a disinhibitor, and this study's significant Restraint x Mood interaction, depicted in Figure 7, supports this hypothesis, as do previous research findings documenting that restrained eaters are disinhibited by a negative mood state (Baucom & Aiken, 1981; Frost et. al., 1982; Ruderman, 1985a). In the present study, restrained eaters ate significantly more when in a dysphoric mood than when in a positive mood, though consumption did not differ significantly across negative and neutral mood conditions. Unrestrained eaters ate similar amounts in positive, negative, and neutral mood conditions.

Positive mood was hypothesized to reduce disinhibited eating in restrained eaters. The analysis indicates that the positive mood induction did not serve to decrease restrained eaters consumption relative to the neutral mood induction group. However, neither did positive mood
disinhibit control over eating among restrained eaters as did negative mood.

Although far from unequivocal, there is some suggestion that positive mood inhibits eating behavior in restrained eaters, or at least assists restrained eaters in maintaining control over their eating behavior. At the very least, it appears that positive mood does not disinhibit restrained eaters in the same way that negative mood does. However, the mechanism by which positive affect may maintain self-regulated eating behavior is unclear. The difficulty in assessing the effects of positive mood on eating behavior among both restrained and unrestrained subjects is compounded by the present procedure's difficulty in inducing a positive mood that was demonstrably different from a neutral mood, particularly when post-test mood scores (rather than difference scores) were used in the analysis. Using a repeated measures analysis also resulted in a failure to demonstrate any difference between pre and post test scores in the Positive mood condition. Using difference scores (post minus pre-test scores) did, however, show some modest and significant effect on mood by the positive mood induction, as measured by the Anxiety and Depression subscales of the MAACL. Therefore, it is likely that some mild positive mood was induced in subjects. As noted, positive mood did not disinhibit restrained subjects'
eating as did negative mood, and the mechanism underlying this apparent maintenance of restraint while in a positive mood is not clearly accounted for by Herman and Polivy's (1984) boundary model of dietary restraint.

One applicable model may be Carver's (1979) cybernetic model of self-attention and self-regulatory processes. Carver contends that when attention is directed to environmental stimuli, those stimuli are analyzed and categorized according to the individual's previously established cognitive schemas. Self-directed attention may then lead to a similar appraisal of an individual's own behavior, resulting in an intensified appreciation of the individual's prominent and relevant behavior, feelings and thoughts. Carver (1979) indicates that "In some cases categorization -- either of one's context or of some self-element -- elicits a response schema, which constitutes a behavioral standard. If a prior categorization has evoked such a behavioral standard, subsequent self-attention engages an automatic sequence in which behavior is altered to conform more closely with the standard." (p. 1251, italics added).

In Carver's model, affect is presumed to indirectly influence self-regulation. For example, if negative affect interrupts self-regulation and is followed by self-focused attention and unfavorable expectancies about one's ability to change, then withdrawal from self-regulation
should ensue. Prior research (see Kirschenbaum, Tomarken, & Humphrey, 1985, for a review) suggests that individuals tend to regulate their behavior in such a way as to sustain or increase the "warm glow" (p. 510) of positive affect. Self-regulatory behavior in a positive mood, or abdication of self-monitoring (and hence self-regulation) in a negative mood state, is enhanced by people's tendency to seek out and remember information that is congruent with their induced affective states (Bower, 1981; Isen, Shalker, Clark, & Karp, 1978). Since overeating presumably results in more negative mood for restrained than unrestrained eaters (e.g., Leon & Chamberlin, 1973), restrained eaters may be more invested in maintaining their positive mood than unrestrained eaters. This also suggests than restrained eaters may have different internal behavioral standards regarding eating behavior than unrestrained eaters.

Extrapolating from Carver's (1979) model, Tomarken and Kirschenbaum (1982) proposed that if self-regulated behavior becomes particularly aversive, following induction of a negative mood state, then individuals will tend to withdraw from self-regulatory behavior either behaviorally or via their attentional (self-monitoring) processes.

Such an explanation for the enhanced regulatory behavior of restrained eaters in a positive mood state
would require one of two assumptions: that the internal behavioral standards of restrained eaters differ from unrestrained eaters or that restrained eaters' experience more self-directed attention in response to their eating behavior than do unrestrained eaters.

Evidence for differing behavioral standards for restrained and unrestrained eaters is largely inferential. For example, one item on the RRS queries "Do you feel guilty after overeating?". An affirmative answer adds to the total restraint score. The experience of guilt after overeating by the restrained eater is suggestive of a more stringent internal requirement regarding food intake. Similarly, Ruderman (1985b) found that restrained eaters are prone to hold rigid, absolute beliefs, as measured by the Rational Beliefs Inventory (RBI). Her findings indicated that restrained eaters are more likely to possess distorted cognitions of an unyielding and perfectionistic nature, suggesting that their standards for behavior, particularly as it concerns food consumption, also differ from unrestrained eaters. The notion that restrained eaters evaluate their eating behavior based on more stringent criteria is also supported by Neimeyer and Khouzam's (1985) finding that restrained eaters had fewer ways of construing themselves in relation to eating, were more disappointed, less content with themselves, and more self-critical.
Huon and Wooton (1987) explored the psychological and nutritional concomitants of loss of control over eating. They found that both the actual food eaten by subjects (low or high carbohydrate) and the subject's belief (or knowledge) about the preload they had eaten predicted their consumption at a later meal. Huon and Wooton contend that both food eaten and beliefs about that food are variables that predict disordered eating. Thus, there is some evidence that restrained eaters, a group at risk for developing eating disorders, have a different set of behavioral standards and beliefs about food and eating.

Similarly, the position that restrained eaters experience more self-directed attention regarding their eating behavior also garners some support in the work of Neimeyer and Khouzam (1985). These authors found that restrained eaters rated themselves as more out of control of their eating habits and more guilty about eating, even in hypothetical situations where overeating did not occur.

Kirschenbaum and Tomarken (1982) suggested that restrained eaters' perceptions of having overeaten must be followed by an abdication of self-monitoring if overeating is to ensue. They further speculated that reactivating self-monitoring processes would prevent preloaded restrained eaters from overeating. To test this hypothesis, they investigated the effects of two self-monitoring clues -- bowl size and caloric labels -- on the
level of consumption of restrained and unrestrained eaters. All subjects were given a milkshake preload and took part in an apparent ice cream taste test. When two self-monitoring cues were present (small bowl, calories labeled), both restrained and unrestrained subjects ate little after the milkshake preload. When neither cue was present, both restrained and unrestrained subjects ate a large amount. In both conditions where one cue was present (large bowl, calories labeled; small bowl, calories unlabeled), restrained eaters ate significantly more than unrestrained eaters. Kirschenbaum and Tomarken construed these findings as evidence that the accentuation of self-monitoring cues promotes self-regulatory behavior under some conditions.

