Habit Reversal Treatment of Bulimia Nervosa

Ken Small

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THE TREATMENT OF BULIMIA NERVOSA WITH HABIT REVERSAL

by

Ken Small

A dissertation submitted in partial fulfillment
of the requirements for the degree
of
DOCTOR OF PHILOSOPHY
in
Psychology

Approved:

UTAH STATE UNIVERSITY
Logan, Utah
1985
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For the successful development and completion of this research, I thank Drs. Striefel, Dobson, Bertoch, and Young who all provided important feedback. As a chairman, Dr. Osborne was most instrumental for the superior quality of the project.

To all my friends who supported me in my struggles to finish (you know who you are): I thank you.

To my family who contributed more than they will ever know, and especially to my mother: I love you.

Ken Small
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Although several writers have emphasized the habit-like characteristics of bulimia nervosa, no study has investigated the extent to which bulimia responds to treatment specifically for habit disorders. Habit reversal is a general treatment plan which teaches individuals to regain lost awareness of all aspects of a habit. The habit is then interrupted at the earliest movement in the chain by a physically competing response. Habit reversal (Azrin & Nunn, 1973) has been effective in treating other habits (e.g., stuttering, tics, bruxism). In the present study, habit reversal was adapted for the treatment of bulimia.

In response to newspaper advertisements, ten females (aged 21-26) with a minimum of two binges/week were included in the study. Bingeing and vomiting ranged from .5/day to 3.57/day during baseline; duration of the disorder ranged from one to eight years. In a multiple-baseline, across-subjects design, subjects were randomly assigned to begin...
treatment following 14 days of baseline data collection. Subjects self-monitored and reported daily binge eating, vomiting, fasting and laxative use. Daily social contacts and athletic activities were self-monitored and reported as secondary dependent measures. A blood chemistry analysis to assess metabolic functioning, the Beck Depression Inventory (BDI) and the Symptom Checklist 90-Revised (SCL-90R) were administered pre- and post-treatment.

Two subjects reported cessation of bulimic episodes during baseline data collection apparently as a result of self-monitoring and frequent phone contacts. A rapid and substantial reduction in the target behaviors for the subjects who received treatment was reported following presentation of habit reversal (mean bingeing reduction=66.7%; mean vomiting reduction=52.0%). As reports of bingeing and vomiting decreased, concomitant increase in reported social contacts and athletic activities was observed in five of seven subjects without treatment for social behavior. Scores on the BDI and SCL-90R did not change as a function of treatment. However, the self-reported frequency of binge eating during treatment correlated positively with psychopathology (r=.95, p<.05). Treatment outcome was not associated with the length of the eating disorder. All subjects demonstrated normal metabolic functioning prior to treatment contrary to clinical predictions. Therefore, habit reversal appears promising in the reduction of bulimic eating patterns. Based on this research, recommendations for further treatment and research are presented.
INTRODUCTION

Binge eating followed by self-induced vomiting and/or fasting is a distinct clinical disorder in the Diagnostic and Statistical Manual of Mental Disorders III (American Psychiatric Association, 1980). Terms used to describe this eating disorder include bulimia nervosa (American Psychiatric Association, 1980; Russell, 1979), bulimarexia (Boskind-Lodahl, 1976), "gorging-purging" syndrome (Rosen & Leitenberg, 1982), and dysorexia (Guiora, 1967). Individuals suffering from bulimia nervosa display a cluster of related behaviors: (a) rapid consumption of large amounts of food in short periods of time; (b) termination of such eating episodes by abdominal pains, sleep, social interruption, or self-induced vomiting; (c) awareness that the eating pattern is abnormal, but awareness also that the eating pattern is out of control, and (d) self-deprecating thoughts following eating binges (American Psychiatric Association, 1980).

In many cases, medical complications ensue as a result of bingeing and vomiting and/or purging. Among the more commonly reported complications are amenorrhea, lethargy due to malnutrition, potassium depletion, urinary infections, swollen salivary glands, and local trauma due to vomiting, e.g., chest pain, chronic hoarse voice, throat infections, and decay of tooth enamel (Fairburn, 1980; Green & Rau, 1974; Russell, 1979). Less common are hypertensive, cardiovascular, and musculoskeletal medical complications (Green & Rau, 1974). In extreme cases, premature death can result from severe electrolyte
disturbances (Garfinkel, Moldofsky & Garner, 1980). In addition to
the medical consequences of bulimia nervosa, several dysfunctional
psychological complications have been noted. Bulimic individuals
generally exhibit a preoccupation with food, weight, body size,
depression (Russell, 1979), and occasionally suicide (Garfinkel et al.,
1980).

Several different theoretical orientations have offered explana-
tions for bulimia. Traditional psychoanalytic theory views the
eating disorder as arising from an individual's sexual role conflict.
A bulimic female is said to overidentify with femininity and to
desire pregnancy as a defense against hatred toward mother (Szyrynski,
1973). The symptomatic manifestation of the oral-sadistic Oedipal
conflict is the bingeing and purging behaviors which are the individual's
expression of aggression towards femininity. Psychoanalytic treatment
of bulimia consists of helping the bulimic woman accept and act out
the traditional feminine role.

The psycho-dynamic view of bulimia considers self-esteem (fear of
failure) as the root of the disorder (Boskind-Lodahl, 1976). The
bulimic individual leads a tightly regulated life to avoid failure;
food is one element that can be indulged excessively. Psychodynamic
therapy seeks to elevate the bulimic's self-esteem and incorporate
more realistic goals.

Behavioral explanations attempt to account for the environmental
events that elicit or maintain the problematic behavior. Geller,
Kelly, Traxler, and Marone (1978) argued that self-induced vomiting
is initiated as a short-term weight-control mechanism that evolves into
a long-term weight-control mechanism. According to Geller et al., treatment consists of both controlling the eating aspects and reducing the self-induced vomiting by modifying all of the antecedent and consequent conditions for each. A similar behavioral viewpoint suggests that binge eating and self-induced vomiting are linked in a "vicious circle" by anxiety (Rosen & Leitenberg, 1982). Eating elicits anxiety and vomiting reduces it; thus, rational fears of gaining weight no longer inhibit overeating. Treatment from this latter viewpoint involves interrupting the link between the anxiety reduction of vomiting and bingeing via response prevention techniques.

Although bulimia nervosa has been accounted for within the framework of the different theoretical perspectives, no systematic investigations or verifications of the different accounts have been reported. None of the theories appear to consistently explain the disorder, nor have any offered sufficient data to support the theoretical arguments. In fact, prior to the Rosen and Leitenberg (1982) study, there were no controlled behavioral treatment studies of bulimia nervosa, and no studies that reported its successful treatment. Research is needed both to provide a theoretical rationale for bulimia and to provide effective treatments.

A behavioral treatment has been developed that might provide a theoretical understanding of bulimia nervosa as well as provide a successful treatment technique for the disorder. Habit reversal was developed by Azrin and Nunn (1973) as a treatment for nervous tics and habits. The rationale for habit reversal was that nervous habits originally start as a normal reaction. An extreme event such as a
physical injury or psychological trauma is associated with the original behavior so that an infrequent, but normal, behavior increases in frequency but alters in form. Azrin and Nunn (1973) suggested that the "behavior becomes classified as a nervous habit when it persists after the original injury or trauma has passed and when it assumes an unusual form and unusually high frequency" (p. 670). According to Azrin and Nunn, a habit persists because the individual is largely unaware of its occurrence due to its gradual development. Habit reversal was designed as a treatment technique based on the characteristics of a nervous habit:

The client should learn to be aware of every occurrence of the habit. Each habit movement should be interrupted so that it is no longer part of a chain of normal movements. A physically competing response should be established to interfere with the habit (p. 620).

Habit reversal has successfully treated a wide range of habits. Stuttering (Azrin & Nunn, 1974; Azrin, Nunn & Frantz, 1979), nail-biting (Horne & Wilkinson, 1980; Katz, Thomas & Williamson, 1976), cigarette-smoking (Katz, Heiman & Gordon, 1977), bruxism (Rosenbaum & Ayllon, 1981b), and neurodermatitis (Rosebaum & Ayllon, 1981a) are among the behaviors viewed as habits and treated with habit reversal. The present author suggests that bingeing and purging might be viewed as a habit. Russell (1979) pointed out that his subjects reported the habit-forming aspects of self-induced vomiting by drawing analogies to smoking, alcohol and drugs. Kenny and Solyman (1971) suggested that

Self-provoked vomiting is an autonomous habit long divorced from the original source of conflict (to enjoy eating and yet to remain slim). Treatment focusing on the elimination
of the habit itself may therefore help more decisively than insight-gaining therapy heretofore considered to be ineffective (p. 107).

It is possible that bulimia may indeed be best explained as a habit and therefore be amenable to habit reversal. No studies have been reported that apply habit reversal to bulimia nervosa.

In summary, a review of the literature indicates a need for: (a) treatment techniques that effectively reduce or eliminate the dysfunctional behaviors comprising bulimia nervosa; (b) investigation of the utility of habit reversal as a treatment technique for bulimia nervosa; and (c) subsequent understanding of bulimia nervosa as a habit.

The purpose of the present study was to provide data to assess the utility of habit reversal as a treatment for bulimia nervosa. Second, data were provided to assess response generalization for the habit reversal treatment of bulimia. Behavioral techniques have been criticized as dealing only with the consummatory aspects of bulimia (Boskind-Lodahl & White, 1978) which prevents the individual from achieving "autonomy and self-determination" (Bruch, 1977, p. 105). It was presently argued that bulimia nervosa is a habit that once successfully reduced or eliminated, allows the individual to experience positive side-effects in other areas of functioning (e.g., increased social contacts that were avoided because of the habit, improved self-control, and a decrease in self-deprecating thoughts).
Eating disorders have been described as "gross disturbances" in eating behavior (American Psychiatric Association, 1980). Bulimia nervosa is an eating disorder characterized primarily by recurrent bouts of binge eating followed by self-induced vomiting and/or fasting. In the following literature review, two areas of research are presented. The first area describes and evaluates the literature related specifically to bulimia nervosa and bulimic-like behaviors. Because bulimia nervosa is characterized by both binge eating and self-induced vomiting, literature related to each behavior is included. A brief, introductory summary of the literature related generally to eating disorders is provided as a background for the discussion of bulimia. The second area to be reviewed focuses on the habit reversal literature. The theoretical basis of habit reversal is detailed and habit reversal research evaluated. Last, it is argued that habit reversal is applicable to bulimia nervosa.

**Eating Disorders**

**Obesity**

Although obesity is included as an eating disorder in the research literature (Agras & Werne, 1981; Barlow, 1981; Stunkard & Mahoney, 1976), obesity is classified as a physical disorder and not as an eating disorder (American Psychiatric Association, 1980). The origins of obesity are as yet unknown and probably reflect the complex interaction
of genetic, biological, psychological and environmental factors (Barlow, 1981). Research in the area of obesity has consisted of the evaluation of various approaches to modifying overeating such as self-monitoring, stimulus control procedures and operant conditioning of alternate eating styles. Little difference has been shown in effectiveness between behavioral and nonbehavioral (inpatient) treatments. A comprehensive review of obesity research is beyond the purposes of the present review (see Agras & Werne, 1981; Barlow, 1981; Stunkard & Mahoney, 1976 for reviews).

**Anorexia Nervosa**

According to the *Diagnostic and Statistical Manual of Mental Disorders III* (American Psychiatric Association, 1980), anorexia nervosa is an eating disorder characterized by the following: (a) disturbance of body image (i.e., claiming to feel fat when emaciated); (b) intense fear of becoming obese that does not diminish as weight loss progresses; (c) weight loss of at least 25 percent of the original body weight; (d) refusal to maintain body weight over a minimal normal weight for age and height; and (e) no known physical illness that would account for the weight loss. Stunkard and Mahoney (1976) viewed anorexia as the opposite pathological extreme from obesity. As with obesity, there is little understanding as to the etiology of anorexia nervosa. Research has concentrated on the effectiveness of various treatment techniques. Desensitization of obesity phobia and reinforcement for eating behavior and weight gain have produced some success. Few controlled studies of treatment for anorexia nervosa have been reported (see Agras & Werne, 1981; Stunkard & Mahoney, 1976 for reviews).
Bulimia Nervosa

As an eating disorder, bulimia nervosa is differentiated from anorexia primarily by a lack of consistent weight gain combined with the frequent occurrence of binge eating terminated by either self-induced vomiting, social interruption, abdominal pain or sleep (American Psychiatric Association, 1980). Individuals suffering from bulimia nervosa are aware of their unusual eating pattern, perceive themselves unable to control their unusual eating behavior and report engaging in self-deprecating thoughts following eating binges. The diagnostic differentiation between bulimia and anorexia is not clear-cut, however, when it is considered that some anorexics do not abstain from eating (Casper, Eckert, Halmi, Goldberg, & Davis, 1980; Geller et al., 1978). In some cases, anorexics experience uncontrollable eating binges and attempt to remove the food through self-induced vomiting, laxatives, enemas and diuretics. Casper et al. reported that 49 of 105 hospitalized anorexics ate large amounts of food and subsequently induced vomiting. In fact, it was noted that most of the anorexics who overate did so with the forethought that they could resort to vomiting. Geller et al. (1978) used "bulimia anorexia" as a term for anorexics who engaged in binge eating and food removal. A possible distinction between bulimia nervosa and anorexia nervosa is that the bulimic maintains weight over time while the anorexic consistently loses weight.

Theoretical Explanations for Bulimia

Psychoanalytic Theory

The psychoanalytic model provides an explanation of bulimia
nervosa that is limited to females. According to psychoanalytic theory, bulimia is rooted in the female maturational process (Szyrynski, 1973). In normal development, the young female attaches emotionally to the mother who represents the child's first love object. A shift in love object from the mother to the father is said to occur as a result of the child's preoccupation with her sexual organ. In Freudian terminology, this conflict in sexuality for the young child is known as the Oedipus complex (Randals, 1974). The young girl notices that males possess a penis while she does not. The awareness that the young girl is without a penis is said to make her feel inferior. She believes that her mother has taken her penis and that her father might give her one. The young girl then shifts her emotional attachment to her father. According to psychoanalytic theory, the Oedipus complex is resolved for the girl when she finds a nonincestuous love object to substitute for the father in a later stage of development.

The psychoanalytic explanation of bulimia is that the disorder begins during the preoedipal rivalries of the young female (Szyrynski, 1973). The bulimic identifies with a kind passive father and at the same time experiences hostility toward an aggressive, castrating mother. The hostility towards mother creates anxiety and is psychologically unacceptable to the young child. As a defense against the hostility, the young girl overidentifies with femininity. The result is an unconscious desire for pregnancy. The ritualistic bingeing of food is interpreted as a provision for unconscious "pregnancy."

Psychoanalytic theory does not offer an explanation to account for self-induced vomiting or fasting concomitant with bingeing.
Psycho-dynamic View

As with psychoanalytic theory, the psycho-dynamic explanation of bulimia nervosa is only for females with the disorder. The crux of the psycho-dynamic explanation for bulimia is that bulimic behaviors are motivated by underlying problems.

The source of the motivation for bulimia arises from parental conflicts (Boskind-Lodahl, 1976). The bulimic individual develops abnormally low self-esteem as a result of perceived parental expectations that cannot be fulfilled. Because of the perceived importance of physical appearance for females, a young female normally develops self-esteem based primarily on physical appearance and sexuality. Parental expectations of any kind are perceived by the young female as sexually related. The young female fears parental disapproval and rejection that might result from sexual activity.

A female develops bulimia out of fear of failure and abnormally low self-esteem. The bulimic female struggles to meet unrealistic goals by imposing severe and ascetic controls. A disproportionate concern with physical appearance is one manifestation of the severe controls that are imposed. In the struggle for perfect control in eating, the binge is perceived as a welcome release or pleasure at being out of control. The binge leads to guilt and shame at having lost control. The removal of food following the binge is the individual's renewed attempt to gain control. According to psychodynamic theory, the bulimic cycle is perpetuated by the individual's struggle for power and control.
Behavioral Explanations

In contrast to psychoanalytic and psycho-dynamic explanations of bulimia nervosa, behavioral explanations focus on environmental events that appear related to the problematic behaviors referred to as bulimic. Bingeing and self-induced vomiting are viewed as the problem with causes in the environment. Behavioral explanations attempt to account for the antecedent and consequent events directly related to the development and maintenance of problem behavior. Antecedent controlling variables are classified as those stimuli that elicit conditioned autonomic and emotional responses, and stimuli that serve as cues. Consequent events are those stimuli that follow a response and that result in an increment or decrement in the frequency or intensity of that response (Lora & Orleans, 1981). When the controlling variables are determined, a variety of behavioral principles such as operant procedures and desensitization or aversion techniques can be applied to establish appropriate control of the individual's behavior.