Two studies by Polivy, Herman, Hackett, and Kuleshnyk (1986) examined the influence of self- and public-attention on the consumption of restrained and unrestrained eaters. Self-attention (SA) was manipulated by forcing subjects to become aware of their consumption through self-monitoring. Public attention (PA) was manipulated by making subjects self-attentive and aware of the experimenter's attention to their consumption. In both studies, the consumption of preloaded (normally disinhibited) in the SA and PA was less than that of restrained eaters in the control condition, though greater than that of preloaded unrestrained eaters. Although the
two studies did not find clearly interpretable differences between the influence of SA and PA on consumption, they demonstrated that self-monitoring influences the consumption of restrained eaters. Polivy et. al. (1986) suggest that paying attention to how much they are eating reactivates dietary concern. Herman, Polivy, and Silver (1979) found that the presence of an observer inhibited the counterregulatory response on the part of restrained eaters.

While these various finding are not wholly consistent with Carver's (1979) model and its interpreters (e.g., Tomarken & Kirschenbaum, 1982), some support seems available for the notion that restrained eaters demonstrate enhanced self-attention regarding eating under particular conditions, relative to unrestrained eaters. Some anecdotal support for this notion can be derived from the clinical observation that eating disordered individuals typically display preoccupation or "obsession" with food (e.g., Hollis, 1985; Stoltz, 1983). The Bulimia Test (BULIT; Smith & Thelen, 1984) contains several items which appear to be designed to measure preoccupation with eating.

It appears that the boundary model, although typically well supported in the restraint literature, may fail to account for a finding of enhanced regulation of eating by restrained eaters under positive mood conditions. In this
light, Carver's (1979) self-attention model may be a useful adjunct for elucidating the enhanced control restrained eaters exhibit in these circumstances. This finding might have important implications for the treatment of eating disordered individuals. It would suggest, as have several authors (e.g., Johnson, Conners, & Tobin, 1987; Katzman & Wolchik, 1984), that self-esteem and depression, with its attendant cognitive distortions, are important issues to address in treating this population.

Although Carver's (1979) model may adequately account for the current findings, other viable explanations are possible. The hypothesis that restrained eaters eat in response to nonspecific, unidentifiable tensions is one that merits further exploration. That stress is a common cause of overeating is a widely held belief, with a long history in the clinical literature, as indicated in the introduction. Bruch (1961) suggests that some obese individuals may be unable to differentiate emotional states, and have been parented to respond to distressful inner states by eating, without discriminating the precipitating feelings. From clinical case studies of obese patients, Hamburger (1951) suggested that overeating occurred as a response to nonspecific tensions, as a substitute gratification when other areas of life provided few satisfactions. Slochower (1976) found that aroused
obese subjects ate more when they could not identify the cause of the arousal than when a "label" for their arousal was provided. Further, they showed affect reduction following eating.

A replication of Slochower's (1976) work with restrained eaters might help further delineate the emotional circumstances (e.g. specific versus diffuse distress) which precipitate overeating among restrained eaters relative to unrestrained eaters.

Baucom and Aiken (1981) have suggested that Costello's (1972) theory of depression as loss of reinforcer effectiveness may provide an explanation for the counterregulatory effect on restrained subjects under the identified disinhibiting circumstances (e.g., preload, negative mood state, etc.). Costello (1972) proposed that although a person still has most of his or her previous reinforcers available when depressed, these reinforcers lose their effectiveness. Applying this reasoning to the present study, we may speculate that for restrained eaters, body image or good physical health makes restricting food intake a reinforcing activity. For nondieters, eating is a potent reinforcer. If, when dieters and nondieters are in a negative mood, the reinforcers lose their effectiveness, this may be an alternate explanation for findings in the restraint literature that indicate that restrained subjects overeat.
both when in an experimentally induced depressed mood (e.g., Baucom & Aiken, 1981; Frost et. al., 1982; Ruderman, 1985a), and when experiencing clinical depression (Polivy & Herman, 1976; Zielinsky, 1978).

In the current study, one would predict that restrained eaters would eat progressively more across positive, neutral, and negative mood states, while unrestrained eaters would show the opposite pattern. While there is some suggestion that eating may occur in this fashion for restrained subjects (especially given the rather modest effect of the positive mood manipulation), this hypothesis does not appear to hold for unrestrained subjects, as their eating behavior did not vary substantially across the three mood conditions.

Exploration of eating-relevant reinforcers utilized by restrained and unrestrained eaters may provide some future direction for researchers who may attempt to garner evidence for this formulation of the effect of mood states on the eating behavior of restrained eaters. However, the speculation that dieting may cause depression (Wadden, Stunkard, & Smoller, 1986) as well as the finding that depression is a frequent concomitant of eating disorders (e.g., Cantwell et. al. 1977; Hudson et. al., 1982), are not easily accommodated by this explanation.

Methodological Issues

Several possible weaknesses in the design of this
study are delineated, as they may have diluted the magnitude of the results. The differential levels of percentage overweight between restrained and unrestrained subjects, food palatability, the effectiveness of the mood induction procedure, particularly for inducing a positive mood state, and the possible effect of manipulation checks, are discussed. Differential response to the mood induction procedure by restrained and unrestrained subjects is addressed in a later section.

The finding that restrained eaters had a higher percentage of overweight than did unrestrained eaters suggests that overweight probably served to confound the restraint variable. Ruderman and Wilson (1979) found that obese restrained eaters ate the same amount regardless of whether or not they had been preloaded (i.e. disinhibited). Ruderman's (1983) speculation that the WF of the RRS accounts for greater total restraint scores in obese restrained subjects is lent some support by the current results. Although the restrained eaters in the present study were not clinically obese, their higher percentage of overweight than their unrestrained counterparts may have served to confound the restraint variable and reduce the effects of the hypothesized eating inhibitor (positive mood induction) and disinhibitor (negative mood induction) on restrained subjects, as obese restrained eaters do not appear to overeat under
circumstances that are normally disinhibiting (Ruderman & Christiansen, 1983; Ruderman & Wilson, 1979). Future restraint studies should perhaps focus on an even more narrow band of normal weight individuals to eliminate any possible confounding effect of overweight differences between restrained and unrestrained subjects. This issue is addressed further in a later section of this manuscript.

The ad lib food used in this study (crackers) may not have been sufficiently palatable to elicit a large counterregulatory response from dieters. Woody and associates (Woody, Costanzo, Liefer, & Conger, 1981), using a preload design, found that two conditions must be met for restraint-breaking to occur in normal weight restrained eaters: 1) The preload must be believed to be high calorie, and 2) The ad lib food must be good-tasting. The conclusion that ad lib food must be good tasting in order for overeating to occur is supported by Schachter's work with the obese (see Schachter, 1971 for a review of this literature). Both the obese and dieters may need to feel that it is worthwhile to break restraint (ie. the food is sufficiently good-tasting). Analysis of taste ratings and their relationship to amount eaten in restraint studies using a taste test paradigm may shed further light on the influence of taste perception on eating behavior among restrained eaters.
The mood induction technique was not particularly successful in producing a positive mood in subjects, relative to the neutral mood condition, when post-test scores only were used in the analysis. The Velten (1968) technique has been used in a variety of studies (e.g., Stickland, Hale, & Anderson, 1975). However, this method has been criticized for demand characteristics (Polivy & Doyle, 1980), inducing multiple moods (Polivy, 1981), and using predominantly female samples (Pignatiello, Camp, & Rasar, 1986).

Of more interest here, however, is the relative lack of effectiveness of the positive mood condition for inducing an elated mood which was demonstrably different from the mood induced by the neutral mood condition. In general, however, a perusal of previous studies inducing mood via either a concept formation task or Velten procedure indicated that quantitatively lower levels of positive mood than negative mood were reported (see also Ruderman, 1986, for a review). Thus it appears that positive mood is somewhat uniformly difficult to produce in the laboratory, relative to a negative mood state. Pignatiello, Camp, and Rasar (1986) used a musical mood induction procedure to induce elated, depressed, and neutral moods, finding that the elated and neutral mood groups also failed to differ from each other on the mood measure. A meta-analytic study might well confirm the
observations put forward here. Future research might well focus on developing effective and ethical means for inducing positive mood, perhaps borrowing methods from social psychological research paradigms.

It is also possible that the mood manipulation check itself may have altered mood in some way. Slochower (1976) has suggested administering mood manipulation checks to only one-half of the subjects in each group and later examining the effects of receiving a manipulation check on mood ratings. This procedure may be an appropriate strategy for future studies which manipulate mood.

**Differential response to Mood Induction by Restraint Status**

The question of why unrestrained subjects responded more to the negative mood manipulation than did restrained subjects, as measured by the Depression subscale of the MAACL, seems to be a thorny one. A similar finding was reported in Frost et. al.'s (1982) study, where they found that restrained subjects were more elated (and less depressed) than unrestrained subjects across all conditions of their mood manipulations, so this current finding is not without precedent. Frost et. al. used a Velten (1968) mood induction procedure and measured subjects' free eating of M & M candies while they listened to the mood induction statements. These authors
hypothesized that eating may have had a differential effect on mood among restrained and unrestrained subjects, such that eating may have soothed the restrained subjects' dysphoric feelings and produced some elation.

In the current study, no such explanation is applicable, as subjects completed the post-test MAACL prior to participating in the taste test. If any of the restraint by mood condition interactions had been significant (for any of the three MAACL subscales in the mood manipulation check), such interactions could have explained the predicted differences in eating behavior simply as a function of the differential effectiveness of the mood manipulation. Since none of these interactions were significant, and since the observed main effects were in the predicted (depressed) direction, the present findings suggest that the negative mood manipulation was effective for both restrained and unrestrained subjects, with unrestrained subjects showing a relatively greater response to the negative mood induction than restrained subjects.

The finding of mood response differences between restrained and unrestrained subjects is all the more surprising, given that obese individuals, the prototypes for restrained eaters, tend to respond in a socially desirable way both when completing the Restraint Scale (Johnson, Lake, & Mahan, 1983; Ruderman & Christensen,
1983) and more generally in seeking guidance from their physical and social environment (Herman, Olmstead, & Polivy, 1983). However, early research indicated that the Restraint Scale was relatively independent of social desirability for normal weight individuals (Kickham & Gayton, 1977). It appears, then, that in the present study there is no reason to think that a socially desirable response set influenced restrained subjects' reported response to the negative mood induction. At any rate, their response was opposite of that we might expect based on the demand characteristics of the Velten (1968) procedure (Polivy & Doyle, 1980).

As mentioned earlier, previous research suggests that restrained eaters, like the obese, are more extreme emotional responders. Polivy, Herman, and Warsh (1978) asked restrained and unrestrained male subjects to rate the affective content of a series of slides, finding restrained eaters' ratings were more excessive than those of unrestrained eaters. However, when given an internal source of arousal (caffeine), unrestrained subjects became more emotional and restrained subjects less so. Polivy and her associates hypothesized that the caffeine-ingesting restrained subjects may have misattributed their arousal to hunger rather than emotion, hence decreasing their emotional responsiveness to the stimuli. Thus, one possible explanation for the greater mood change observed
in unrestrained subjects in the present study is that restrained subjects were able to attribute their increased arousal to another internal state (such as hunger, from chronic deprivation) rather than emotion, while unrestrained eaters had no such available internal state (other than emotion) to which they could attribute their increased arousal.

However, a more parsimonious explanation may be available. Previous research (Pliner et. al., 1974; Polivy et. al., 1978) indicates that both obese and restrained individuals were found to be more responsive to externally presented stimuli, consistent with the externality theory of obesity. In the current study, unrestrained eaters reported more response (mood change) in response to the affect induction procedure that did restrained eaters. However, in this study, no external referent was being rated; subjects were essentially asked to monitor, identify, and report on their internal emotional state using the mood instrument. Unrestrained eaters apparently did so more proficiently than did restrained eaters, who were unable to gauge, and therefore accurately report, their internal emotional state, in the absence of an external stimulus or clearly discernable demand characteristics. That restrained eaters did in fact experience mood change is supported by their varied eating behavior in the experimental situation across the
three mood induction groups. That is, restrained subjects counterregulated as expected, presumably in response to their dysphoric mood, even though they did not report mood changes at the same level as their unrestrained counterparts.