According to behavioral concepts, a binge can be triggered by seeing, tasting, smelling, having access to preferred and fattening food, or engaging in activities associated with eating. Also, significant others who pressure or seek to help the bulimic may inadvertently reinforce or strengthen the behaviors they hope to weaken or discourage (Lora & Orleans, 1981). The function of self-induced vomiting might be that the individual perceives vomiting as the only way of keeping weight down in the face of a recently established rise in food consumption (Fairburn, 1980). Behavioral conceptualizations have been utilized to generate treatment procedures.
Treatment of Bulimia

Very few controlled treatment studies have been reported in the area of bulimia nervosa. The treatment literature is comprised primarily of case reports and theoretical essays. Additionally, several studies have reported treatment of binge eating or self-induced vomiting that does not occur in combination as with bulimia. The treatment literature for bulimia is reviewed below from medical, psychoanalytic, psychodynamic and behavioral perspectives, although the medical (pharmacological) treatment of bulimia does not offer a theoretical understanding of the eating disorder.

Medical Treatment

In one case report, a tricyclic anti-depressant (amitriptyline) was administered over a 4-month period to a 20-year-old female who engaged in "multiple daily eating and vomiting episodes" (Moore, 1977, p. 1303). The medication was started after 18 months of unspecified psychotherapy. Moore indicated that the vomiting episodes decreased to two per week after one week of medication (100 mg/day), and to zero after two weeks (150 mg/day). The dosage of amitriptyline was tapered off at approximately four months of treatment when it was reported that the subject experienced protracted episodes of bingeing and vomiting. The medication was renewed at the original levels and the behavior ceased again. Moore argued that the serendipitous reversal design achieved in the case documented the possible efficacy of amitriptyline for bingeing and vomiting. However, it was entirely possible that there were placebo effects of the medication, or that there were experimenter
expectations related to the medication that produced the effect. 
Moore did not indicate whether concurrent psychotherapy occurred that 
could have been a confounding factor. The results of this case 
report are only suggestive of the possibilities in future controlled 
research with amitriptyline.

Another case report included a serendipitous reversal design while 
utilizing an MAO anti-depressant (phenelyzine sulfate) for the treatment 
Unspecified concurrent psychotherapy was conducted with the administra-
tion of the medication. Rich indicated that the vomiting was under 
control after four weeks of treatment. No objective data were provided 
in the report. Three months after discontinuing the medication, 
vomiting re-appeared. Phenelyzine sulfate was administered again and 
vomiting again decreased. Valid conclusions drawn from this case 
report must be limited. The results were confounded by concurrent 
psychotherapy and the possible placebo effects of the medication. 
Also, historical factors could have intervened during the three months 
following discontinuation of the medication that might account for the 
renewed occurrence of the vomiting in a fashion related to the with-
drawal of the medication.

A different medication utilized with bulimic-like behavior has 
been an anti-convulsant. Green and Rau (1974) hypothesized that 
disturbances in eating behavior may be a result of hypothalamic 
neurological dysfunction. In a case report, they treated 10 subjects 
who displayed episodic overeating with diphenylhydantoin (Dilantin).
Nine of the 10 subjects showed abnormal brain wave patterns on an 
electroencephalogram (EEG). Concurrent psychotherapy was provided
with the medication. Green and Rau reported that the treatment was successful, but the authors did not provide objective data. No firm conclusions can be drawn from this study due to the absence of controls for placebo effects, the confounding of psychotherapy and pharmacological treatment, and the lack of objective, observational data.

In order to examine the possible clinical effectiveness of Dilantin (Green & Rau, 1974), Wermuth, David, Hollister, and Stunkard (1977) conducted a 12-week, double-blind crossover study comparing Dilantin with a placebo. Nineteen women who exhibited at least one binge per week were included in the study. The definition for binge eating stipulated that binge termination occur only when a point of physical discomfort was reached and feelings of guilt, remorse or self-contempt followed. The subjects could not have experienced a binge-free interval longer than three weeks during the previous year. No concurrent psychotherapy occurred during the study. Medication was monitored by psychiatrists who were not informed to which condition the subjects were assigned. Subjects were randomly assigned to one of two experimental groups. Stage I of treatment consisted of Dilantin administration to one experimental group for six weeks and placebo (unspecified) administration to a second experimental group for six weeks. Stage II was placebo administration to the first experimental group for six weeks and Dilantin administration to the second experimental group for six weeks. Subjects estimated their weekly frequency of binges prior to treatment to serve as historical baseline condition.

Results of the Wermuth et al. study indicated that the mean frequency of bingeing was significantly lower from baseline to Stage I for the Dilantin-placebo group, but no change occurred from baseline
to Stage I for the placebo-Dilantin group. The Dilantin-placebo group continued to exhibit the same mean frequency of bingeing in Stage II as in Stage I. Blood analyses conducted every two weeks showed no detectable plasma concentrations of Dilantin; therefore, it was speculated by the authors that a learning effect was created once the pattern of binge eating was interrupted. For Stage II of the placebo-Dilantin group, the mean frequency of bingeing decreased. EEG abnormalities were not correlated with treatment. Wermuth et al. concluded that conventional anti-convulsant activity did not account for the binge-reducing activity of the drug. According to the authors, the mechanisms of action for Dilantin in binge eating remain unclear. Even though the mean rate of binges per week was reduced with Dilantin, examination of individual data revealed that no change was seen in five subjects, and six subjects were classified as slightly changing (20% to 40% reduction). Although clearly effective in this study, the clinical effectiveness of Dilantin remains to be demonstrated across a broader range of subjects. Statistically significant changes in mean rates of binges were somewhat obfuscated by considerable individual variability in the data.

In summary, medical treatment for bulimia nervosa remains to be proven. No sound evidence yet exists for demonstrating the clinical effectiveness of medication for bulimia, nor has there been any medical rationale developed to adequately account for possible physiological factors related to the disorder. Controlled studies to examine the mechanisms of medication treatments are needed in lieu of case studies.
Psychoanalytic Treatment

No controlled research has utilized psychoanalytic treatment for bulimia nervosa. Various authors cited case histories of patients from which psychoanalytic interpretations were drawn. Wulff (1945) discussed psychoanalytic treatment as disclosing the unconscious content of the eating disorder. The mother conflict may be covered by an oral-sadistic Oedipus conflict and therefore assume a disordered oral (eating) syndrome. According to Wulff, the patients have an intense unconscious hatred against their mothers and against femininity. Similar interpretations have been offered by Linder (1955) who suggested that the cure for bulimia involves putting an end to the hatred of femininity by helping women accept and act out the traditional female role. A more recent writer suggested that treatment focus on parent-child relations from their beginnings without recourse to an overly symbolic approach (Bruch, 1977). Yet Bruch (1977) went on to confirm the importance that fear of "oral impregnation" contributes to the disorder.

One must approach psychoanalytic arguments with healthy skepticism due to the lack of supporting research data. Psychoanalytic treatment effectiveness for bulimia has yet to be empirically demonstrated. The case reports offered in the literature are anecdotal and are, therefore, subject to bias and distortion by their authors.

Psycho-dynamic Treatment

In psycho-dynamic treatment of bulimia nervosa, the goal is to treat the underlying motivation for which bingeing and vomiting is
a symptom. Several studies have reported descriptive analyses of individuals diagnosed as bulimic in order to provide an understanding of the underlying problem. Guiora (1967) studied the verbal comments related to eating for six females diagnosed as bulimic. According to Guiora, the basis of the eating disorder is early deprivation in the mother-child relationship. Bulimia is viewed by Guiora as an expression of a basic conflict in womanhood, motherhood, identity and aggression. Beaumont, George, and Smart (1976) supported the contention that there is an underlying personality problem in bulimia nervosa.

In a retrospective analysis of 31 case records, Beumont et al. suggested that the only difference between dieters and vomiters-and-purgers was in the long duration of the illness for vomiters. They suggested that individuals were predisposed to manifest the eating disorder in reaction to stress because of an obsessional personality. Both the Guiora (1967) and Beaumont et al. studies contain methodological flaws characteristic of retrospective case studies. Because of the lack of precision of data collection and subsequent subjectivity in interpretation, the results have limited validity.

Controlled treatment outcome studies utilizing a psycho-dynamic approach are almost nonexistent. Boskind-Lodahl and White (1978) argued that treatment of distorted body image, low self-esteem, feelings of helplessness and inordinate shame is necessary to alleviate the eating disorder. The authors designed an experiential group treatment program consisting of a combination of Gestalt awareness exercises and behavioral techniques (e.g., journal reading, role-playing and guided fantasy exercises) designed to increase understanding of sexuality,
awareness of emotions related to eating and feelings of positive self-esteem. Twenty-six females who exhibited bingeing and purging, a distorted body image as measured by a modified Body Cathexsis Test and low self-esteem as measured by the 16 Personality Factor Questionnaire were included in the study. In the experimental group, 13 subjects participated in 11 weekly 2-hour group sessions and one 6-hour marathon group session midway during treatment. The other 13 subjects were placed on a waiting list. Subjects reported frequencies of bingeing. From the results of the study, Roskind-Lodahl and White concluded that "the treatment program did not prove sufficient to alter the critical aspects of this syndrome" (p. 92), although subjects were "helped to recognize their problem" and seek further treatment. The authors did not provide data on the subjects' bingeing and purging. Treatment effectiveness of psycho-dynamic approaches for bulimia nervosa remains to be shown.

Behavioral Treatment

Behavioral conceptualizations have generated treatment techniques for behaviors described as bulimia. Among the bulimic-like behaviors treated have been binge eating in obesity (Loro & Orleans, 1981; Meyer, 1973; Smith, 1981), compulsive eating (Morganstern, 1974; Wijesinghe, 1973), vomiting (Kenny & Solyman, 1971), bulimia anorexia (Geller, et al., 1978; Monti, McCrady & Barlow, 1977) and two individual cases of bulimia nervosa (Rosen & Leitenberg, 1982; Wijesinghe, 1973). The literature is primarily composed of case reports, but a few controlled studies have been reported. The various behavioral treatment studies are discussed below.
There has been some confusion in the literature regarding the labeling of excessive eating behavior as compulsive eating vis-a-vis binge eating. Both Russell (1979) and Smith (1981) argued that compulsive eating is an obsessional disorder that consists of continued eating throughout the day. According to Stunkard and Mahoney (1976), "compulsion" should be confined to strong, irresistible inclinations to carry out repetitive and apparently meaningless acts. Binge eating, on the other hand, is viewed as a distinct disorder consisting of episodic bouts of overeating that coincide with reported awareness that the eating pattern is abnormal, fear of not being able to stop, and depressed mood and self-deprecating thoughts following the binge (Loro & Orleans, 1981; Smith, 1981). The distinction between compulsive eating and binge eating apparently is in the length of time involved in eating and reported perceptions of the individual concerning the eating pattern. Compulsive eating is defined by its indefinite length and by the individual's report that the eating pattern is normal. Binge eating is defined as a bout of overeating that occurs within a specified period of time combined with the individual's report that the eating pattern is abnormal and disgusting. The present paper defines eating patterns as compulsive or bingeing based on the latter distinction.

Compulsive eating. Two case studies have reported treatment of compulsive eating with aversion therapy. Wijesinghe (1973) applied massed electrical aversion training to a 20-year-old female who ate sweet foods throughout the day that contributed to obesity. The subject was administered shocks at various stages of handling her
preferred food over six sessions in a single day. The intensity and duration of the shocks were randomly varied over the 40 to 50 trials per session. The subject's weight at treatment was 184 lb, which decreased to 165 lb at a 6-month follow up. In another case report, Morganstern (1974) trained a 24-year-old female in the self-management of continuous eating of candy and junk food (e.g., cookies and doughnuts) by aversion conditioning with cigarette smoke as the noxious stimulus. The training occurred over 18 weekly treatment sessions with instructions for daily home practice by the subject. Aversion treatment consisted of having the subject chew the targeted food, take a puff on a cigarette, spit out the food and say, "eating this junk food makes me sick." Over a 24-week period, the subject lost 41 lb. Morganstern noted that the food aversion generalized to ice cream and pizza. Results of both the Wijesinghe and Morganstern case reports are only suggestive that aversion therapy can be successfully applied to the treatment of compulsive eating. In each case, it was possible that other, nonspecific factors accounted for the weight reduction (e.g., demand characteristics) instead of aversion conditioning. Controlled research is needed to conclude that aversion therapy can reduce compulsive eating.

Binge eating. In this area, Meyer (1973) and Smith (1981) reported successful treatment utilizing response prevention techniques. Meyer (1973) contracted with a 32-year-old female to either go for a walk or meet a friend to prevent a binge whenever the urge to binge occurred. The subject was instructed to call the therapist immediately whenever the impulse to eat was so great that she felt she could no longer resist
the impulse by any other means. No data were provided although it was indicated that treatment was successful. Smith (1981) treated a 36-year-old woman with response prevention for weekly binges. The subject brought highly desired food (e.g., two sandwiches) to a treatment session. She ate a certain amount of the food (e.g., one sandwich) and then had to refrain from eating the remaining food (the other sandwich) while in its presence for 30 minutes. Over four sessions, the amount of food eaten was gradually decreased. During treatment, the subject was taught to eat at a normal pace through modeling by the therapist. The subject was also asked to practice response prevention daily for 30 minutes. Smith reported that the subject lost 11 lb. after one month of treatment, and exhibited decreased bingeing. After five months, the subject had lost another 12 lb. and decreased bingeing from weekly to monthly episodes.

These uncontrolled case studies utilizing response prevention for binge eating must be interpreted with caution since the changes in the targeted behavior could be accounted for by factors other than response prevention. Experimenter expectation is one such factor. As with aversion therapy for compulsive eating, controlled research is needed to assess the causal relation between response prevention and binge eating.

**Vomiting.** Vomiting was treated by faradic disruption of mental images in a 22-year-old female (Kenny & Solyman, 1971). An electric shock was administered at pain threshold while the subject imaged the sequence of behaviors from eating a heavy meal to vomiting. The treatment occurred over 22 daily sessions. Complete elimination of
vomiting was achieved by the fifteenth session. The subject reported controlled eating habits at a 3-month follow up. As with the case reports cited above, the data from the Kenny and Solyman study could be accounted for by nonspecific factors such as demand characteristics, and should only be taken as suggestive of the outcome of further controlled research.

**Bulimia anorexia.** Bulimia anorexia has been described as alternating periods of overeating and vomiting with periods of decreased eating and consistent weight loss (Geller et al., 1978; Monti et al., 1977). Utilizing a variety of behavioral techniques, Geller et al. treated an 18-year-old female diagnosed with bulimia anorexia. During inpatient treatment, the subject could earn hospital privileges leading to discharge in exchange for normal eating patterns with no subsequent vomiting. The patient was given contingent verbal praise and encouragement by the therapists for decreasing the number of self-induced vomiting episodes per day, increasing the latency between eating and vomiting and systematically increasing the amount of food retained in the stomach. Concurrent family therapy for problem-solving and communication skills was conducted. After 18 days, the patient was eating three normal meals per day with no vomiting. Weekly metabolic monitoring indicated increased serum potassium levels that provided independent verification for decreased vomiting. During outpatient treatment, the subject returned to vomiting and was re-hospitalized. After six days, her eating patterns returned to normal. At a 5-month follow up, the patient's serum potassium levels remained normal and her family reported normal eating patterns. Because the Geller et al.
study was uncontrolled, causal statements regarding the relationship between treatment and behavioral outcome cannot be made.

In a more controlled case study of bulimia anorexia, Monti et al., (1977) treated a 28-year-old inpatient female with positive reinforcement and information feedback in a A-B-C-B-D single subject design. During baseline (A), caloric intake and weight were monitored. During reinforcement (B), the subject earned hospital privileges for specified weight gains. In the reinforcement plus feedback phase (C), reinforcement continued, and the subject graphed weight data on a wall graph. A return to reinforcement was instituted with the additional contingency of a specified amount of increased caloric intake. A fourth phase followed (D). Reinforcement and informational feedback were combined with systematic desensitization to self-deprecating thoughts. The subject was released to outpatient treatment consisting of contingency contracting for caloric intake with desensitization after 44 days of inpatient treatment. A 6-1/2 month follow up indicated that the patient maintained an appropriate caloric intake and weight level. No data on vomiting were reported. Monti et al. concluded that feedback appeared to play an important role in treatment. Reinforcement was more effective following reinforcement plus feedback and about the same as when desensitization was added. Although the results of this study support the contention that bulimia anorexia may be amenable to treatment by feedback and reinforcement techniques, the results must be skeptically accepted. The effects of reinforcement plus feedback are not directly comparable to baseline responding since the feedback plus reinforcement followed a reinforcement phase. Order
effects may have contributed to the results. Systematic replication across a variety of subjects is required to support treatment effectiveness of reinforcement and feedback techniques for bulimia anorexia.

**Bulimia nervosa.** To this point the review has included only bulimic-like behaviors. The behavioral treatment literature of bulimia nervosa is sparse. In the Wijesinghe (1973) study cited above, a 37-year-old woman was defined by the author as a compulsive eater, but in the manner her eating pattern was described, she more accurately would be diagnosed as bulimic. The woman engaged in twice weekly binges (i.e., consumption of large amounts of sweet, starchy foods over a 2-hour period) which were terminated by physical discomfort and followed by self-reported guilt and fasting. Wijesinghe treated this woman with electrical aversion therapy in the manner described previously for compulsive eating. The author reported complete cessation of bingeing at a one-year follow up. The same methodological criticisms discussed for this study earlier apply to the results for the bulimic woman.

One controlled study of a behavioral treatment for bulimia has been reported. Rosen and Leitenberg (1982) applied supervised exposure and response prevention to a 21-year-old female with chronic bulimia nervosa in a multiple baseline design across three classes of food stimuli. The classes of food were large meals, junk food (pizza, meatball submarine sandwich), and snack food (cream-filled chocolate cookies). During a 44-day treatment phase, the subject ate enough food to experience the urge to vomit, but she was not permitted to do so. No instructions to practice at home were given. Data were gathered on the
amount of food consumed, subjective units of discomfort (SUD) reported by the subject following supervised exposure, and self-reported bingeing and vomiting. Exposure and response prevention were effective in modifying all features of bulimia including elimination of bingeing and vomiting, minimization of subjective anxiety after eating and increased food intake of certain foods without vomiting. Rosen and Leitenberg argued that vomiting in bulimia serves an anxiety reducing function and therefore maintains binge eating.

The Rosen and Leitenberg (1982) study was confounded by several factors that were not discussed by the authors. The subject was given a plausible explanation for the cause of her bingeing and vomiting. This explanation could have sensitized the subject to antecedent events from which she could have modified her behavior. The supervised exposure might have served to change the subject's awareness of her eating habits or style. She could have then modified her eating patterns independent of treatment. It was therefore possible that factors other than supervised exposure and response prevention accounted for the treatment results. Rosen and Leitenberg postulated that vomiting is the driving force behind bingeing in bulimia, yet they failed to account for the fact that fasting is an alternative to vomiting in bulimia. Fasting does not immediately appear amenable to response prevention without the possibility of a weight increase for the bulimic individual.

Summary. The literature reporting treatment outcomes utilizing behavioral techniques is composed primarily of partially controlled case studies. Bulimia and bulimic-like behaviors have been treated
by aversion techniques, reinforcement, feedback, response prevention, inpatient hospitalization and contingency contracting. The case studies can be taken as encouraging, but controlled research in these areas is needed. The few controlled studies have limited generalizability and must be viewed cautiously. Behavioral techniques for bulimia nervosa have not been fully substantiated.

**Habit Characteristics of Bulimia Nervosa**

It is presently argued that bulimia nervosa might be conceptualized as a habit that would be amenable to habit reversal treatment. Before reviewing the habit reversal literature, support for this argument is presented. A habit is defined as any behavior(s) that persist(s) after an original injury or trauma and which is exhibited in unusual form and unusually high frequency (Azrin & Nunn, 1973). Several authors have suggested that the behaviors comprising bulimia have the properties of a habit.

Bingeing and/or self-induced vomiting can occur at low frequencies and not be considered problematic. Fairburn (1980) and Russell (1979) suggested that vomiting begins as a means of keeping weight down after a rise in caloric consumption. Vomiting becomes progressively easier. The body's nutritional requirements are not met and more hunger ensues. The cycle is perpetuated as the hunger is satisfied, but the added weight becomes a factor again. Loro and Orleans (1981) noted that extreme approaches to weight reduction tend to result in more binge eating. Fasting is an alternative strategy for weight control utilized by bulimics with similar consequences as vomiting. The bingeing and
vomiting and/or fasting cycle assumes a high frequency and can be defined as a habit.

Different mechanisms have been postulated to account for maintenance of the bulimic habit by different investigators. Rosen and Leitenberg (1982) argued that vomiting reduces the anxiety created by bingeing which makes it easier for the individual to binge again. According to Boskind-Lodahl and White (1978), the motivation to continue the bulimic habit reflects the individual's underlying need for self-esteem based on physical appearance. Psychoanalytic theory views the bulimic habit as maintained by unconscious hostility directed at the traditional feminine role (Szyrynski, 1973). No research has been reported that investigated the habit-like characteristics of bulimia nervosa. In the present study, the view and treatment of habits suggested by Azrin and Nunn (1973) is applied to bulimia.

**Habit Reversal**

Habit reversal is a behavioral technique developed specifically for the treatment of nervous tics and habits (Azrin & Nunn, 1973). In the following section, the theoretical basis of habit reversal is discussed. Second, habit reversal research is reviewed. The review of habit reversal includes clinical applications as well as comparisons of habit reversal with other treatment techniques. Last, applicability of habit reversal treatment for bulimia is proposed.

**Theoretical Rationale for Habit Reversal**

Azrin and Nunn (1973) suggested that a habit begins as a low-frequency behavior which gradually increases over a period of time.
The habit may begin as a result of an extreme event such as a physical injury or psychological trauma. The individual slowly becomes accustomed to the annoyances associated with the habit so that there is a failure to realize how much of a nuisance the habit is. According to Azrin and Nunn, gradualness is the cause of habit persistence. A pattern of unawareness develops to the occurrence of the habit. The unawareness is maintained because there is an absence of social reaction to the habit. Additionally, the habit becomes intertwined with other behaviors and becomes a part of normal, functional activities.

Based on the notion that habits develop gradually and persist because the individual is unaware of the habit pattern, Azrin and Nunn (1973) developed a general treatment plan for habits that is composed of several components. The first component of the general treatment plan is habit control motivation. The individual is taught to realize the full extent of the inconvenience caused by the habit by reviewing all of the situations in which the habit has caused difficulty. A list of annoyances and inconveniences is developed by the subject. To increase motivation for changing the habit, social support is elicited from family or close friends to encourage involvement in the treatment program. The second component of habit reversal is awareness training. The subject is taught to become aware of the specific details surrounding the habit. A list of behaviors that immediately precede the habit is constructed. This list also identifies where and how the habit is performed. An aspect of awareness training is to learn a competing reaction to the habit. The competing reaction enables the individual to stop the habit once awareness of its
occurrence has been achieved. The individual first learns to emit the competing reaction to interrupt the habit as soon as the habit is initiated. The next step is to learn to emit the competing response whenever habit temptation occurs to prevent the habit from starting. Last, behaviors associated with the occurrence of the habit trigger the competing reaction. In the third component of habit reversal, generalization training is implemented. Symbolic rehearsal is conducted in which the subject images common habit-eliciting situations in which the treatment is successfully performed.

Within each component of habit reversal, Azrin and Nunn (1973) coined terms for the specific procedures utilized to accomplish the general goals of each component. For the habit control motivation component, the procedures were termed "habit inconvenience review," "social support procedure" and "public display procedure" (practice in high-risk situations). Within the awareness training component, the procedures were termed "response description," "response detection procedure," "competing response practice" and "situation awareness training." "Symbolic rehearsal procedure" is the only procedure for the generalization training component.

Habit Reversal Outcome Research

Since the development of habit reversal as a treatment for nervous tics and habits (Azrin & Nunn, 1973), habit reversal has been applied to a broad variety of habit-like behaviors. Nervous tics have included muscle spasms in the neck, wrist, torso and arm, Tourette's syndrome, eye-blinking, eye-twitching and torticollis. Behaviors defined as habits have included nail-biting, thumb-sucking,
neurodermatitis (scratching), hair-pulling, stuttering, bruxism and cigarette-smoking. Since habit reversal is uniform across most studies, several studies are cited as examples. Habit reversal studies with notable deviations are indicated. Table 1 summarizes the research for the reader.

Several studies have applied habit reversal to nail-biting (Azrin, Nunn & Frantz, 1980a; Delparto, Aleh, Bambusch & Barclay, 1977; Katz, Thomas, Williamson, 1976; Ladouceur, 1979). Habit reversal procedures utilized to control fingernail-biting are as follows: First, the client discussed personal and social inconveniences that had resulted from nail-biting (habit inconvenience review). For example, nail-biting results in poor physical appearance of hands, self-consciousness of the habit leads to negative self-thoughts and members of the opposite sex are avoided because of the habit. Close friends were asked to comment favorably on the client's efforts and improved appearance (social support procedure). The counselor also provided encouragement by telephone on a daily basis for the first couple of weeks. The client was instructed to seek out likely nail-biting situations and practice the competing activity in each of them (public practice procedure). For awareness training, the client learned to attend to all of the situations (situation awareness procedure) where nail-biting was likely to occur as well as all of the behaviors associated with nail-biting (response description and response detection procedure). Associated behaviors might include picking at the cuticles or skin surrounding the nail, or frequently resting hands on the face. Clients viewed
Table 1

Summary of Habit Reversal Literature

<table>
<thead>
<tr>
<th>Authors</th>
<th>N</th>
<th>Dependent behaviors</th>
<th>Procedures utilized</th>
<th>Results</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azrin &amp; Nunn (1973)</td>
<td>12</td>
<td>shoulder-jerking, elbow-flapping, head-jerking, head-shaking, eyelash-plucking, fingernail-biting, thumb-sucking, lisping, tongue-thrusting</td>
<td>habit reversal</td>
<td>2 Ss-- 90% reduction</td>
<td>5 months for 7 Ss-- 100% reduction</td>
</tr>
<tr>
<td>Katz, Thomas, &amp; Williamson (1976)</td>
<td>14</td>
<td>stuttering</td>
<td>habit reversal</td>
<td>94% reduction after first day</td>
<td>4 months-- 98% reduction</td>
</tr>
<tr>
<td>Nunn &amp; Azrin (1976)</td>
<td>13</td>
<td>nail-biting</td>
<td>habit reversal</td>
<td>100% reduction</td>
<td>9 Ss at 3 months-- 100% reduction</td>
</tr>
<tr>
<td>Delparto, A., Bambusch, &amp; Barclay (1977)</td>
<td>3</td>
<td>nail-biting</td>
<td>habit reversal</td>
<td>at week 8, gain in nail length ranging from 33% to 120%</td>
<td>6 months-- nail length gains of 30%, 70%, and 241.</td>
</tr>
<tr>
<td>Katz, Neuman, &amp; Gordon (1977)</td>
<td>30</td>
<td>cigarette-smoking</td>
<td>habit reversal vs. self-instruction &amp; self-reinforcement vs. education/will power</td>
<td>no differences between groups 27% average reduction</td>
<td>Not reported</td>
</tr>
<tr>
<td>Azrin, Nunn, &amp; Frantz (1979)</td>
<td>38</td>
<td>stuttering</td>
<td>habit reversal vs. abbreviated desensitization</td>
<td>HR: 94% reduction</td>
<td>HR: 3 months-- 97%</td>
</tr>
<tr>
<td>Ladouceur (1979)</td>
<td>59</td>
<td>nail-biting</td>
<td>habit reversal vs. self-monitoring vs. HR &amp; SM vs. SM &amp; daily graphing vs. control (2 hrs of beh. analy.)</td>
<td>4 groups significantly and equally increased nail length as compared to control</td>
<td>3 months-- Same</td>
</tr>
</tbody>
</table>
Table 1 (continued)

<table>
<thead>
<tr>
<th>Study, Authors</th>
<th>Sample Size</th>
<th>Target Behavior</th>
<th>Comparison</th>
<th>HR Effect</th>
<th>NP Effect</th>
<th>IIR Effect</th>
<th>Follow-Up</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azrin, Nunn, &amp; Frantz (1980a)</td>
<td>97</td>
<td>nail-biting</td>
<td>habit reversal vs. negative practice</td>
<td>HR: 98% reduction</td>
<td>NP: 60% reduction</td>
<td>IIR: 84% reduction</td>
<td>3 months-- 98%</td>
<td>NP: 3 months-- 60%</td>
</tr>
<tr>
<td>Azrin, Nunn, &amp; Frantz (1980b)</td>
<td>22</td>
<td>nervous tics (neck, head, wrist, torso, and mouth jerking or twisting)</td>
<td>habit reversal vs. negative practice</td>
<td>HR: 84% reduction</td>
<td>NP: 30% reduction</td>
<td>IIR: 84% reduction</td>
<td>18 months-- 97%</td>
<td>NP: 1 month-- 33%</td>
</tr>
<tr>
<td>Azrin, Nunn, &amp; Frantz (1980c)</td>
<td>34</td>
<td>hair-pulling</td>
<td>habit reversal vs. negative practice</td>
<td>HR: 99% reduction</td>
<td>NP: 58% reduction</td>
<td>IIR: 99% reduction</td>
<td>3 months-- 91%</td>
<td>NP: 3 months-- 50%</td>
</tr>
<tr>
<td>Horne &amp; Wilkinson (1980)</td>
<td>40</td>
<td>nail-biting</td>
<td>simplified HR (fist-clenching &amp; nail-care) vs. simplified HR &amp; series of ongoing targets vs. no fist-clenching vs. waiting-list control</td>
<td>no difference in reduction rate (100%) at treatment phase compared to control</td>
<td></td>
<td></td>
<td></td>
<td>2 months; HR component associated with lower relapse rate</td>
</tr>
<tr>
<td>Azrin, Nunn, &amp; Frantz-Renshaw (1980)</td>
<td>30</td>
<td>thumb-sucking</td>
<td>habit reversal vs. bitter tasting solution</td>
<td>92% reduction for both after first week</td>
<td>HR: 20 months-- 89%</td>
<td>BTS: 20 months-- 35%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rosenbaum &amp; Aylton (1981b)</td>
<td>4</td>
<td>bruxism</td>
<td>habit reversal</td>
<td>88% reduction</td>
<td></td>
<td></td>
<td></td>
<td>12 months-- average of 80% reduction</td>
</tr>
<tr>
<td>Rosenbaum &amp; Aylton (1981a)</td>
<td>4</td>
<td>neurodermatitis</td>
<td>habit reversal</td>
<td>75% reduction</td>
<td></td>
<td></td>
<td></td>
<td>6 months-- average of 80% reduction</td>
</tr>
<tr>
<td>Franco (1982)</td>
<td>5</td>
<td>nervous tics (Tourette's syndrome, torticollis, arm-jerking, mouth-jerking)</td>
<td>habit reversal</td>
<td>99.5% reduction</td>
<td></td>
<td></td>
<td></td>
<td>Not reported</td>
</tr>
</tbody>
</table>

Note. HR= habit reversal; SM= self-monitoring; AD= abbreviated desensitization; NP= negative practice; BTS= bitter tasting solution
themselves in a mirror while purposely engaging in fingernail-biting in order to learn these associated behaviors. The client next learned to differentiate these associated behaviors from other normal movements (early warning procedure). The competing response procedure consisted of either grasping a situation-appropriate object or objects with both hands, or clenching the fists with thumbs placed against the palm of the hand until a slight amount of tension was felt. The competing response was maintained for three minutes.

Habit reversal has been highly effective in reducing and/or eliminating fingernail-biting. Azrin et al., (1980a) demonstrated a 98 percent reduction in nail-biting at a 5-month follow up as compared to a 33 percent reduction for a control group treated with negative practice. Nunn and Azrin (1976) showed a 100 percent reduction in nail-biting for nine of 13 subjects at a 3-month follow up. Other studies have shown significant increases in nail lengths compared to control groups based on photographs taken as pre- and post-measures (Horne & Wilkinson, 1980; Katz et al., 1976; Ladouceur, 1979). Importantly, none of the studies reported that the competing response activity substituted as a habit for fingernail-biting. From the weight of the evidence, it can be concluded that habit reversal is a successful treatment for nail-biting. Habit reversal has been applied to nail-biting across a large number of subjects in different clinical settings (Azrin et al., 1980a; Delparto et al., 1977; Horne & Wilkinson, 1980; Katz et al., 1976).