This interpretation of the differential response of restrained and unrestrained subjects is congruent with both the externality and the psychosomatic theories of obesity. Schacter (1968) and Bruch (1961) have both argued that obese individuals differ crucially from nonobese persons in that the obese are relatively insensitive to internal states. Herman and Mack (1975) asserted that the external orientation of the obese is due to their dieting behavior, thus developing the dietary restraint construct. Thus, we might regard dieters, including obese dieters, as deprived, but not necessarily sensitive to internal states and sensations (including hunger and emotion). Restrained eaters have presumably become accustomed to ignoring internal stimuli (i.e. hunger), and may have a different threshold for experiencing or becoming aware of either hunger or emotion than unrestrained subjects in the absence of a clearly identifiable external referent.

The Restraint Scale as a Measure of Dietary Restraint

The Restraint Scale has been extensively criticized on both psychometric and conceptual grounds. The major
problems that have been identified are the Restraint Scale's confounding of dietary restriction and disinhibited eating (Stunkard & Messick, 1985; VanStrien, Frijters, Bergers, & Defares, 1985), its apparent inadequacy when applied to overweight and obese populations (Drenowski, Riskey, & Desor, 1982; Ruderman & Christensen, 1983; Ruderman, 1985b), its factor structure, particularly in varied populations (Johnson, Corrigan, Crusco, & Schunldt, 1986; Johnson, Lake, & Mahan, 1983; Lowe, 1983; Ruderman, 1983), and its lack of construct validity and internal reliability (Stunkard & Messick, 1985; Johnson et. al., 1983). Two of these measurement issues identified in the literature, the Restraint Scale's inadequacy when applied to the overweight and the confounding of dietary restraint and disinhibition, are addressed below as they pertain to the current study.

The application of the RS to overweight populations. The inapplicability of the Restraint Scale to overweight populations has been discussed by a number of researchers (Ruderman, 1983; Ruderman, 1986; Tomarken & Kirschenbaum, 1984). Drenowski, Riskey, and Desor (1982) have argued that obese individuals would tend to obtain high scores on the Restraint Scale even if they did not engage in chronic dieting. Ruderman (1985b, 1986) has suggested, in a similar vein, that the obese may obtain
spuriously high restraint scores. Higher restraint scores by the obese may result from their greater scores on the weight fluctuation (WF) factor of the RS, an attribute of the obese that is unrelated to dieting behavior per se, but is rather a function of their greater body mass.

There is a consistent relationship reported between percentage overweight and restraint scores (Lowe, 1983; \( r = .38 \); Ruderman, 1985b: \( r = .38 \); Wardle, 1980: \( r = .39 \)). In the present study, total restraint scores correlated with percentage overweight at a comparable level (\( r = .33 \)). (The somewhat lower correlation may reflect a restricted range of percentage overweight in the present subjects, as no obese individuals were used in this study). These results do indeed suggest that the obese obtain higher restraint scores than do normal weight persons. However, it is unclear whether the obese's higher scores are due to their concern with dieting, greater weight fluctuation, or both.

Drenowski et al. (1982) found that only two of the WF items accounted for 70% of the variance in total restraint scores, and that obese persons actually scored lower on the CD factor than did normal weight persons. Blanchard and Frost (1983) reported that the WF factor is more correlated with percentage overweight (\( r = .48 \)) than the CD factor (\( r = .29 \)). However, Lowe (1983) reported that the correlation between overweight and CD (\( r = .43 \)) was
significantly higher than the correlation between percentage overweight and WF \((r = .14)\). Furthermore, Lowe (1983) found that the correlation between overweight and WF was eliminated when the CD factor was used as a partial correlate. Ruderman (1985b), on the other hand, reported finding partial correlations opposite to those of Lowe, such that WF remains significantly correlated with overweight when CD is partialled out, whereas CD does not remain significantly correlated with overweight when WF is partialled out.

In the present study, percentage overweight was more correlated with WF \((r = .38)\) than with CD \((r = .19)\). Partial correlations were not computed on the present data. The current findings lend support to Ruderman's (1985b), Blanchard and Frost's (1983), and Drenowski and colleagues' (1982) findings that the higher restraint scores of overweight subjects result, at least in part, from their higher scores on the WF factor of the Restraint Scale. In the present study, even subclinical levels of overweight served to increase subjects' total restraint scores, and percentage overweight served as a powerful predictor of food consumption in the neutral mood condition. The results of the current study suggests that future studies which explore the restraint construct in normal weight populations may be less confounded by focusing on a narrower band of normal weight subjects.
(e.g., those whose weight falls within 10% of the midpoint of their desired weight) to avoid the apparently contaminating effect of even modest overweight on the restraint construct.

**Disinhibition and Restraint.** The majority of research examining the eating behavior of people scoring high on the Restraint Scale has contrasted experimental situations in which restraint has remained intact with situations in which restraint is broken, with consequent overeating. In fact, Herman and Polivy's (1980; Polivy & Herman, 1983) view of the restraint construct has changed so as to acknowledge that most dieters do not succeed in maintaining uninterrupted restriction of intake. According to Herman and his colleagues (e.g., Heatherton et. al., 1988), the average dieter is likely to exhibit periods of restraint punctuated by episodes of disinhibited eating and probably does not achieve significant weight loss relative to their physiologically determined set-point. By way of contrast, the relatively rare dieter who succeeds in achieving and maintaining significant weight loss is likely to have a lower restraint score than the unsuccessful dieter (Harowski & Jeffrey, 1983).

The fact that most effective dieters do not necessarily score high on the restraint scale has been a criticism offered by several authors (e.g., Lowe, 1986;
Van Strien, 1986), as restraint scores were originally hypothesized to be related to physiological deprivation (that is, carrying a weight that is below one's set-point). However, Herman and associates now disclaim this notion (Heatherton et. al., 1988).

Instead, Herman and his colleagues (Polivy & Herman, 1985) now argue that dieting and binging are related in that dieting causes binging or overeating due to the physiological and psychological consequences of deprivation. Marcus et. al. (1985) studied a sample that consisted primarily of obese women, finding a strong relationship between binge eating severity and dietary restraint, as measured by Stunkard and Messick's (1985) Eating Inventory. This provides support for the notion that levels of restraint are indeed related to binging behavior, though does not substantiate the causal relationship purported by Polivy and Herman (1985) that dieting causes binging.