Stuttering has also been classified as a habit and treated with habit reversal. Azrin and his associates (Azrin & Nunn, 1974; Azrin
et al., 1979) labeled habit reversal for stuttering "the regulated-breathing approach." The treatment specific to stuttering included teaching the client to relax when nervous by changing body posture and breathing, to identify stuttering-prone sounds, situations and bodily precursors of stuttering, to enlist a supportive family member, to seek out situations previously avoided and to practice the competing response (stop speech and exhale smoothly while blending words into the exhalation pattern) in those situations. Azrin and Nunn (1974) demonstrated a 98 percent reduction in stuttering for 14 subjects at a 4-month follow up. Since there were no control conditions in this study, the results could be accounted for by nonspecific factors of the experimental setting. In a controlled follow up study, Azrin et al. (1979) compared habit reversal with abbreviated desensitization treatment of stuttering. Habit reversal reduced stuttering 97 percent when assessed at a 3-month follow up as compared to a 12 percent reduction for abbreviated desensitization (N=19 for each group).

More research is needed to establish confidence in the generalizability of habit reversal stuttering to a broad range of stuttering individuals.

The most noticeable deviation in the habit reversal research thus far reported has been the addition of a relaxation procedure (Azrin, Nunn & Frantz, 1980b, c; Franco, 1982; Rosenbaum & Ayllon, 1981a). Azrin et al. (1980b) considered nervousness a common precursor to a habit. Relaxation training consisted of two different forms. Deep regular breathing and postural adjustments were utilized in the case of stuttering and hair-pulling, while deep-muscle relaxation was instituted as an adjunct to habit reversal for bruxism. No data have been
presented to determine the relative contribution of adding the relaxation response to the competing response procedure of habit reversal.

Another deviation in habit reversal was its adaptation for young children with thumb-sucking (Azrin, Nunn & Frantz-Renshaw, 1980). Thumb-sucking was treated by habit reversal and a bitter-tasting solution control. Treatment was presented as a game involving exercises (clenching and grasping). The parents provided reminders and encouragement and enforced the program only when the child failed to perform the exercises after a gentle reminder. The various procedures and probable problem situations were role-played. The authors noted an 89 percent reduction in thumb-sucking at a 20-month follow up compared to a 35 percent reduction for the bitter-tasting solution group.

When reviewing the habit reversal literature, the reader may be misled by different terminology utilized by various researchers. The general treatment is the same across studies although terms have been added or changed. For example, Azrin et al. (1980b) utilized the term "prevention training" to represent practice of the competing response to prevent hair-pulling. Azrin and Nunn (1974) used "anticipation awareness" in place of "early warning procedure," and "positive practice" in place of "public display." The same basic procedures were used regardless of the terminology.

It is of interest to note that habit reversal was found to be as effective as several other techniques in the treatment of cigarette-smoking (Katz et al., 1977). A 27 percent reduction matched the reduction levels reported in the cigarette-smoking literature. Katz
et al. concluded that the similarity between cigarette-smoking and other nervous habits is superficial at best. The authors did not discuss the specific implications of the physiologically addicting properties of cigarette-smoking. Habit reversal may be inapplicable for an addictive habit. It might be that once the physical addiction is systematically reduced to a minimum, habit reversal would be effective in eliminating the habit. Research is required to test this hypothesis.

**Side Effects**

An important finding consistently noted in habit reversal studies is the absence of negative side effects. The competing response for nervous tics and habits does not become a habit itself (Azrin & Nunn, 1973; Nunn & Azrin, 1976). In the treatment of hair-pulling, Azrin et al. (1980b) reported that the competing response did not persist as a habit after the hair-pulling was eliminated. In fact, the subjects spontaneously stated that the urge to pull hair was gone. Thumb-sucking treated by habit reversal did not produce the eating or speaking problems associated with other forms of treatment, nor did the competing response persist as a habit (Azrin et al., 1980). Last, Azrin and Nunn indicated that individuals who had previously stuttered now entered into conversations more frequently and no longer avoided persons or situations as verified by family members (Azrin & Nunn, 1974; Azrin et al., 1979).

No studies have reported a systematic investigation of the possible negative or positive side effects of habit reversal.

In summary, habit reversal has produced substantial and durable decreases in a variety of habits in different subjects (including children) and habit reversal appears amenable to adaptation to a wide
variety of habit-like behaviors. Research related to the necessary and sufficient components of habit reversal is now reviewed.

Habit Reversal Comparison Research

Habit reversal consists of several different components based on a theoretical rationale of habit development. No systematic studies have been reported investigating the relative effectiveness of each component of habit reversal. One of the difficulties that exists in a component analysis of habit reversal is that awareness cannot be reversed or withdrawn. Symbolic rehearsal is predicated on learning awareness procedures and habit motivation control. An adequate experimental group design would require a large sample from a homogeneous population. Large samples of subjects who exhibit similar clinical symptomology are difficult to obtain. Research on some habits, such as bulimia, may entail ethical responsibilities against withholding treatment for an extended time from certain control groups.

With the above considerations in mind, the research suggestive of the relative contributions of each component in habit reversal is reviewed below.

Hypothesizing that habit reversal was a variant of self-monitoring and the crucial element responsible for its success, Ladouceur (1979) compared habit reversal with variations of self-monitoring using nail-biting as the dependent behavior. Self-monitoring consisted of making a check on a behavior inventory especially designed for the study. Habit reversal was compared to habit reversal plus self-monitoring, self-monitoring, self-monitoring plus daily graphing and a waiting list control. Pre- and post-treatment photographs were taken.
of the subjects' fingernails. Results of the study indicated that the four treatment groups significantly and equally reduced fingernail-biting as compared to the control group. Ladouceur (1979) argued that awareness was the crucial component in habit reversal effectiveness. However, a serious flaw existed in the statistics utilized in the Ladouceur study that negates the study's conclusions. A chi-square analysis was conducted without an adequate number of subjects in each cell to compare treatment groups. For a chi-square analysis, no more than 20 percent of the expected frequencies can be less than five (Bartz, 1981). Two of the five cells in the study had expected frequencies of four. Ladouceur discarded data of five subjects for "technical reasons" thereby invalidating the results.

A series of studies compared habit reversal with negative practice (Azrin et al., 1980a, b, c). Negative practice is the performance of an inappropriate behavior repeatedly over a short duration. As a control condition for habit reversal, negative practice is comparable to awareness training, daily practice periods, and self-recording procedures. Azrin et al. (1980b) showed a 91 percent reduction from baseline in hair-pulling at a 3-month follow up as compared to a 50 percent reduction by negative practice. Nail-biting was reduced 98 percent from baseline at a 3-month follow up as compared to a 60 percent reduction by negative practice (Azrin et al., 1980a). A substantial clinical difference was found between treatment by habit reversal (97% reduction) and treatment by negative practice (33% reduction) for nervous tics assessed at the end of treatment (Azrin et al., 1980c). Azrin et al. (1980a) attributed the differential
results between habit reversal and negative practice to the specific nature of the habit reversal training rather than general placebo effects or general effects of self-recording.

The relative contribution of the competing response procedure in habit reversal was investigated utilizing fingernail-biting (Horne & Wilkinson, 1980) and motor tics (Franco, 1982) as the dependent behaviors. Horne and Wilkinson (1980) compared simplified habit reversal (nail-care instructions and fist-clenching when the urge to bite occurred) with simplified habit reversal plus a 4-week series of on-going target goals to facilitate gradual decreases in nail-biting, nail-care instructions plus the series of on-going target goals, and a waiting list control. The study demonstrated equal and significant treatment effects for the three treatment groups (increased mean nail length) as compared to the control groups at initial assessment. Horne and Wilkinson noted that a greater number of subjects showed complete absence of nail-biting in the simplified habit reversal group at eight weeks while the other two treatment groups showed a greater number of relapses. The sample size for each group, however, was too small to conduct a statistical analysis. The trends noted by the authors are only suggestive that the competing response is necessary for maintenance of treatment results.

In another study, Franco (1982) investigated habit reversal with and without the competing response procedure in the treatment of motor tics. Four subjects who exhibited at least one tic per minute were administered awareness training (AT), relaxation (R) and isometric tensing (IT), or the competing response, in a multiple baseline
reversal design. The results indicated that a greater reduction in tic rate occurred for the entire habit reversal package (AT+R+IT) compared to AT+R. A substantial tic rate reduction from baseline was observed for AT+R, but in spite of the relative reduction, all subjects continued to emit tics at a high rate (i.e., several tics per 10-minute block of time). The AT+R+IT treatment resulted in near elimination of tics for all subjects. Franco suggested that self-monitoring or awareness training is not sufficient by itself to eliminate high frequency motor tics.

In general, the relative contributions of each component in habit reversal to treatment effectiveness have not been firmly established. Researchers have suggested that the specific nature of habit reversal is responsible for treatment effectiveness rather than general placebo or self-monitoring effects. It may be that the components of habit reversal are additive in their effects. The additive effect of each component of habit reversal may be critical to the maintenance of treatment results. Data are needed to determine whether habit reversal components are additive in their effects, or whether the components are indeed all necessary for maintenance of treatment results.

Applicability of Habit Reversal to Bulimia

Bulimia nervosa can be viewed as a habit. Originally, self-induced vomiting or fasting is instituted as a weight-control mechanism. As a result of controlling weight by vomiting or fasting, the body's nutritional requirements are not met and hunger follows. The individual eats greater amounts of food to satisfy
the increase in hunger. Self-induced vomiting or fasting increases concomitantly with increases in caloric consumption. What originally began as a low-frequency weight-control mechanism transforms into a regular cycle of binge eating and vomiting and/or fasting. Habit reversal may be an effective treatment for this disorder.

Several authors have commented on important factors in the treatment of bulimia. Habit reversal appears to already encompass these considerations. These suggested considerations are presented below as supporting evidence for the argument that habit reversal is applicable to bulimia.

One of the components of habit reversal is awareness training comprised of response description, response detection, early warning, competing response and situation awareness procedures. Loro and Orleans (1981) discussed awareness training when they recommended that the "client learn . . . to view his/her bingeing behavior as a habit under the control of antecedent and consequent events rather than the expression of personal weaknesses or as a person-deficit" (p. 163). Loro and Orleans also recommended a programmed binge as part of treatment. A programmed binge would consist of the habit reversal response description, response detection and early warning procedures. No data were provided by Loro and Orleans to support their recommendations.

In discussing considerations for the prevention of relapse in the treatment of addictive behaviors, Marlatt and Gordon (1980) appeared to corroborate the importance of the awareness training and public display procedures of habit reversal. According to
Marlatt and Gordon, a first step in the prevention of relapse is to train the client to recognize those high-risk situations that may increase the likelihood of relapse. To increase the generalization of newly acquired coping skills, it is important that the client practice the adaptive behavior in the actual high-risk situation. Habit reversal provides for both covert rehearsal of coping skills in high-risk situations (symbolic rehearsal procedure) as well as overt rehearsal via public display.

Additional support for the importance of awareness training comes from Bruch's (1977) description of the bulimic.

They lack discriminating awareness of bodily need, specifically they are inaccurate in hunger awareness. They also fail to identify other states of bodily discomfort, such as cold or fatigue, or to discriminate bodily tension from anxiety, depression or other psychological states (p. 103).

A programmed binge might provide more awareness of hunger. The relaxation component of the competing response might assist the individual to increase awareness of body states. Habits associated with body tension (hair-pulling, fingernail-biting, stuttering, bruxism, nervous tics) have been substantially decreased with habit reversal.

In summary, habit reversal provides a sound rationale for the treatment of bulimia nervosa. Binge eating followed by food removal appears to begin as a low-frequency behavior which develops gradually and is maintained by a lack of awareness surrounding the habit. Habit reversal provides for awareness training, habit control motivation and generalization training. The present study investigated the clinical effectiveness of habit reversal for bulimia nervosa.
Statement of the Problem

Controlled treatment research is lacking in the area of bulimia nervosa. As an eating disorder, bulimia is associated with medical and psychological complications that can be dysfunctional to the individual. A theoretical rationale for the treatment of bulimia has yet to be applied effectively. In this study bulimia is viewed as a habit and treated by habit reversal. Habit reversal treatment has been demonstrated as effective across a wide variety of habit-like behaviors. No studies have reported the treatment of bulimia with habit reversal to date. Also, the habit reversal research literature contains no investigations of side effects associated with habit reversal.

The questions posed for the present study are whether:

a. Habit reversal is effective in the treatment of bulimia nervosa as compared to no treatment (attention control condition); and
b. Habit reversal produces desirable side effects (e.g., increase in social contacts or decrease in reported depression) when applied to bulimia nervosa.
METHODOLOGY

Subjects

Subject Selection

Twelve women responded to advertisements in the local newspaper for free, confidential treatment of recurrent binge eating combined with either self-induced vomiting, fasting or laxative use (see Appendix A). One woman was referred to the experimenter by a physician who read the advertisement. Criteria for inclusion in the study were:

(1) The duration of the disordered eating pattern was a minimum of three months.

(2) During the past three months, the subject did not experience more than one binge-free week.

(3) On the average, the subject experienced two binges weekly over the past three months followed by either self-induced vomiting, fasting, or laxative use.

Two women did not meet the criteria for inclusion in the study due to their low frequency of reported bingeing and vomiting. Information was provided to these women on available treatment services in the area. Ten women were eligible for the study.

Subject 1. Subject 1 was a 24-year-old single female. She was a full-time university student. At the time of intake, she stood 5 ft. 6 in. and weighed 138 lb. Bingeing and vomiting began eight years
previously. No laxatives, diuretics or diet pills were used. She reported bingeing and vomiting three to four times daily over the prior three months. Subject 1 initiated therapy at the onset of her eating disorder and irregularly thereafter. Anti-depressants, group therapy and individual psychotherapy were unsuccessful in improving the disordered eating patterns. Her family and several friends knew of her problem behaviors. Subject 1 was not receiving medication at intake.

Subject 2. Subject 2 was a 24-year-old married female with no children. She weighed 138 lb. and stood 5 ft. 5 1/2 in. She worked full-time as a white-collar professional. One year previous to the study, she began bingeing and vomiting. No diet pills, laxatives or diuretics were taken. She reported binge eating and vomiting once a day. Her husband and one friend knew that she self-induced vomiting, but no one knew that she binged. The present treatment was the first intervention for her eating problem.

Subject 3. Subject 3 was a 21-year-old single female who weighed 124 lb. and stood 5 ft. 2 in. at intake. Subject 3 began binge eating and vomiting seven years previously. Diet pills, laxatives or diuretics were not attempted. She was a full-time university student. She reported bingeing and vomiting at least once daily. This subject had received individual psychotherapy for two consecutive academic quarters in 1981 without changing her eating patterns. At intake, no one knew of these problems.

Subject 4. Subject 4 was a 26-year-old 5 ft. 8 in., 155 lb. married female with two children. She worked two days a week. Four
years previously, she began bingeing which she followed by using laxative pills (Exlax) and diet pills (nonprescription). The diet pills were stopped in 1981 when she learned of her second pregnancy. She continued laxative use following each binge. At the time of intake, she was three months into her third pregnancy. Bingeing occurred three or four times weekly followed by approximately five laxative pills. This subject had consulted a mental health center counselor on three occasions during the year prior to this study without successful resolution of her eating problem. Her mother and husband knew of the binge eating and laxative use.

**Subject 5.** Subject 5 was a 21-year-old single female who worked full-time as a receptionist. She weighed 125 lb. and stood 5 ft. 8 in. Six years previously, Subject 5 began bingeing and vomiting without diet pills, laxatives or diuretics. She sought psychological intervention in 1979 for three months, and again in 1982 for several individual sessions. Her eating disorder did not appear to change with individual or family psychotherapy. She reported bingeing and vomiting two or three times daily. Several friends and her immediate family knew of the eating problem.

**Subject 6.** Subject 6 was a 22-year-old single female. She was a full-time university student who stood 5 ft. 3 in. and weighed 135 lb. at intake. Binge eating began three years ago and was followed by vomiting. No laxatives, diet pills or diuretics were used. She reported binge eating and vomiting at least once daily, although she indicated that the frequency of bingeing and vomiting had escalated
to four per day during the two weeks prior to intake. Subject 6 had received no prior treatment and no one knew of her eating disorder.

Subject 7. Subject 7 was a 22-year-old married female with no children. She worked full-time as a secretary. At intake she weighed 110 lb. and stood 5 ft. 8 in. Binge eating began three years previously. Vomiting occurred after each binge, but vomiting also occurred after a meal or snack occasionally as well. No diet pills, laxatives or diuretics were used. She reported bingeing and vomiting three times per day over the three months prior to intake. No previous therapy for the eating problem was reported. No one knew that she had an eating disorder.

Subject 8. Subject 8 was a 22-year-old single female. She was a full-time university student who stood 5 ft. 8 in. and weighed 140 lb. She began binge eating and vomiting three years prior to intake. Subject 8 did not use laxatives, diuretics or diet pills. For the three months prior to intake, she reported bingeing and vomiting once daily. No one knew of this problem, nor had she sought prior treatment.

Subject 9. Subject 9 was a 22-year-old single female. She worked full-time as a secretary. She weighed 125 lb. and stood 5 ft. 8 in. Subject 9 began binge eating four months prior to intake. She reported bingeing once daily. Bingeing was followed by vomiting. Diet pills, laxatives, or diuretics were not used. Her mother and three friends knew of her problem. This treatment study was the first therapy she sought.
Subject 10. Subject 10 was a 23-year-old married female with two children. She was a full-time mother who stood 5 ft. 6 1/2 in. and weighed 124 lb. Seven years prior to intake, she began binge eating. She reported that bingeing was terminated by physical discomfort or pain. She did not induce vomiting or take diet pills, laxatives or diuretics. Although she received no formal psychological intervention, a physician evaluated Subject 10 and suggested that an elevated rate of metabolism accounted for the absence of weight gain in the face of binge eating. Subject 10 exercised daily. During the three months prior to intake, she reported bingeing at least once daily followed by fasting. Her mother and husband knew of her problem.

Design

The study utilized a multiple baseline design with replication across subjects (Hersen & Barlow, 1976). The multiple baseline design requires continuous recording of the dependent variables of several subjects during baseline and experimental conditions. The independent variable is introduced to each subject at different points in time during baseline. If changes in the dependent variables are due to the presentation of the independent variable, these changes occur only upon the presentation of the independent variable to each subject and not at other times.

There are several advantages to a multiple baseline design: (a) The design is particularly useful when reversing or withdrawing the treatment condition is undesirable. (b) All subjects are exposed to all treatment conditions. (c) A small sample can be
used and the results applied directly to individual patients of concern to clinicians in the field. (d) The possible effects of extraneous experimental variables such as placebo effects and attention can be controlled. A liability of the design is that results can be generalized only to individuals with characteristics similar to the study sample.

Originally, the experimental design of the present study placed the ten eligible subjects into a multiple baseline design combined with group design considerations. The ten subjects were paired according to the severity (i.e., frequency) of their binge eating during baseline. Subjects were randomly assigned to a treatment group or a data collection control (i.e., attention) group. The intent of combining multiple baseline with group design considerations was to compare the treatment group with the attention control group for statistically significant differences on potentially relevant psychometric measures.

Several practical limitations that precluded combining single subject with group design methodology arose during baseline data collection. First, subject attrition occurred. Subject 8 and Subject 10 reported zero binge eating and vomiting during baseline. Subject 9 reported only one episode of bingeing and vomiting over the first three weeks of baseline. Subject 1 left the study 21 days into treatment when she decided to seek alternative treatment for depression. Second, attention control subjects were on an extended baseline (e.g., 60 days). Several control subjects reported a high frequency of binge eating and self-induced vomiting (e.g., two or
three episodes daily); there were ethical concerns regarding maintaining these subjects on baseline for two additional months. Last, the final number of subjects eligible for treatment was too small (seven) for adequate statistical comparisons. Accordingly, the group design considerations were deleted.

Assignment to begin treatment was random except for Subject 1. During baseline, Subject 1 showed a high rate of both binge eating and vomiting (i.e., 3.57 per day). It was indicated by Subject 1 that she would leave the study if she did not receive treatment for her eating problem immediately. Apparently, maintaining daily data cards (as a part of baseline) was distressing. Beginning Subject 1 without random assignment probably did not substantially bias the results since the severity of her eating problem could have selected against achieving desired results. The remainder of the subjects were randomly assigned to begin treatment. When the group design considerations were eliminated after approximately 60 days of baseline, Subjects 5, 6, and 7 were randomly assigned to begin treatment as a second treatment group.

Dependent Variables

Self-report Data

The focus of the present study was to decrease and/or eliminate inappropriate binge eating and concomitant self-induced vomiting or laxative use. Normal eating has been largely defined in the context of regular, individualistic eating patterns (Bennison, 1979). Slight deficiencies in dieting intake and estimated nutrient intake can
result in malnutritional states depending on the nutritional requirements of the individual. Because of the largely individualistic definition of appropriate eating, operational definitions of binge eating have not been reported. Dependent measures of binge eating have relied on subject self-report based on their own perceived bingeing. Although an operational definition of binge eating was developed in the present study for the purpose of treatment (see below), the dependent measure of binge eating maintained throughout the study relied on each subject's own judgement based on the following definition. Self-report measures were maintained daily by subjects on prepared data cards (see Appendix B).

**Binge eating.** Subjects self-monitored the frequency with which they ate food to the point of experiencing actual physical discomfort (e.g., bloating, stomach cramping, general pain sensations). Additionally, in order to be considered a binge, the eating episode must have been terminated by self-induced vomiting, social interruption, sleep, or physical discomfort.

**Self-induced vomiting or fasting.** Each subject maintained a record of their response to binge eating. Self-induced vomiting was defined as any regurgitation of food that could not be attributed to illness that occurred within one hour of ending a binge. Food must have been expelled from the mouth to be considered a vomit. Fasting was defined as a 12 waking hours of noncaloric intake. Sleeping time was subtracted from the time without caloric intake in order to achieve the 12 hours.
Urge-to-binge. Anecdotal reports have suggested that once a habit is eliminated, the urge to perform the habit spontaneously remits (Azrin et al., 1980c). No studies have systematically investigated whether a bulimic's self-reported urge-to-binge is changed in any manner, nor has any study investigated in a controlled fashion if habit reversal eliminates habit urges. Subjects in the present study rated the urge-to-binge that occurred prior to engaging in a binge episode. Subjects designated urge-to-binge intensity on a 10-point scale. A 10 represented an absolutely uncontrollable urge-to-binge, and a 1 represented no urge-to-binge. Subjects were trained to assign ratings on urge-to-binge intensity during baseline. Three previous binge episodes and three previous normal meals were reviewed with the experimenter and rated by each subject as part of training.

Subjective units of discomfort (SUD). Each subject maintained a record of subjective units of discomfort (Wolpe, 1969) which followed binge eating. Rosen and Leitenberg (1982) utilized SUD as a dependent variable arguing that tension is typically associated with bingeing. The experimenter trained the subjects in discrimination of SUD by describing 10 different situations of varying levels of stress (see Appendix C). The subjects ranked each situation on a scale ranging from 100 SUD (extremely stressful) to 1 SUD (extremely calm). Each subject also chose three personal situations representing mild, moderate, and severe levels of stress and assigned SUD.

Secondary Dependent Variables

Generalization is "the occurrence of a relevant behavior under
different, nontraining conditions (i.e., across subjects, settings, behaviors and/or time) without the scheduling of the same events in those conditions as had been scheduled in the training conditions" (Stokes & Baer, 1977, p. 350). Bulimia is a secretive habit in which bulimics restrict their inappropriate behavior to private settings. All subjects in the present study were secretive in their binge eating and vomiting, and requested confidential treatment. Because of the necessity of maintaining confidentiality in the present study, secondary dependent variables (e.g., reported social contacts, depression) were employed as indirect measures of generalization of treatment. Research has not yet demonstrated empirical relations between the bingeing and purging aspects of bulimia and other behaviors clinically associated with bulimia. The following section describes the secondary dependent variables for the study. A rationale for each variable is provided.

Social contacts. Bulimia has been characterized as a secretive habit. Bulimics may restrict social interactions in order to minimize the risk of exposure. Alternately, large numbers of social contacts might be incompatible with bingeing. Habit reversal does not specifically treat the interpersonal aspects of bulimia. As a means of converging on the success of the habit reversal, the subjects monitored social contacts. A social contact was defined as any recreational activity or entertaining activity not related to work, school or church activities. Social contacts were face-to-face, mutual interchanges with a minimum of one other person which were no
less than 10 minutes in duration. No maximum time was placed on the duration of a social contact.

**Athletic activity.** Athletic activity was also considered incompatible with bingeing. As another means of converging on the success of treatment, subjects recorded the frequency of exercise. Exercise was defined as any activity that the subject intended as exercise. Events that might be categorized as either social or athletic (e.g., bowling, skiing) were recorded according to the subjects' intent. No duration for athletic activity was specified.

**Beck Depression Inventory (BDI).** Bulimic individuals typically report feeling guilt or engaging in self-deprecating thoughts following bulimic episodes (American Psychiatric Association, 1980). Using the BDI, Hawkins and Clement (1980) found that 56 of 86 females were moderately depressed and 30 were very depressed following a binge. The BDI is a self-report inventory with 21 items individually ranked in order to reflect degree of severity (Beck, 1967). Beck (1967) has shown that the BDI detects changes in depression over time. Williams, Barlow, and Agras (1972) demonstrated that the BDI correlated moderately (.67) with certain behavioral indices of depression (i.e., talking, smiling and motor activity). The BDI (see Appendix D) was administered to subjects in the present study at baseline and at the end of habit reversal.

**Symptom Checklist 90-Revised (SCL-90 R).** Several authors have reported an association between bulimia and psychological complications. These complications include anxiety (Rosen & Leitenberg, 1982), perceptions of being out of control (American Psychiatric Association,
1980), feelings of personal inadequacy (Boskind-Lodahl & White, 1978), and obsessions with food, weight and body size (Russell, 1979).

No data have been provided to support empirical relations between these behaviors. In the present study, subjects were administered the SCL-90 R to test for possible psychological complications related to treatment. The SCL-90 R is a 90-item self-report symptom checklist that provides a measure of nine symptom dimensions (Derogatis, 1977): somatization (psychological distress that arises from perception of bodily dysfunction), obsessive-compulsive (a general cognitive performance deficit), interpersonal sensitivity (feelings of personal inadequacy, self-deprecation, and acute self-consciousness), depression, anxiety, phobic anxiety (agoraphobic tendencies), paranoid ideation, and psychoticism (extreme interpersonal alienation).

The inventory items are ranked by the subject on a 5-point scale with 0 representing "not at all distressed" by the item content and 4 representing "extremely distressed" by the item content (see Appendix F). A global score index (GSI) is a combined score from the nine symptom dimensions plus several additional items. The GSI purports to be a single measure of overall psychopathology.

Test-retest correlations for the nine SCL-90 R dimensions ranged from +.78 to +.86 based on 1,002 heterogeneous psychiatric outpatients (Derogatis, Rickels & Rock, 1976). The theoretical structure of the SCL-90 R matched highly to an empirically based analysis in a test of the construct validity of the SCL-90 R (Derogatis & Cleary, 1977). Data from the SCL-90 R for 1,002 psychiatric outpatients were intercorrelated with the hypothesized dimensional
structure of the inventory items and subsequently factor analyzed. The empirical-theoretical match of the rotated factor loadings was excellent (e.g., .42 and .40 for "headaches," .58 and .57 for "trouble concentrating," .75 and .76 for "shouting or throwing things").

The SCL-90 R was administered in the same manner as the BDI to provide additional information of possible changes in secondary dependent variables as a function of habit reversal.

Medical Data

A possible verification of treatment outcome for bulimia suggested by Geller et al., (1978) was metabolic monitoring. In the case of frequent vomiting over a prolonged time period, or continuous vomiting through the course of a day, corresponding changes in potassium blood serum levels have been observed. Other electrolytes can be influenced, but no data have been reported. As part of this study, subjects underwent routine blood chemistry analyses. The routine analysis included sodium (Na), potassium (K), chloride (Cl) and carbon dioxide content (CO₂). Normal ranges exist for each blood electrolyte level; however, clinicians utilize a calculation to determine the balance between positively (e.g., Na⁺) and negatively (e.g., Cl⁻, CO₂⁻) charged electrolytes (Guyton, 1981). The Na⁺, Cl⁻ and CO₂⁻ concentration does not become clinically problematic (i.e., metabolic acidosis which can lead to hyperventilation) until Na - (Cl + CO₂) > 12.

Blood samples were drawn at baseline and at termination of habit reversal. The samples were drawn by a private physician for Subject 4 and by the Logan Regional Hospital in all other cases. The
subjects were instructed to have the samples drawn at least 12 hours following the most recent vomiting episode to decrease the likelihood that the metabolic measure was contaminated by recent vomiting. If self-induced vomiting occurred more frequently than a 12-hour latency period, the longest latency time for that subject was utilized.

Data Analysis

Changes in binge eating, self-induced vomiting and laxative use across treatment phases were evaluated by visual inspection. The criterion for evaluation of change in the present study was whether clinically significant reductions (i.e., readily observable or noticeable by visual inspection) occurred in bulimic episodes comparing baseline to treatment responding (Kazdin, 1978). Visual inspection was also used to determine if self-reported social contact, athletic activities, SUD or urges-to-binge changed as a result of treatment. Baseline responding of these latter dependent variables was compared to treatment and follow-up responding. If average performance during treatment and follow-up did not overlap with average performance during baseline when the data points were plotted over time, the effect was considered reliable. Medical data were visually compared to normal ranges available for the electrolytes measured (potassium, chloride, CO₂, sodium).

Statistical treatment of changes in mean BDI and SCL-90 R subscale scores was not possible after the experimental design was changed when several clinically extenuating circumstances arose (discussed above). Visual inspection of BDI and SCL-90 R scores was conducted to assess gross changes in psychological functioning from baseline to post-treatment.
For subjects receiving habit reversal, Spearman rank-difference correlations were computed to determine: (a) The relationship between severity of the eating disorder and treatment outcome. Data entered into the latter analysis were length of the eating disorder in months, mean daily frequency of binge eating and self-induced vomiting during baseline, baseline raw scores for the BDI and SCL-90 R subscales and percent reductions in binge eating and self-induced vomiting during treatment; (b) The relationship between all self-monitored data and psychometric measures as possible convergent validity evidence for the self-report measures. Data entered into this analysis included baseline and treatment mean daily frequencies of reported social contacts and athletic activities, average SUD and urge-to-binge during baseline and treatment and raw scores for the BDI and the SCL-90 R subscales obtained at baseline and post-treatment; and (c) The relationship between depression, general psychopathology and self-reported frequency of bulimic eating patterns. Data entered into this analysis were raw scores on the BDI and the SCL-90 R subscales obtained during baseline and post-treatment assessments and the mean daily frequency of reported binge eating and self-induced vomiting during baseline and treatment. Spearman rank-difference correlations were considered statistically significant if the correlation was different enough from zero to have occurred less than five times in one hundred by chance alone (i.e., \( p \leq .05 \)).
Procedure

Intake

Upon telephoning the experimenter, a time was scheduled with each potential subject and the experimenter to discuss eligibility for the study. All contacts with the subjects throughout the study were held individually in a counseling room at a university residence hall. At the intake appointment, information was obtained on the frequency and length of bulimic eating patterns in the course of obtaining historical information related to eating (see Appendix F). For those subjects who met the minimum severity criteria for inclusion in the study, informed consent was obtained (see Appendix G). Individuals who did not qualify for the study were provided information on available treatment services in the local area.

Prior to entering treatment, each eligible subject submitted to a general medical evaluation. The same physician examined all but one of the subjects who preferred her own personal physician. Each subject was medically cleared to participate in the study.

Baseline (Session I)

Individual appointments were scheduled with the subjects to begin baseline assessment once medical clearance was obtained verbally from the physicians. The subjects were informed that a baseline was necessary to understand and measure the problematic eating as it occurred in its natural environment. The rationale given to the subjects for the study was that a treatment program had been designed by the experimenter specifically for bulimia, and
the treatment was to undergo careful evaluation. The subjects were told that a careful evaluation monitored many different areas of personal functioning to fully understand treatment effects.

Subjects were provided with a package of seven 4 X 6 in. index cards with preprinted designations to record self-monitoring data (see Appendix B). Each category of data was reviewed with the subjects. The experimenter requested that each subject attempt to telephone their data to the experimenter daily in the evening; the experimenter also attempted daily phone contacts when subjects did not report during any particular evening by 9:00 p.m. An answering machine was provided specifically for subjects to report data when the experimenter could not be easily reached. Each day, the experimenter recorded a new message indicating the date and times when he would be available. Data cards were collected at weekly sessions when a new data package was provided.

At the baseline session, the Beck Depression Inventory and the SCL-90 R were administered. Subjects were informed that treatment would be scheduled by phone as soon as sufficient data were collected. A rationale was provided on the necessity of random assignment to treatment which required that each subject begin treatment after varying lengths of time.