Critics of the restraint scale, however, contend that the Restraint Scale confounds dietary restraint and disinhibition, and at least two additional scales have been devised to remedy the perceived shortcomings of the Restraint Scale. These include the Three factor eating questionnaire (Stunkard & Messick, 1985) and the Dutch Eating Behavior Questionnaire (Van Strien et. al., 1985). Both of these instruments measure three ostensibly
independent aspects of eating, rather than a unitary construct as the Restraint Scale purports to do (Heatherton et al., 1988).

The Restraint Scale might more appropriately be named the Dieting and Binging Scale, as it seems to measure not chronic dieting per se, but behaviors (such as counter-regulation) that characterize most dieters. Heatherton et al. (1988), in a recent defense of the Restraint Scale, indicate that "restraint, rather than referring to a single behavioral tendency, is a multifaceted syndrome involving both a propensity to restrict food intake as well as a tendency to splurge" (p. 26). However, they choose to retain the current name of the scale because the restrained eater who "is exclusively restrained (i.e., the individual who scores high on Van Strien et al.'s, 1985, and Stunkard and Messick's, 1985, restraint subscales) is not representative of restrained eaters in general, whereas the restrained eater who occasionally splurges is" (p. 20).

In the present study, dieting status alone (as measured by the Restraint Scale) was not as predictive of disinhibition of eating in a negative mood state as were both dieting status and percentage overweight in a univariate regression equation. This finding seems to imply that percentage overweight may be an important variable that is all too often ignored in the restraint
literature. A study with a large number of subjects and a comprehensive array of predictor variables using a multivariate regression statistical analysis may provide more definitive information about the effects of dieting on eating behavior. It is clear that there are a large number of individual differences among dieters, and further work identifying those factors which significantly predict good candidates for weight loss programs are in order (Harowski & Jeffrey, 1983). As Stunkard and Messick (1985) note, the identification of the multiple factors that contribute to a behavior can have important implications for treatment methods.

**CD and WF as predictors of disinhibition**

Frost et. al. (1982) found that the WF factor was a better predictor of food intake during an experimentally-induced depressed mood than the CD factor. Ruderman (1985a), however, found precisely the opposite. In the current study, neither factor accurately predicted food intake in an experimentally induced negative mood, although total restraint scores did predict consumption in a negative mood state. Neither of the factor scores, nor total restraint scores predicted food consumption in a positive mood condition.

Tentatively then, neither factor seems, at the current time, to superiorly predict food consumption in a negative mood condition. Further research may well be directed
toward identifying high and low scorers on the WF and CD factors to experimentally evaluate the effect of each factor on food consumption under disinhibiting and non-disinhibiting conditions. Herman and colleagues (Heatherton et. al., 1988) have argued that each factor measures different aspects of same construct (restraint), and that the two factors together are more predictive of dietary restraint and the subsequent tendency to disinhibit under some circumstances, than either factor alone. In the present study, this assertion is supported by the finding that total restraint scores predicted consumption across and within mood conditions more accurately than did either factor alone.

Summary

In summary, the current study was designed to test the hypothesis that positive mood would result in inhibited eating among restrained eaters relative to negative and neutral mood states. Fifty-one restrained and 51 unrestrained subjects were assigned to positive, negative, or neutral mood conditions, and a check on the mood manipulation indicated that the negative mood manipulation was successful, while the positive mood induction was found to be only marginally effective. In addition, unrestrained subjects were more responsive to the negative mood manipulation than were restrained subjects. Negative mood has been found to result in increased consumption
among restrained subjects, and the typical counterregulatory response was also found in the present study. The findings also confirm previous research indicating that positive mood does not disinhibit eating among restrained eaters in the same way that negative mood does. This finding, however, is tempered by the difficulty of experimentally inducing positive mood. Future studies may well focus on developing effective methods of inducing positive mood states in the laboratory, and examining the mechanism underlying the effect of affective states on eating behavior. In addition, differential overweight levels were found between normal weight restrained and unrestrained subjects in this project, which continues to muddle interpretation of differences between these two groups. Future researchers may well want to focus on an even more narrow band of normal weight restrained and unrestrained subjects when investigating the restraint construct in normal weight populations.
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Appendix A

Eating Habits Questionnaire
(Revised Restraint Scale)

1. How often are you dieting?
   Never    Rarely    Sometimes    Often    Always
   (Scored 0-4)

2. What is the maximum amount of weight (in pounds) that you have ever lost within one month?
   0-4    5-9    10-14    15-19    20+
   (Scored 0-4)

3. What is your maximum weight gain within a week?
   0-1    1.1-2    2.1-3    3.1-5    5.1+
   (Scored 0-4)

4. In a typical week, how much does your weight fluctuate?
   0-1    1.1-2    2.1-3    3.1-5    5.1+
   (Scored 0-4)

5. Would a weight fluctuation of 5 pounds affect the way you live your life?
   Not at all    Slightly    Moderately    Very Much
   (Scored 0-3)

6. Do you eat sensibly in front of others and splurge alone?
   Never    Rarely    Often    Always
   (Scored 0-3)
7. Do you give too much time and thought to food?
   Never  Rarely  Often  Always
   (Scored 0-3)

8. Do you have feelings of guilt after overeating?
   Never  Rarely  Often  Always
   (Scored 0-3)

9. How conscious are you of what you are eating?
   Not at all  Slightly  Moderately  Extremely
   (Scored 0-3)

10. How many pounds over your desired weight were you at your maximum weight?
   0-1  1-5  6-10  11-20  21+
   (Scored 0-4)

### Appendix B

**Desirable Weights for Women**
*(Ages 25 and over)*

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<th>Height Frame (without shoes)</th>
<th>Weight in Pounds According to (in Indoor Clothing)</th>
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Appendix C

Multiple Affect Adjective Checklist (MAACL)

DIRECTIONS: On this sheet you will find words which describe different kinds of moods and feelings. Mark an X in the boxes beside the words which describe how you feel right now. Some of the words may sound alike, but we want you to check all the words that describe your feelings. Work quickly.

<table>
<thead>
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<th>81</th>
<th>mild</th>
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40__energetic  80__merry  120__understanding
121__unhappy
122__unsociable
123__upset
124__vexed
125__warm
126__whole
127__wild
128__willful
129__wilted
130__worrying
131__young
Appendix D

Mood Induction Statements

Negative Statements

1. I can feel my body sagging when I walk.
2. I can feel my body sinking into the chair.
3. My body feels weak and drained of energy.
4. I feel tired and sleepy.
5. My eyelids feel heavy.
6. I don't feel like I have enough energy to make it through the day.
7. I feel as though I am carrying a great weight.
8. I feel lethargic and slow-moving right now.
9. My legs feel very heavy.
10. It seems to be too much effort to lift my arms.
11. I feel rather sluggish now.
12. Today I feel so tired and gloomy that I'd rather just sit than do anything.
13. I feel rather light-headed and faint right now.
14. There is a fuzzy feeling in my head.
15. I feel so tired and apathetic that I'm having trouble thinking clearly.
16. When I feel this lackluster, the day somehow seems quite dreary.
17. I feel as though I'm going to have trouble getting out of this chair.
18. Everything seems to take too much energy for me today.
19. I feel drained, unable to do hardly anything.
20. It takes too much effort to walk very quickly today.
21. It seems to take an extraordinary effort to walk today.
22. My neck feels hardly able to hold my head up.
23. I wish I had the energy to get things done.
24. I feel as though even lifting my hand would take a great deal of energy.
25. Everything seems hopeless when I'm this down-hearted and drained.
26. It's difficult to move quickly when I feel this sluggish and worn out.
27. I feel as though I'm shouldering a big burden today.
28. My energy is drained today.
29. It takes a lot of effort to move today.
30. I feel as though I don't even have the energy to think.
31. I feel a sense of fatigue today.
32. When I feel this sluggish, I start thinking I'm a lazy person.
33. I'm not worth anything when I feel this worn out.
34. I feel sleepy and weak today.
35. My head feels too heavy to hold up today.
36. I certainly lack confidence when I feel this muddled and worn out.
37. My eyelids are beginning to droop.
38. I can barely write I feel so weak.
39. My legs feel as though they can barely support me.
40. I feel as though my neck is too weak to support my
head.

41. My self-esteem falters when I feel this drained.
42. I feel down-hearted and slow today.
43. It takes all my energy just to get through the day.
44. My breathing seems shallow and labored right now.
45. I feel the energy being drained out of me.

Positive Statements
1. I feel full of energy.
2. I feel a great surge of vitality welling up inside of me.
3. I feel fully alive and energized.
4. My entire body feels energized.
5. I feel ready to do almost anything.
6. I feel a sense of invigoration throughout my body.
7. I have a feeling of well-being.
8. There is a great surge of energy running through me.
9. I can almost feel the invigorating flow of blood through my limbs.
10. I feel fully awake and invigorated.
11. I feel strong enough to tackle anything today.
12. I feel refreshed and alert.
13. My body seems to be functioning perfectly today.
14. My arms and legs feel strong and perfectly coordinated right now.
15. I can feel a rush of invigoration go through me.
16. I feel like dancing for joy.
17. My sense of being alive is particularly strong and vivid today.

18. I feel as though I have the strength of 2 people today.

19. When I have this much energy, I feel entirely self-confident.

20. I feel overcome with elated and happy feelings.

21. I feel a rush of happiness surging in me.

22. My energy seems boundless today.

23. I feel a sense of strength and purpose.

24. Every cell of my body is tingling with invigoration.

25. I feel like skipping when I walk.

26. I feel a great surge of elation.

27. I certainly feel self-confident when I have this much energy.

28. I feel as though I won't need to sleep for a long time.

29. I notice myself taking deep breaths, absorbing energy and strength from the air.

30. It feels good to be alive and charged up about life.

31. Life seems full of possibilities when I have this kind of energy.

32. I would like to burst out in song, I feel so good.

33. I feel as though a great weight has been lifted from my shoulders.

34. My mind is clear and sharp today.

35. My entire being feels electrified with energy and invigoration.

36. I feel elated and excited today.
37. I feel as though all my movements today are filled with well-controlled energy and enthusiasm.

38. Every muscle in my body feels alive and energized.

39. My whole being seems aglow with good feelings.

40. I feel thrilled to be feeling this good.

41. I feel like smiling today.

42. I have more than enough energy to get things done today.

43. My movements are sure and controlled today.

44. My cheeks must be glowing with pleasure and energy.

45. I feel a particular vigor in everything I'm doing today.

Neutral Statements

1. Many states provide milk for schoolchildren.

2. Tomatoes are actually fruit.

3. It is quite cold/warm today.

4. The work of a policeman must be interesting.

5. Utah is the Beehive state.

6. This book or any part thereof must not be reproduced in any form.

7. Austin is the capital of Texas.

8. Wheat is the primary crop of Kansas.

9. The average person needs 7 to 8 hours of sleep per night.

10. Monopoly is a board game where one buys and sells properties.

11. Many television programs are about private detectives.
12. Researchers are getting closer to find a cure for cancer.

13. School lunches are often given away to the needy.

14. Movies are more expensive than they used to be.

15. Florida is the Sunshine state.

16. The earth's land masses consists of 7 continents.

17. Oranges are high in Vitamin C.

18. Columbus discovered America in 1492.

19. Chlorophyll is the substance in plant responsible for their growth.

20. Daffodils are one of the first flowers of spring.

21. There are 48 contiguous states in the United States.

22. John F. Kennedy was assassinated in 1963.

23. Paris is the capital of France.

24. Food, water, and shelter are necessary for life.

25. Labor day falls in the month of September.

26. The boiling point of water is 212 degrees Fahrenheit.

27. George Washington was the first president of the United States.

28. An economic depression occurred in the United States in the 1930's.

29. Sacramento is the capital of California.

30. New Year's day is January 1st.

31. Chicago is often called "the windy city".

32. There are five oceans in the world.

33. The American flag is red, white, and blue.

34. It is a good idea to have auto insurance.
35. Public schools usually start their academic year after Labor day.

36. Rhode Island is the smallest state in the U.S..

37. Land in the city usually costs more than land in the country.

38. California experienced a gold rush in the 1800's.

39. Budgets help you keep track of your spending.

40. Red, blue and yellow are primary colors.

41. The Kentucky Derby is held at Churchill Downs.

42. Editorials often contain people's opinions about political issues.

43. Defensive driving is a good way to avoid accidents.

44. The most common favorite color is blue.

45. Nurses must know how to take a person's blood pressure.
Appendix E

Demographic Questionnaire

Name:_________________________ Age:_____

Phone (local):________________

Sex:  Male____  Female_____

Year in School: (Check one)

  Freshman____  Sophomore____
  Junior____   Senior_____

Height_____

Weight______
Appendix F
Informed Consent Form
"The Effect of Mood on Taste Sensations"

Principal Investigator: Naomi Smith
Under the direction of D.B. Jeffrey, Ph.D.
University of Montana

I understand that by signing my name below, I give my informed consent to participate in this study.