Habit Reversal Treatment (Session II)

Session II consisted of administering the entire habit reversal package. The general treatment plan was summarized to subjects as an introduction before the various components were presented.
Subjects were given the definition of a habit suggested by Azrin and Nunn (1973) as it related to bulimia.

**Habit inconvenience review.** A list of questions was developed by Azrin and Nunn (1977) to increase subjects' awareness of the negative aspects of their habit. It was assumed that motivation to change the habit would be increased. Appendix H presents the review questions and possible answers related to the bulimic habit discussed in the literature. Each subject was presented the question orally by the experimenter. An answer was first verbalized, then written by each subject on paper provided. When a subject exhausted spontaneous answers for a particular question, any answers listed in Appendix H not offered by the subject were suggested as pertinent to the subjects. In this manner, each subject was given a similar understanding of the related medical and psychological consequences of bulimia reported in the literature. A copy of Appendix H was given to each subject at the end of this procedure.

**Awareness training.** The purpose of awareness training was for the subject to become aware of all aspects of the habit by identifying and verbally labeling the behaviors that immediately preceded binge eating and by identifying and verbally labeling how and when binge eating and purging occurred. Second, a physically competing response to the bulimic habit was developed to interrupt the chain of events at the earliest point that cued each subject when the bulimic habit was imminent. Awareness training for bulimia consisted of several procedures: (a) each subject was requested
to perform the binge eating aspect of the habit for the experimenter;
(b) immediately preceding this treatment binge each subject was
first trained to define a binge operationally to increase awareness
of the sequence of events prior to the binge; (c) also prior to
the treatment binge, each subject answered prepared questions designed
to increase awareness of behaviors and sensations surrounding the
entire bulimic episode; and (d) these questions were repeated
following the treatment binge (see below). Vomiting following
the treatment binge was strongly discouraged. No further mention
of vomiting occurred once the treatment binge began.

Operational definition of binge eating. Each subject was
given individual criteria for defining a binge. At intake, the
experimenter ascertained each subject's own regular daily eating
patterns occurring prior to the onset of bulimia. Eating patterns
varied from one meal per day to several meals daily plus snacks.
Utilizing the Harris-Benedict (1919) formula, each subject's
estimated daily minimum energy (caloric) requirement were calculated.
The Harris-Benedict formula calculates basal energy requirements
in calories with adjustments for different activity levels. For
men, the formula is: $66 + (13.7 \times \text{weight in kilograms}) + (5 \times \text{height in centimeters}) - (6.8 \times \text{age in years})$. For women, the formula is:
$655 + (9.6 \times \text{weight in kilograms}) + (1.7 \times \text{height in centimeters}) - (4.7 \times \text{age in years})$. The activity factor adjustment consists of
multiplying the derived caloric amount by 1.3 for maintenance
activity (out-of-bed), 1.4 for moderate activity (daily work), and 1.5 for daily exercising.

Each regular meal and/or snack was assigned a caloric amount appropriate to the subjects' daily eating patterns prior to the onset of the eating disorder. The number of daily meals and snacks were divided evenly by the daily caloric requirement so that meals encompassed 3/4 of the total caloric requirement if snacks were normally included. A meal was defined as an eating period of more than 10 minutes including more than two food groups (e.g., meat, bread, fruit, vegetables) which required more than 10 minutes in total preparation time.

A binge was operationally defined as caloric intake that exceeded 600 calories (e.g., three doughnuts or six pieces of bread) above the caloric amount assigned as appropriate for a meal or snack. To be considered a binge, the time period for counting calories was one hour from initiation of eating. After one hour, the count began again. A binge was also defined as 600 calories above the total amount of calories allowable for any given day. As an example, Subject 3 was assigned 1,904 calories per day based on her age, height, weight and moderate activity level. Before she developed bulimic eating patterns, Subject 3 ate three meals daily with one snack on a regular basis. Subject 3 was assigned 476 calories for each meal and 476 calories for one snack per day. A binge for Subject 3 equalled 1,076 calories over one hour of eating. When Subject 3 ate ice cream for a snack, a binge was defined at the point she ate three and 9/10 cups (a cup of regular
ice cream is equivalent to 275 calories or 15 calories for each level tablespoon).

The subjects were trained to count calories in typical meals they consumed, and calories contained in typical binge foods. A food and drink list (Food and Drink Counter, 1976) was provided to each subject. The calories contained in three typical meals for a subject from the previous week were counted first. Second, three typical binges from the prior month were counted for calories. The point at which the present study defined a binge operationally was determined for these binges. Last, three possible meals for the next week were reviewed given normal eating. The subjects designated likely binge foods and determined when a binge should be defined for any given day. Three successive correct designations of the operational definition for a binge were required to consider each subject trained. The subjects were instructed to keep the calorie list in an easily accessible place for quick reference. Guessing at calorie amounts was verbally discouraged.

Binge awareness questionnaire. After subjects received training in defining binges operationally, a list of typed questions designed to increase awareness of all behaviors and sensations associated with binges (see Appendix I) was presented. The experimenter read each question aloud, the subjects verbalized an answer, and then immediately wrote their answers on the questionnaire. The binge awareness questionnaire was completed prior to the treatment binge. Following the treatment binge, the questionnaire was reviewed again with prompts from the experimenter to list any new sensations or
or behaviors occurring as a result of the treatment binge (e.g., "Did you notice any stomach sensations not listed previously?").

Treatment binge. On the telephone subjects designated their most preferred food utilized for binges when the habit reversal session was scheduled. The preferred binge food was brought to the session by the subjects in an amount no less than an operationally defined binge. Questions from subjects on the purpose of bringing binge food to the treatment session were answered with: "to help you understand more about your eating problem." No subjects questioned further, and each brought the appropriate amount of food to the session.

At the treatment session, the subjects were asked to eat as much of the preferred binge food as they could, in the quickest amount of time that they could. This request was made immediately following completion of the binge awareness questionnaire. When a subject hesitated to eat, encouragement was given to eat at least several mouthfuls. All subjects ate a minimum of several mouthfuls, but no subject ate more than 1/3 of the food brought to the session.

Competing response procedure. After engaging in the treatment binge and completing the binge awareness questionnaire a second time, instructions were given on the competing response procedure. The competing response for the bulimic habit consisted of either telephoning or meeting with someone for a minimum of five minutes, or leaving the situation by taking a walk for a minimum of five minutes. No subject provided the names of significant others in their
natural environment who were trusted enough to be systematically involved in the competing response procedure.

When another individual was unavailable, subjects were allowed to telephone the experimenter or the experimenter's answering machine at a telephone number designated exclusively for the study. Any topic was permissible during the competing response phone contact. The answering machine utilized for the study was voice activated, recorded 60 total minutes, and was remote controlled. The experimenter monitored the telephone system daily.

The competing response was instituted at the first point in the bulimic habit sequence that cued the subject that the binge or vomit was likely to occur. The competing response was repeated every time a subject detected cues that signaled the onset of the habit. When a subject judged that she was able to refrain from the habit, the competing response was terminated.

Abbreviated relaxation. An abbreviated relaxation response was included with the competing response (Azrin et al., 1980b, c; Franco, 1982; Rosenbaum & Ayllon, 1981b). Each subject was trained in regular deep breathing and postural adjustments. The relaxation consisted of breathing in to a 4-count, a pause, and breathing out to a 4-count. Three deep breaths equaled a set; three sets were one relaxation response. The postural adjustment consisted of relaxing the neck and shoulder areas by changing to a more comfortable position, and adjusting the position of any other body part that was perceived as tense. One abbreviated relaxation response was practiced at the treatment session. The
treatment practice was audio taped, and the cassette was given to subjects to be used as necessary. The subjects were instructed to engage in regular deep breathing and postural adjustments in combination with each five-minute competing response. Subjects were instructed not to practice relaxation if vomiting occurred.

**Public display procedure.** Next, subjects were instructed to practice the competing response and abbreviated relaxation response in combination once daily in high risk situations. The public practice occurred at a time when subjects judged that they could practice successfully. Practice consisted of going to a high risk situation, observing preferred binge food for no more than five seconds and immediately instituting the competing response and abbreviated relaxation. Sample high risk situations were reviewed during the treatment session. The high risk situations were determined from the data cards maintained during baseline. Daily public practice occurred in addition to any required implementation(s) of the competing response.

**Symbolic rehearsal.** Successful completions of the competing response and abbreviated relaxation were imaged under three conditions. In the first condition, the experimenter described a subject's typical binge as having occurred. In the second condition, the experimenter described a typical binge for that subject as occurring. In the third condition, the experimenter described the typical events immediately preceding a binge episode. In each condition, the experimenter described the subject successfully interrupting the bulimic habit and engaging in the competing response with abbreviated relaxation. Subjects practiced
the imagery until each image matched the experimenter's description as reported by each subject verbally.

Social support. Subjects reviewed any improvements in decreasing the bulimic habit with the experimenter during phone contacts that were attempted daily. During the telephone contacts, the following possible successes were assessed: (a) any successful termination of the habit at any point in the sequence (i.e., a competing response); (b) shorter latency periods from onset of habit to time of interruption; and (c) decreases in the frequency of habit behavior over weekly periods. When subjects reported difficulty following any of the habit reversal procedures, the experimenter helped subjects problem-solve alternatives to successfully complete the procedure.

Subjects were also given graph paper and trained to record daily binges, vomits, or laxative use. Subjects were referred to the graphs during phone contacts while reviewing improvements. The experimenter provided encouragement for any other, spontaneous improvements noted by subjects during phone contacts (e.g., savings in money, more time for other activities).

Weekly Sessions

Weekly sessions with the experimenter were scheduled to review progress, examine problematic situations related to the habit reversal procedures and to collect data cards. Habit reversal assignments were reviewed weekly to increase the probability that subjects were completing the appropriate procedures. For subjects on baseline, weekly sessions consisted of collecting data cards and listening
to concerns expressed by subjects. Requests for advice by baseline
subjects were deferred by requesting patience on the subjects' part, and by reiterating the importance of their participation in the research for understanding bulimia.

The criterion for which weekly sessions were terminated was one bulimic episode over a 30-day period, or when the experimenter and subject agreed to terminate. At termination, all but one subject was offered alternative treatment or referral to alternative services.

Follow Up

Six months after treatment cessation, subjects were contacted by phone to obtain follow-up data. Subjects 5 and 8 moved from their residences during the treatment phase and did not respond to either of two letters addressed with directions to be forwarded. Subjects 2, 6, and 7 also moved; however, each returned their new telephone numbers on post cards forwarded by mail. All subjects contacted by telephone agreed to complete nine more days of daily data recording and a questionnaire designed specifically to assess their reactions to habit reversal (see Appendix J). The questionnaire was adapted for subjects who only recorded data and did not receive habit reversal (see Appendix K).

Internal Validity (Process Check)

The independent variable in the present study was a treatment package consisting of a number of different components. In order to determine the extent to which the treatment was consistently applied across subjects, Session II (habit reversal) was audiotaped. Two
raters marked the occurrence or nonoccurrence of each treatment component on a checklist that outlined the entire treatment package (see Appendix L). The experimenter reviewed each procedure with the raters prior to the ratings. Point-by-point agreement was computed on the raters' data to provide a measure of the consistency with which habit reversal was applied. Agreement between the raters averaged 99.2 percent with a range from 94.4 percent to 100 percent. Actually, only one disagreement was noted for all seven subjects receiving habit reversal. Subject 4 was rated as not receiving information on the medical complications of laxative misuse.

Reliability

As a part of habit reversal, subjects were asked to enlist the support of a close friend or relative in their treatment. No subject agreed to involve another individual in the treatment in an overt manner. The experimenter served the function of providing the support that a significant other might have. As a result, reliability checks on the subjects' self-monitoring data were difficult to obtain. Therefore, it was possible that subjects were not recording the dependent behaviors accurately. One measure of reliability was possible. Each subject telephoned their daily data to the experimenter on a minimum twice weekly basis. The daily data cards were collected weekly. The agreement between data on the cards collected and data reported on the telephone for all subjects was 100 percent.
RESULTS

Self-report Data

Binge Eating, Vomiting and Laxative Use

Figure 1 represents the frequency in 3-day blocks of binges, vomits, and laxative use during baseline, habit reversal, and 6-month follow up. Means, standard deviations and percent changes in daily binges, vomits, and laxative use across treatment phases are shown in Table 2. During baseline for the group, mean daily binges were 1.82 (range= .5 to 3.57), and mean daily vomits were 2.48 (range= .5 to 3.57). Only Subject 4 engaged in laxative use (mean daily pill consumption= 2.98). Since number of laxative pills consumed for Subject 4 followed binges in the same manner as vomits did for the other subjects, number of laxative pills consumed was included in the data analysis with vomiting frequency.

Following habit reversal, the group mean frequency of daily binges decreased 66.7 percent from baseline (range= 39.2% to 91.4%). Group mean frequency of daily binges was reduced to .69 (range= .11 to 1.84). The group mean frequency of daily vomits following habit reversal decreased 52.0 percent (range= 22.7% to 79.6%). Subjects averaged 1.29 vomits per day (range= .14 to 2.76) over the treatment phase.

For five subjects contacted at a 6-month follow up, group mean reductions in daily binges were maintained at 68.4 percent; however, three subjects showed greater reductions in binges from treatment.
Table 2

Means, Standard Deviations, and % Change from Baseline of Daily Binge Eating and Vomiting/Laxative Use.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Treatment</th>
<th>% Change from Baseline</th>
<th>6 Month Follow-Up</th>
<th>% Change from Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Binges</td>
<td>SD Vomits</td>
<td>N Binges</td>
<td>SD Vomits</td>
</tr>
<tr>
<td>Subject 1</td>
<td>14</td>
<td>3.57</td>
<td>.78</td>
<td>3.57</td>
<td>.78</td>
</tr>
<tr>
<td>Subject 2</td>
<td>24</td>
<td>1.96</td>
<td>.69</td>
<td>2.75</td>
<td>.85</td>
</tr>
<tr>
<td>Subject 3</td>
<td>56</td>
<td>.5</td>
<td>.504</td>
<td>.5</td>
<td>.5</td>
</tr>
<tr>
<td>Subject 4</td>
<td>54</td>
<td>.91</td>
<td>.90</td>
<td>2.96</td>
<td>.33</td>
</tr>
<tr>
<td>Subject 5</td>
<td>60</td>
<td>2.45</td>
<td>.75</td>
<td>2.45</td>
<td>.75</td>
</tr>
<tr>
<td>Subject 6</td>
<td>78</td>
<td>1.63</td>
<td>1.45</td>
<td>1.63</td>
<td>1.45</td>
</tr>
<tr>
<td>Subject 7</td>
<td>88</td>
<td>1.73</td>
<td>1.1</td>
<td>3.52</td>
<td>1.42</td>
</tr>
</tbody>
</table>

*Indicates number of laxative pills
levels, one subject remained at approximately treatment level and one subject increased daily binges to baseline level. Group mean daily vomits increased from 1.29 at treatment end to 1.46 at 6-month follow up. This increase in vomiting frequency still represented a 44 percent reduction from baseline. Three subjects showed greater reductions in vomits from treatment levels, one subject maintained the same level as treatment end and one subject increased vomits above baseline levels.

Fasting

Although subjects were instructed to record occurrences of fasting during the study, only Subject 7 reported the use of fasting following bingeing. Fasting occurred for Subject 7 on just two occasions throughout the entire study. Because of its low frequency, fasting was not included in the data analysis.

Subjective Ratings

Mean ratings for subjective units of discomfort (SUD) and urges-to-binge (UB) across treatment phases are displayed in Figure 2. Ratings on SUD and UB were provided by subjects only if a binge, vomit or laxative use occurred. Subject 4 did not provide SUD or UB ratings during habit reversal. Table 3 presents means, standard deviations and percent changes for SUD and UB. During baseline, group mean SUD was 74.73 (range= 66.87 to 83.52). Following treatment, group mean SUD was 78.12 (range= 49.30 to 96.17), or a 3.48 percent increase (range= -35.03% to 24.9%). Five subjects increased SUD after treatment while only one subject decreased. SUD were provided by three subjects at 6-month follow up. Group mean SUD was 74.18 representing an increase of 3.91 percent from baseline.
Table 3

Means, Standard Deviations, and % Change from Baseline of Daily Self-Reported Subjective Units of Discomfort (SUD) and Urge-to-Binge (UB)

<table>
<thead>
<tr>
<th>Subject</th>
<th>N</th>
<th>SUD</th>
<th>SD</th>
<th>UB</th>
<th>SD</th>
<th>N</th>
<th>SUD</th>
<th>SD</th>
<th>UB</th>
<th>SD</th>
<th>% Change from Baseline</th>
<th>6 Month Follow-Up</th>
<th>% Change from Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Baseline</td>
<td></td>
<td>Treatment</td>
<td></td>
<td></td>
<td>Baseline</td>
<td></td>
<td>Treatment</td>
<td></td>
<td>SUD</td>
<td>UB</td>
<td>SUD</td>
</tr>
<tr>
<td>Subject 1</td>
<td>50</td>
<td>83.52</td>
<td>9.9</td>
<td>8.78</td>
<td>1.36</td>
<td>61</td>
<td>92.87</td>
<td>3.28</td>
<td>9.48</td>
<td>2.7</td>
<td>11.19</td>
<td>7.84</td>
<td>No data obtained</td>
</tr>
<tr>
<td>Subject 2</td>
<td>61</td>
<td>71.31</td>
<td>10.99</td>
<td>8.1</td>
<td>2.26</td>
<td>48</td>
<td>71.88</td>
<td>8.61</td>
<td>6.98</td>
<td>1.77</td>
<td>.80</td>
<td>14.43</td>
<td>1</td>
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<tr>
<td>Subject 3</td>
<td>27</td>
<td>74.37</td>
<td>8.0</td>
<td>8.17</td>
<td>.48</td>
<td>2</td>
<td>75.0</td>
<td>14.14</td>
<td>8.0</td>
<td>0.0</td>
<td>.85</td>
<td>-2.08</td>
<td>No data obtained</td>
</tr>
<tr>
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<td>38</td>
<td>69.74</td>
<td>13.45</td>
<td>8.5</td>
<td>1.27</td>
<td>2</td>
<td>No data provided by subject</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>81.4</td>
<td>16.36</td>
<td>7.88</td>
<td>1.58</td>
<td>51</td>
<td>No data obtained</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subject 6</td>
<td>108</td>
<td>75.88</td>
<td>14.75</td>
<td>8.91</td>
<td>1.72</td>
<td>50</td>
<td>49.30</td>
<td>16.04</td>
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<td>1.86</td>
<td>-35.03</td>
<td>-31.40</td>
<td>26/15</td>
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<tr>
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<td>18.14</td>
<td>8.07</td>
<td>2.14</td>
<td>149</td>
<td>83.52</td>
<td>8.96</td>
<td>6.23</td>
<td>1.64</td>
<td>24.90</td>
<td>22.88</td>
<td>13</td>
</tr>
</tbody>
</table>
Group mean UB was 7.06 at baseline (range= 5.07 to 8.79), 7.41 following habit reversal (range= 4.74 to 9.48) and 6.28 at follow up (range= 4.0 to 8.0 for four subjects). Group mean UB increased 4.25 percent during treatment (range= -31.4% to 22.88%). Group mean UB decreased 3.14 percent from baseline for three subjects at follow up. This decrease in UB at follow up was reflected by two subjects who decreased 34.43 percent. Subject 4 reported UB at follow up; however, Subject 4 did not provide UB during the treatment phase precluding a comparison.

Secondary Dependent Variables

Self-report Data

Frequencies of social contacts and athletic activities across treatment phases are displayed in Figure 3. Note differences in the ordinate scales for Subjects 5 and 6 for social contacts due to their substantially higher rate of responses. Means, standard deviations and percent changes for daily social contacts are presented in Table 4. Means, standard deviations and percent changes in daily athletic activities are presented in Table 5. As a group, subjects averaged 2.68 social contacts daily during baseline (range= .57 to 7.77) while athletic activities averaged .18 per day (range= .03 to .36).

Following habit reversal for the group, mean daily social contacts increased an average of 67.8 percent (range=-5.68% to 190.6%). Mean daily social contacts averaged 5.48 (range= .82 to 22.58). Five of seven subjects increased the frequency of social contacts following habit reversal while two subjects decreased slightly. At 6-month
follow up, for four subjects, the mean was 9.75 social contacts daily
(range= 1.1 to 33.4) for an 79.2 percent increase from baseline.

For the group, frequency of athletic activities increased an
average 82.62 percent (range= -100% to 285.7%) following habit
reversal. Group mean daily athletic activities increased to .33
(range= 0 to .62), or 2.31 per week. Six of seven subjects showed
substantial increases in athletic activities, while one subject
decreased from less than once per month during baseline to zero over
three months of treatment. Group mean athletic activity increased
from baseline to follow up by an average of 198.9 percent (range=
53.85% to 288.89%). These large percentage increases in athletic
activities were represented by a daily mean increase to .75 (range=
.4 to 1.00). All five subjects contacted at follow up reported
increases in athletic activities.

Psychometric Measures

Table 6 presents raw scores for the Beck Depression Inventory (BDI)
administered during baseline and post-habit reversal. Inadvertently,
the BDI was not administered at 6-month follow up. At baseline, two
subjects scored in the no depression range, three subjects scored in the
mild depression range and two subjects scored in the severe depression
range (group mean= 14.7; standard deviation= 12.3).

One subject who scored in the severely depressed range left the
study to seek alternative treatment for her depression. The second
subject who scored in the severely depressed range was three months
pregnant at baseline assessment. This subject reported that her
depression was partly a result of emotional lability experienced
Table 4

Means, Standard Deviations, and % Change from Baseline of Daily Social Contacts.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Baseline</th>
<th>Treatment</th>
<th>% Change from Baseline</th>
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<th>% Change from Baseline</th>
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Table 5

Means, Standard Deviations, and % Change from Baseline of Daily Athletic Activities.

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<th>% Change from Baseline</th>
<th>6 Month Follow-Up</th>
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Table 6

Beck Depression Inventory Raw Scores

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*Ranges: No depression = 0 to 9; Mild depression = 10 to 15; Moderate depression = 16 to 23; Severe depression = 24 to 63.*
during pregnancy which she also experienced during two previous uncomplicated pregnancies.

At post-treatment, four subjects achieved BDI scores within the no depression range. Two subjects achieved BDI scores within the moderate depression range (group mean= 8.17; standard deviation= 9.0). The changes in BDI scores from pre- to post-treatment were not treated statistically for significance of change due to the absense of an appropriate control group.

Raw scores for the Symptom Checklist 90 (SCL-90 R) administered pre- and post-treatment are shown in Table 7. To assist the reader in interpreting SCL-90 R raw scores, each raw score was converted to a standardized T-score utilizing a normative sample of women without psychiatric problems as a reference point. On the SCL-90 R, a T-score of 40 represents the 16th percentile, a T-score of 50 represents the 50th percentile and a T-score of 60 represents the 84th percentile. T-scores between 40 and 60 are considered within the normal range of psychological functioning. Three subjects achieved global score indices (GSI) in the pathological range at baseline, and four subjects achieved GSI scores within the normal range (group mean= 59.71; standard deviation= 10.70). Again inadvertently, six-month follow-up data on the SCL-90 R were not obtained.

Each subject administered the SCL-90 R post-habit reversal achieved scores within the same range of psychological functioning on the GSI as achieved during baseline administration (group mean= 55.17; standard deviation= 12.51). Pre- to post-treatment changes were not treated statistically due to the lack of an appropriate control.
Table 7

Raw and T-Scores for SCL-90 Subscales Pre- and Post-Treatment

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Note: Subject 1 did not complete post-treatment SCL-90. SOM=Somatization, OC=Obsessive-Compulsive, I-S=Interpersonal Sensitivity, DEP=Depression, ANX=Anxiety, HOS=Hostility, PhAnx=Phobic Anxiety, Paid=Paranoid Ideation, PSY=Psychoticism, GSI=Global Scale Index.
Table 8

Blood Chemistry Levels Pre- and Post-Treatment

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<th>Post</th>
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</table>

Note: Subject 4 did not supply data from personal physician. Normal range for sodium=135-145 meq/L, Potassium=3.5-5.0 meq/L, Chloride=95-105 meq/L, CO₂=22-34 meq/L. Overall normal range of electrolytic functioning=Na-(Cl+CO₂) ≥ 12.
Medical Data

Blood chemistry analyses obtained during baseline and following habit reversal are displayed in Table 8. Subject 1 did not submit to a blood chemistry analysis post-treatment. Subject 4 did not provide a copy of her blood chemistry analyses conducted by her personal physician. All remaining subjects achieved sodium, potassium, chloride and carbonate scores within the clinically normal range of functioning during baseline and post-treatment assessments.

Spearman Rank-difference Correlation Analyses

Severity of Eating Disorder and Treatment Outcome

Spearman rank-difference correlations for the length of the eating disorder in months and baseline raw scores of the BDI and SCL-90 R subscales with mean daily baseline and treatment frequencies of binges and vomits and percent reductions in binges and vomits during treatment are presented in Table 9. The following text reports only those correlations statistically significant at the .05 level. BDI raw scores at baseline correlated .78 with mean daily binges during treatment. Depression subscale raw scores correlated .83 with mean daily binges during treatment. Psychoticism subscale raw scores correlated .84 with mean daily binges during baseline, .95 with mean daily binges during treatment, and .77 with mean daily vomits during treatment.

Frequency of Disordered Eating and Treatment Outcome

Spearman rank-difference correlations for the mean daily frequency of binges and vomits for baseline and treatment with percent reductions
Table 9

Correlations for Bingeing and Vomiting and Change in Bingeing and Vomiting with the Length of the Eating Disorder, the BDI and the Subscales of the SCL-90.

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<tr>
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<td>.75</td>
<td>.45</td>
<td>.36</td>
<td>.83*</td>
<td>.65</td>
<td>.70</td>
<td>.61</td>
<td>.56</td>
<td>.95*</td>
<td>.71</td>
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<td>.15</td>
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<tr>
<td>Mean Vomit 2</td>
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<td>.43</td>
<td>.61</td>
<td>.25</td>
<td>.07</td>
<td>.56</td>
<td>.47</td>
<td>.44</td>
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**NOTE:** BDI = Beck Depression Inventory, SOM = Somatization, OC = Obsessive Compulsive, IS = Interpersonal-Sensitivity, DEP = Depression, ANX = Anxiety, HOS = Hostility, PhAnx = Phobic Anxiety, PaId = Paranoid Ideation, PSY = Psychoticism, GSI = Global Scale Index, 1 = Baseline, 2 = Treatment, % = Percent reductions.

P < .05
in binge eating and vomiting are displayed in Table 10. Mean daily baseline binges correlated .82 (N=7) with mean daily binges during treatment. Mean daily binges during treatment correlated .78 (N=7) with mean daily vomits during baseline and .78 (N=7) with percent reductions in binges. Mean daily vomits during treatment correlated -.93 (N=7) with percent reductions in vomits during treatment. Mean daily binges during treatment correlated .78 (N=7) with mean daily vomits during treatment.

Relationship of Self-monitoring Data to Psychometric Measures

Spearman rank-difference correlations of mean daily reported social contacts, athletic activities, mean SUD and UB scores all for baseline and treatment with raw scores for the BDI and SCL-90 R subscales for baseline and treatment are shown in Table 11. Again, the following text only reports correlations that were statistically significant (p < .05).

SUD during treatment correlated .93 (N=6) with the baseline depression subscale raw score, .81 (N=6) with the baseline psychoticism subscale raw score, .95 (N=6) with the post-treatment interpersonal sensitivity subscale raw score, and .94 with the baseline hostility subscale raw score.

UB during treatment correlated .83 (N=6) with baseline BDI raw score, .81 (N=6) with the baseline obsessive-compulsive subscale raw score, .81 (N=6) with the baseline depression subscale raw score, .84 (N=6) with the baseline phobic anxiety subscale raw score and .90 (N=5) with the post-treatment obsessive-compulsive subscale raw score.

Depression, General Psychopathology and Self-reported Frequency of Bulimic Eating Patterns

Spearman rank-difference correlations for baseline BDI and SCL-90 R subscales with mean daily binges and vomits during baseline and treatment
Table 10

Correlations of Frequency of Disordered Eating and Treatment Outcome

<table>
<thead>
<tr>
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<th>Binge 2</th>
<th>Vomit 2</th>
<th>% Binge</th>
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<td>.57</td>
<td>.43</td>
<td>-.46</td>
</tr>
<tr>
<td>Vomit 1</td>
<td>.78*</td>
<td>.61</td>
<td>.71</td>
<td>-.57</td>
</tr>
<tr>
<td>Binge 2</td>
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<td>.78*</td>
<td>.78*</td>
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<td>-.71</td>
<td>-.93</td>
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Note: 1 = Baseline, 2 = Treatment, % = Percent changes

* p < .05
### Table 11

**Correlations of Self-Monitoring Data with Psychometric Measures**

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<th>BD2</th>
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<td>.43</td>
<td>.21</td>
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</table>

**NOTE:** 1=Baseline, 2=Treatment. BDI=Beck Depression Inventory, SOM=Somatization, OC=Obsessive-Compulsive, IS=Interpersonal-Sensitivity, Dep=Depression, Anx=Anxiety, Hos=Hostility, PhAnx=Phobic Anxiety, PaId=Phobic Anxiety, PaId=Paranoid Ideation, Psy=Psychoticism, GSI=Global Scale Index, SC=Social Contacts, AA=Athletic Activity, SUD=Subjective Units of Discomfort, UB=Urge-to-binge. All Baseline measures N=7. Treatment measures for BDI and SCL-90 subscales N=6. SUD for treatment N=5.

\( P < .05 \)
were reported previously with the analyses of the relationship between the severity of the eating disorder and treatment outcome. Table 12 presents the Spearman rank-difference correlations of mean daily binges and vomits during treatment with post-treatment BDI and SCL-90 R subscale raw scores. Mean daily frequency of binge eating during treatment correlated significantly (r=.83) with the post-treatment BDI raw score (p < .05).

Follow-up Questionnaire

Ratings of Subject-perceived Change, Satisfaction and Control

Six subjects who received habit reversal completed follow-up questionnaires. The Likert scale ratings for subject-perceived change, control, and satisfaction were converted to numerical values so that the five choices for answering each question were assigned the numbers one through five. Number one represented a negative evaluation, number three represented a neutral evaluation and number five represented a positive evaluation. The converted ratings of change, satisfaction and change are presented in raw form in Table 13.

The mean rating of change in subjects' overall daily functioning at follow up was 3.83 (range= 2.0 to 5.0). The mean rating of change in binge eating at follow up was 4.17 (range= 4.0 to 5.0), and the mean rating of change in vomiting at follow up was 3.83 (range= 2.0 to 5.0). The mean rating of satisfaction for reductions achieved in binge eating was 2.67 (range= 1.0 to 5.0) while the mean rating of satisfaction for reductions achieved in vomiting was 3.17 (range= 1.0 to 5.0).
Table 12

Correlations of Mean Daily Binge Eating and Vomiting During Treatment with BDI and SCL-90 Subscales Post-Treatment

<table>
<thead>
<tr>
<th>Subscales</th>
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<th>DEP</th>
<th>ANX</th>
<th>Hos</th>
<th>PHANX</th>
<th>PaId</th>
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<th>GSI</th>
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<td>.66</td>
<td>.48</td>
<td>.76</td>
<td>.63</td>
<td>.38</td>
<td>.12</td>
<td>.52</td>
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<tr>
<td>Mean Vomit</td>
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<td>.27</td>
<td>-.26</td>
<td>.36</td>
<td>.08</td>
<td>.14</td>
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<td>.03</td>
<td>-.23</td>
<td>.06</td>
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</table>

NOTE: BDI=Beck Depression Inventory, SOM=Somatization, OC=Obsessive-compulsive, IS=Interpersonal sensitivity, DEP=Depression, ANX=Anxiety, Hos=Hostility, PhAnx=Phobic Anxiety, PaId=Paranoid Ideation, PSY=Psychoticism, GSI=Global Scale Index. *P < .05
Table 13

Follow up Ratings of Change, Satisfaction, and Control of Eating Patterns.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Change</th>
<th>Satisfaction</th>
<th>Pre-Treatment Control</th>
<th>Follow-up Control</th>
</tr>
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<td>Binge Eating</td>
<td>Binge Eating</td>
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<tr>
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<td>2</td>
<td>4</td>
<td>4</td>
<td>2</td>
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<td>2</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
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<tr>
<td>$\bar{x}$</td>
<td>3.83</td>
<td>4.17</td>
<td>3.83</td>
<td>2.67</td>
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</table>

NOTE: Higher scores indicate more positive rating.
The mean retrospective rating for pre-treatment control of binge eating was 1.83 (range= 1.0 to 4.0). The mean retrospective rating for pre-treatment control of vomiting was 1.5 (range= 1.0 to 2.0). At follow up, group rating for perceived control of binge eating was 3.67 (range= 3.0 to 4.0). Perceived control of vomiting at follow up averaged 3.33 (range= 2.0 to 5.0).