1. The procedures to be followed include completion of several short questionnaires, listening to taped statements and participating in a "taste test" to develop marketing strategies. The total time commitment for participating in this study is between 45 minutes and one hour, which includes a debriefing session after your participation.

2. All information you provide will be kept strictly confidential. Your name will not be associated with any of the data collected. Only a subject number will be associated with your data.

3. The only side effect you may experience are some transient changes in mood.

4. You will receive two experimental credits for participating in this study.

5. You may refuse to participate or discontinue participation at any time, without prejudice to you and without jeopardy to any credits you are entitled to.

6. After the study is completed, you may obtain a report of the results and have any questions answered that you may have. You may contact the Principal Investigator, Naomi Smith, at 243-4523. Because of confidentiality, no information can be provided about you or any other participating individual.

I HAVE READ AND UNDERSTOOD THE ABOVE AND AGREE TO PARTICIPATE IN THIS STUDY.

Participant ____________________________ Date ____________

Experimenter ___________________________ Date ____________
Appendix G

Institutional Review Board Proposal

THE EFFECT OF MOOD STATES ON EATING BEHAVIOR AMONG RESTRAINED AND UNRESTRAINED EATERS

Investigator: Naomi Smith

1. Description of Research

The proposed research project is designed to investigate the effects of positive, negative, and neutral mood states on eating behavior among chronic dieters ("restrained eaters") relative to a non-dieting group ("unrestrained eaters"). A 2 x 3 (Restraint x Mood) factorial design will be used. Further details are given below.

2. Benefits of the Research

Dietary restraint has been identified by several researchers as a risk factor for the development of a clinical eating disorder. The variables which "disinhibit" dietary restraint, resulting in diet transgression, have been the subject of several investigations. One such "disinhibiting" factor is negative emotional states. Dysphoric mood causes restrained eaters to overeat, relative to both neutral mood and to unrestrained eaters in dysphoric mood conditions. However, the impact of positive emotional states on restrained eaters' food intake has not been adequately studied. There is some evidence from research
in self-regulatory processes that positive affect increases self-control. If positive mood states are found to enhance dieters' control over their eating behavior, relative to neutral and negative mood conditions, some evidence will be garnered for eating disorder treatment modalities which focus on underlying depression. Some research has suggested that eating disorders, particularly bulimia, may be a variant expression of a primary affective disorder. In addition, a finding that positive mood states strengthen dieters' control would have important implications for the current "boundary model" of dietary restraint.

3. Use of Subjects

Female subjects will receive a measure of dietary restraint and a brief demographic questionnaire during the first week of classes Winter quarter 1989 in their introductory psychology class with other screening instruments. From this pool, 60 restrained and 60 unrestrained eaters will be selected and contacted over the phone to solicit their participation in a study ostensibly investigating "the effects of mood on taste sensations". Subjects will receive 2 experimental credits for their introductory psychology class requirement. All subjects will be instructed not to eat for two hours prior to their experimental appointment. Upon arrival, subjects will be greeted by the experimenter, and will be asked to
sign the informed consent form (attached). Subjects will then complete a brief questionnaire detailing when and what they had last eaten and asking them to rate their hunger level on a 7-point Likert scale. Subjects will be informed that they are participating in a market research project to test the effect of mood on taste. At this point, all subjects will receive the Multiple Adjective Affect Checklist (MAACL), a brief mood checklist. Subjects will then receive one of the three mood induction conditions (positive, negative or neutral). The mood induction procedure will consist of subjects listening to 45 taped self-referent statements and reflecting on them. The neutral group will receive statements such as "Many states provide milk for grammar school children". The negative group will receive statements focusing on the somatic concomitants of dysphoric feelings, emphasizing lethargy and fatigue. An example is "I can feel my body sagging when I walk". For the remaining group (positive mood), the statements will emphasize elation and invigoration and their attendant physical sensations (e.g. "I feel a great surge of vitality welling up inside of me."). After they have completed listening to the tape, subjects will again complete the MAACL. The experimenter will then present the subject with three bowls of commercially available crackers, asking her to rate them on a variety of dimensions. The subject will be invited
to eat as many crackers as she desires after she has completed the ratings. The experimenter will leave the room, return after 10 minutes to give the subject a post-experimental questionnaire asking the subject what she thought the purpose of the study was. The experimenter will then weigh and measure the subject, and measure the distance between the two prominent elbow bones with calipers. Subjects will be debriefed and asked not to discuss the study. All subjects will receive 20 positive statements will be provided on 3" x 5" cards to counteract any lingering feelings of dysphoria. The statements will be provided uniformly to all groups to preserve the empirical integrity of the study.

4. Description of Subjects

All subjects will be female introductory psychology (Psych 110) students 18 years of age or older. One-half of the 120 subjects will be restrained eaters (chronic dieters) and the other half will be unrestrained eaters (non-dieters). Restrained eaters are a laboratory analogue of eating disordered individuals and are at increased risk of developing eating disorders.

5. Risks and Discomforts

The primary risk of deleterious effects to subjects will be for those subjects in the negative mood condition. This mood induction procedure is typically effective, and subjects in the negative mood condition will undoubtedly
experience some dysphoric feelings.

6. **Correction of Undesirable Consequences to Subjects**

   As previously mentioned, subjects will receive 20 positive mood statements to counteract any lingering effects of the mood induction procedure. All subjects will be debriefed about the nature of the study.

7. **Protection of Confidentiality**

   During the screening period, subjects will complete a brief demographic questionnaire listing their name and phone number, and the restraint measure. The restraint scale will be scored by the current author and the demographic questionnaire separated from the restraint measure. These will be stored separately. A research aide (Psychology 390 student) will be provided with a list of prospective subjects and their phone numbers. Restrained subjects will be designated by a 0, while unrestrained subjects will be designated by a 1. The research aide will not know the subjects' restraint status. He will contact subjects over the phone and schedule them for the study. When the subjects arrive, they will be assigned a subject number on all materials used for data collection.

8. **Informed Consent**

   The form to be used for obtaining informed consent from subjects is attached (p. 6).

9. **Waiver of Informed Consent**
Not applicable.

10. Other information pertaining to ethical responsibility

Not necessary.

I HAVE READ THE ABOVE AND AGREE THAT IT IS AN ACCURATE REPRESENTATION OF THE PROCEDURES TO BE USED IN THIS STUDY.

__________________________
D. Balfour Jeffrey, Ph.D.
Professor of Psychology
Chairperson of Thesis Committee
Appendix H

Hunger Scale

1. How many hours has it been since you last had something to eat?

2. What was it that you ate?

3. How hungry are you at this time?

1 2 3 4 5 6 7

Not hungry at all very hungry
Appendix I

Experimental Instructions
(Experimenters' Script)

E: "Thank you for participating in this study. Your participation in the study will take from 45 minutes to 1 hour, and you will receive the full 2 experimental credits regardless of whether it takes 45 minutes or 1 hour. I can't answer any questions about the purpose of the study while we are conducting it, but when we are finished I will be happy to answer any questions you may have. As you know from reading the experimental sign-up sheet, we are interested in the effects of mood on taste sensations. Before we begin, there is a short questionnaire here for you to take."

[Subjects will complete the hunger scale (Appendix C.)]

E: [Collects questionnaire from Ss and puts them aside. If subject reports food intake within last 2 hours on this questionnaire, the subject is dismissed at that point. For these subjects, full experimental credit is given, and they are asked not to discuss the study]. "This study is being funded through a grant from a major commercial food manufacturer. The goal of the study is to obtain prospective consumers' opinions, under varying mood conditions, in a setting free of marketing 'gimmicks', such as advertisements, packaging, and the like. This information will be valuable in developing marketing procedures because, as you know, advertising often involves manipulations of mood. Mood can affect subjective ratings of taste, so I have an initial mood questionnaire for you to take. Please follow the instructions on the top of the questionnaire." [E gives Ss MAACL (Appendix D)].

[Ss completes MAACL.]

E: [Takes questionnaire from Ss, puts it aside without looking at it]. "We now have some taped statements for you to listen to. Please listen to the instructions provided on the tape and follow them as well as you are able. Please don't discuss the taped statements with me, except at the end of the experiment, when I will answer any questions you have." [Escorts Ss to taping room, having preselected 1 of the 3 taped messages according to consecutive assignment procedure and put it in the tape player.] "Please sit down here and make yourself comfortable [Indicates chair]. Here are some headphones for you. When I leave the room, simply press the play
button. As a control, the volume is preset. When you get
to the end of the statements, the voice on the tape will
instruct you to take off the headphones and take the
questionnaire here. This questionnaire is just like the
one you completed earlier. Please fill out the
questionnaire as you are feeling at the moment. You many
then leave the room, and return to the area we were
earlier. We'll continue with the experiment there. Are
there any questions about what you are to do now?"
[Experimenter clarifies above instructions as needed].

[Ss listens to tape and rejoins experimenter].

E: Okay. Now, this study is concerned with people's
sensitivity and liking for different kinds of tastes.
Here are three bowls of crackers. As you can see, each
bowl is labeled either A, B, or C (points to the three
bowls so labeled). You will have 10 minutes to rate the
three types of crackers on these 3 separate
questionnaires. Please rate the crackers in the following
order, first Type B, then Type C, and then Type A. This
will control for the effects of one taste on another.
Please complete tasting and rating one cracker type before
continuing to the next one. You may eat as many crackers
as you like in making your taste ratings. Once you've
completed all the ratings, you may help yourself to any
more crackers you'd like, but please don't change your
initial ratings. Do you have any questions about this?
[E clarifies instructions as needed, and then leaves the
room].

[Experimenter returns after precisely 10 minutes have
passed]

E: "Now, I'll need to take your height and weight.
Please step over here". (Experimenter weighs and measures
subject.) "Now I'll measure your frame size. Please roll
up your sleeve and extend your elbow straight out like
this" (Experimenter demonstrates posture and takes
measurement).

E: "Here is a short questionnaire about your impressions
and ideas about the purpose of the study. After you
complete it, we will discuss the study".

[Ss completes post-experimental questionnaire (Appendix
G).]

[Debriefing. E will carefully ask Ss about whether she
had prior knowledge or suspicions about the study. Ss
will be fully debriefed and asked not to discuss the
experiment.
Appendix J

Cracker A Taste Rating Form

Instructions: Please rate Cracker A on the dimensions listed below by circling the number corresponding to your rating. Thank you.

1. How spicy was cracker A?

   - [ ] 1  [ ] 2  [ ] 3  [ ] 4  [ ] 5
   - Very spicy
   - Very bland

2. How sweet was cracker A?

   - [ ] 1  [ ] 2  [ ] 3  [ ] 4  [ ] 5
   - Very sweet
   - Not sweet at all

3. How salty was cracker A?

   - [ ] 1  [ ] 2  [ ] 3  [ ] 4  [ ] 5
   - Very salty
   - Not salty at all

4. How buttery tasting was cracker A?

   - [ ] 1  [ ] 2  [ ] 3  [ ] 4  [ ] 5
   - Very buttery tasting
   - Not buttery tasting at all

5. How likely would you be in the future to buy this cracker?

   - [ ] 1  [ ] 2  [ ] 3  [ ] 4  [ ] 5
   - Very likely
   - Not likely at all
   - to buy
   - to buy
Appendix K

Post-Experimental Questionnaire

Do you think the experimenter was interested in something other than what she said she was interested in? If so, what do you think the experimenter was actually interested in?
Appendix L

Debriefing Outline

First, I'd like to ask you a few questions in line with the questionnaire you just completed.

Had you heard about this study prior to participating today?

What did you hear about the study?

What was your impression of the study prior to coming here today?

What is your impression of the study now?

Were you suspicious about any parts of the study?

Which part(s)? Why?

Okay. I'd like to tell you about the study. Before I begin to tell you about the study, it's very important that you agree to not talk about the study with anyone until Spring quarter. This is a study that will most likely be published by Dr. Jeffrey and Naomi Smith. As you know, if people know about the study before they come, that can effect the results, such that we may be publishing things that aren't true. Can you agree to this? We're interested in how people respond to different mood states and how that effects their eating behavior. For example, we are wanting to know if taste responses and amount eaten differ as the result of different moods. Your participation in the study has been helpful in providing more information about this topic, which has important implications for weight control. If you are interested in further details, we can send you a summary of the results when the study is completed -- simply write your name and address here (Experimenter points to list of names and addresses). You understand, of course, that no
individual data will be reported. [Experimenter signs credit slip and makes provisions for subjects to learn the results of the study if they are interested in doing so, by taking their name and phone number. Experimenter thanks subject and dismisses them].