Anecdotal Data

The following section summarizes anecdotal data provided by five treatment subjects who completed eight questions related to habit reversal. Results for each of the eight questions are presented in turn. For many questions, subjects supplied more than one answer per question. The summaries for each question represent the number of subjects who provided common answers for each question.

The first question asked, "What specifically did you learn from the treatment?" Four subjects indicated that they learned to control their eating habits. Two subjects indicated that communication with the experimenter about their eating problem helped control their problem. One subject reported gaining knowledge of calories in a binge. In the general area of increased awareness, one subject indicated an increased understanding of her emotions (e.g., guilt, anger, tension), and also an awareness that other problems in her life were bigger than her eating problem. One subject noted that she found she did not totally have the desire to change.

The second question was, "Are you still using any part of the treatment? If so, describe." This question included a listing of each habit reversal component as described to the subject at the
habit reversal session. Five subjects indicated that they utilized some form of competing response (e.g., exercise, leaving the situation, walking.) Three subjects utilized counting calories or paying attention to what they were eating (i.e., binge awareness). In fact, Subject 2 reported utilizing the habit reversal program as she had during the treatment phase, and she mailed a copy of a graph of her eating behavior over three months prior to follow up. Apparently Subject 2 suffered a relapse in her bingeing and vomiting following a move to another state; she re-instituted the treatment on her own initiative.

Question three was, "What was the most important part of the treatment for you?" Two subjects indicated that the telephone contacts helped; one of these two subjects noted that phone contacts were both helpful support and an incentive to do well. One subject reported that support for her problem in general was one of the most important parts of treatment. She also indicated that the realization of time and money spent indulging her problem behavior was an incentive to stop (i.e., habit inconvenience review). Knowing calorie amounts was important for one subject. One subject wrote that recording data was important, and another subject evaluated the competing response as important.

The fourth question was, "Have you at anytime since treatment during the past several months recorded data on your eating patterns?" Five of six subjects did not record data since treatment end. Subject 2 sent a copied graph of her eating behavior to demonstrate her record keeping as noted above.
The fifth question was, "What, if any, benefits in your life have resulted from this treatment? Any detriments?" Answers for this question closely paralleled answers provided in the first question. Greater awareness of calories was listed by two subjects. Greater control was noted by three subjects. One subject indicated saving time and money. In the area of detriments, one subject believed it was a detriment to know that her bingeing and vomiting would not physically harm her (this perception apparently related to her electrolyte analysis which was reported to her as within normal limits). Subject 1, who left the study, indicated that she experienced greater stress by not dealing with her clinical depression.

Question six, was "Have you sought any other interventions for your eating problem since termination of treatment? If so, describe." Subject 1 left the study to seek treatment for depression. She reported consulting a social worker and a psychologist who both provided individual psychotherapy (unspecified). One subject went to one meeting of Overeater's Anonymous, but she did not like this organization's philosophy (unspecified). One subject attempted acupuncture and prescription diet pills.

Question seven asked, "Can you think of anything else that might be helpful for understanding your reaction to treatment?" One subject indicated that it would have been helpful to first assist her in achieving desired weight loss, in which case she believed the vomiting would stop. One subject emphasized the importance for her of receiving supportive initial treatment, and one subject suggested
simultaneously dealing with her other existing problems in addition to her eating disorder.

The eighth question was, "What suggestions would you make to improve treatment as I work with other individuals with similar problems?" One subject suggested developing an appropriate diet program along with habit reversal. Another subject suggested a complete assessment of individual needs. Last, Subject 2 listed specific requests to have more space on data cards to record competing responses, to require three or more public practices daily, to require social support from significant others and to maintain a daily journal of emotions from which to evaluate change.

**Reacted Subjects**

Two subjects (8 and 10) who met the minimum severity criteria for inclusion in the study reported no binge eating or self-induced vomiting during baseline data collection. One subject (9) who qualified for the study reported one bulimic episode over a three-week baseline period. These three subjects were not entered into habit reversal treatment at their request. Each attributed their reductions in bingeing and vomiting to the daily data recording. Psychometric data obtained at baseline for the reacted subjects are shown in Table 14. Statistical comparisons between reacted subjects and treated subjects on the BDI and SCL-90 R were not made due to the small number of reacted subjects. Visual inspection of the BDI and SCL-90 R for the reacted subjects yielded no obvious differences in comparison to treated subjects.
Table 14

Baseline BDI Raw Scores and SCL-90 Subscale Raw and T-Scores for Reacted Subjects

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<td>0</td>
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</table>
Two of the three reacted subjects completed the 6-month follow-up questionnaire designed to assess their reactions to daily data recording. Each of these recorded daily data for nine days. Results of the daily data recording indicated no bulimic episodes for one subject (10) and one bulimic episode for the other subject (8).

In response to the questionnaire, Subject 8 reported that the cards were an incentive not to vomit so that she would not have to record its occurrence. Subject 8 noted that when she stopped recording data, she recommenced bingeing and vomiting. According to Subject 8, the data recording helped her gain the knowledge that the eating disorder required effort to keep under control.

Subject 10 wrote that recording daily data helped her understand the circumstances that "triggered" her bingeing which she then was able to "escape." By keeping data on her social contacts, Subject 10 learned that she spent very little time with anyone but her children. As a result, she made an effort to become more involved with other people. Subject 10 noted that the daily data cards assisted her in personal goal setting and evaluation which contributed to more productivity and an improved self-image. Neither Subject 8 nor Subject 10 reported any negative side effects of daily data recording.
DISCUSSION

Introduction

The present study hypothesized that bulimia is a habit and investigated the utility of habit reversal for the treatment of this eating disorder. Habit reversal was adapted specifically to decrease and/or eliminate the bingeing and purging responses of bulimia. A secondary purpose of the study was to assess any side effects of treating bulimia with habit reversal. Secondary dependent data were obtained on self-reported social contacts, athletic activities, subjective units of discomfort, urges-to-binge, and psychometric measures of both depression (Beck Depression Inventory) and general psychopathology (Symptom Checklist 90-Revised). Blood electrolyte levels were drawn during baseline and post-treatment. Unless otherwise noted, all correlations in the following discussion were statistically significant at the .05 level.

Primary Dependent Variables

Given the limitations of the present study, the results demonstrate that habit reversal is effective in decreasing and/or eliminating bulimic habits. Reported decreases in bingeing and vomiting were immediate, substantial and concurrent with treatment. The decreases obtained in bingeing and vomiting were maintained for five of six subjects contacted at 6-month follow up. The results of the present study are consistent with the habit reversal treatment of other habit-like

Although substantial reductions in reported bingeing and vomiting occurred concurrently with habit reversal, variability in treatment outcome for the target behaviors was observed across subjects. Percent reductions in bingeing ranged from a low of 39.2 percent during treatment to a high of 91.4 percent during treatment. Reductions in vomiting showed similar variability with a low of 22.7 percent and a high of 79.6 percent during treatment. The variability in treatment outcome across subjects was also observed at 6-month follow up.

Individual variability in treatment outcome can be partially accounted for by differences in pre-treatment psychopathology. First, habit reversal was more effective for subjects who reported the least baseline psychoticism (i.e., extreme interpersonal alienation) as indexed by significant positive correlations between the psychoticism subscale raw score at baseline with both mean daily bingeing ($r = .95$) and mean daily vomiting ($r = .77$) during treatment. Second, pre-treatment depression was associated with mean daily bingeing during treatment as indexed by significant positive correlations between mean daily bingeing during treatment with both the baseline BDI raw scores ($r = .78$) and baseline depression subscale raw scores ($r = .83$). Thus, psychological dysfunction concomitant with bulimic eating patterns at baseline may have contributed to differential effectiveness of habit reversal. However, individual variability in treatment outcome was not associated with the reported length of the eating disorder.
The finding that concurrent psychological dysfunction related to the effectiveness of habit reversal suggests that simultaneous treatment of other psychological problems may increase the effectiveness of habit reversal. In support of this supposition, Wolff (1983) found that obese bingers did not achieve satisfactory reductions in binge eating with cognitive restructuring because of competing emotional difficulties such as depression and marital conflict. A careful assessment of each bulimic individual could determine an individualized component to be added to habit reversal. For example, a cognitive restructuring intervention could be added to habit reversal for an individual who reported self-deprecating thoughts following each bulimic episode.

As bingeing decreased following habit reversal, several subjects reported vomiting in the absence of bingeing. This finding has not been previously reported. Reductions achieved in vomiting, however, were highly related to reductions achieved in binge eating ($r = .78$). Habit reversal appeared to impact bingeing and vomiting to a similar degree.

In the present study, a competing response and an abbreviated relaxation procedure to interrupt the chain of events leading to vomiting did not eliminate vomiting which occurred in the absence of bingeing. It is possible that subjects did not utilize the competing response and abbreviated relaxation properly to prevent vomiting. It is also possible that the degree of relaxation was not sufficient to interrupt the urge-to-vomit. An independent evaluation of the subjects' skills at implementing the competing response was not possible given the demands for confidentiality on each subject's
part. Before firm conclusions can be drawn regarding the effectiveness of the habit reversal package for decreasing the vomiting aspect of bulimia, a validation of the occurrence of the competing response is needed.

The urge-to-vomit was not monitored by the subjects. Awareness of such urges produced by self-monitoring may have contributed to further decreases in vomiting. Another possible explanation for the diminished effectiveness of habit reversal for vomiting in the absence of bingeing is that chronic vomiting may be a class of responses separate from bulimia. Habit reversal techniques may not be appropriate for vomiting in the absence of bingeing. Chronic vomiting has been treated with electric shock (Kenny & Solyman, 1971), operant conditioning techniques (Ingersoll & Curry, 1977) and relaxation training (see Redd & Andrykowski, 1982 for a review).

In order to overcome the aforestated limitations of abbreviated relaxation, complete relaxation training could be added to habit reversal. Progressive relaxation training alone was effective in reducing bulimic eating patterns in two case studies (Mizes, 1984; Mizes & Lohr, 1983). The advantages of utilizing progressive muscle relaxation training as an adjunct to the competing response procedure are: (a) a minimum degree of relaxation training can be assured during weekly practice sessions, (b) the degree of relaxation achieved during weekly practice can be measured physiologically and related to treatment outcome, and (c) the degree of compliance to home practice can be assessed with a marked tape procedure in which subjects record the frequency of randomly placed tones on specially prepared cassettes (Martin, Collins, Hillenberg, Zabin & Katell, 1981). This compliance
measure for home practice would also be a reliability measure for the competing response in general. Other forms of relaxation training, such as autogenics, may be equally effective as an adjunct to the competing response procedure; however, no data yet exist to support the effectiveness of any other form of relaxation training with bulimia.

It is notable that fasting was not substituted as a weight control mechanism when the frequency of vomiting decreased. During baseline, only one subject evidenced fasting on two separate occasions. This subject did not fast at any time in treatment. In addition, neither laxatives nor diuretics were substituted as a weight control mechanism by any subject. Only one subject utilized laxatives during baseline, and laxative use decreased with habit reversal in the same manner as vomiting. Based on anecdotal reports, it appeared that decreased food intake was considered sufficient as a diet mechanism.

Reduction in the urges preceding bingeing were not reported as bulimic eating patterns decreased. Yet, Azrin et al. (1980c) reported reductions in the urges preceding hair-pulling. This latter result may be limited to more simple habits. The bulimic habit encompasses a complex set of behaviors with which the urge-to-binge is intertwined. For example, every bulimic must face food daily in one way or another which may prevent extinction of the urge-to-binge. It may also be that UB was not assessed adequately in the present study. Subjects only provided UB when a binge occurred. In the relative absence of binges, changes in UB may have been lost without the prompt to record provided by the binge itself. More
data on UB are needed before any conclusions can be drawn on the effects of habit reversal thereon.

It was also found that tension associated with bingeing and vomiting did not decrease as bingeing and vomiting reduced in frequency as reported by Rosen and Leitenberg (1982). In fact, Subjective Units of Discomfort (SUD) increased slightly during treatment. This is not surprising given the fact that habit reversal does not provide extensive treatment for stress management. Rosen and Leitenberg produced reductions in SUD via an exposure treatment designed specifically to reduce the anxiety associated with bingeing. In the present study habit reversal may have allowed insufficient exposure to bingeing for tension to extinguish. Adding complete relaxation training to habit reversal may serve the dual purpose of providing a degree of general stress reduction and increasing the effectiveness of the competing response procedure.

Secondary Dependent Variables

Habit reversal treatment clearly decreased the bingeing and vomiting aspects of the bulimic habit. Equally important was the finding that habit reversal was associated with numerous positive side effects while no negative side effects were observed. The most obvious positive side effects were increases in the frequency of reported social contacts and athletic activities. Also, no clinical increases in psychopathology were observed. Last, results of blood chemistry analyses indicated normal metabolic functioning for all subjects at baseline and post-treatment. Each secondary dependent variable is discussed in turn.
Dramatic increases in the frequency of reported social contacts and athletic activities occurred following habit reversal. Every treated subject reported increases in either social contacts, athletic activities or both. Large percentage increases observed in the frequency of social contacts and athletic activities for some subjects are not unusual given their relatively low baseline frequencies. For example, the addition of just two more daily social contacts doubled the daily mean of 1.12 for Subject 2. On the average, subjects nearly doubled athletic activities from 1.26 to 2.31 per week following treatment. Increases in social contacts and athletic activities represent only changes in reported frequencies. It is not possible to infer anything about the quality or duration of either measure from these data. However, the substantial changes in reported frequencies represent a clinically significant finding. As subjects decreased bulimic episodes, the time was partially filled with more adaptive behavior.

Although no formal intervention was provided to change social or athletic behavior, it is possible that the competing response procedure contributed to the increases in social contacts and athletic activities. It can be argued that the time made available by reductions in bulimic eating patterns was partially filled by social or athletic activity stimulated by successfully completed competing responses. The competing responses were a mild form of social contact (i.e., talking with someone in person or on the telephone) or athletic activity (i.e., taking a walk). The increased social and/or athletic behavior could have become natural competing responses maintained by their environmental consequences. The changes reported in social behavior are consistent with those noted by Azrin and Nunn (1974).
and Azrin et al. (1979) in the habit reversal of stuttering. Anecdotal data provided by the authors indicated that individuals who had previously stuttered and avoided social encounters became more social following treatment. The present data provide a somewhat more controlled demonstration of the positive side effects of habit reversal in the area of social behavior.

As another attempt to assess the side effects of habit reversal for bulimia, measures of depression (Beck Depression Inventory) and general psychopathology (Symptom Checklist 90-Revised) were obtained during baseline and post-treatment. In the originally planned design of the present study, the psychometric measures for treated subjects were to be statistically compared to an attention control group for significance of differences from baseline to treatment. However, for reasons previously outlined, the attention control group was eliminated. Without the experimental control group, any changes in the psychometric measures could be a result of factors other than treatment (e.g., regression to the mean, experience with pre-testing). Therefore, changes on the psychometric measures from baseline to post-treatment must be interpreted cautiously.

At best, the BDI and SCL-90 indicated no observable clinical changes in depression and general psychopathology from baseline to post-treatment. Habit reversal did not improve or worsen baseline psychological functioning. Even though no apparent changes in depression or psychopathology were observed as a result of treatment, the findings appear clinically important in light of the criticism that behavioral treatments for bulimia may lead
to the development of other psychological problems (Bruch, 1977). In the present study, bulimic individuals who underwent a behavioral treatment did not develop a worsened psychological state as measured by the BDI and SCL-90.

While it has been argued that bulimic eating patterns are related to depression and general psychopathology (American Psychiatric Association, 1980; Boskind-Lodahl & Sirlin, 1977; Wolf & Crowther, 1983), the nature of the relationship remains unclear. On the one hand, bulimia was associated with relatively normal psychological functioning in 39 bulimic patients as measured by the Minnesota Multiphasic Personality Inventory (Norman & Herzog, 1983). On the other hand, significant elevations were found on several subscales of the Minnesota Multiphasic Personality Inventory for 34 bulimic patients (Pyle, Mitchell & Eckert, 1981). No data have been reported on the relationship between the self-reported frequency of bingeing or vomiting and measures of depression or general psychological functioning. For seven subjects in the present investigation, baseline raw scores on the BDI were unrelated to baseline frequency of bulimic eating episodes. Mean daily bingeing correlated positively with the baseline psychoticism subscale raw score (r=.84). However, a more important relationship was discovered. Psychological dysfunction predicted the degree of success of habit reversal in reducing bulimic eating episodes (discussed above). The overall evidence suggests that psychopathology and bulimic eating patterns may be separate phenomena which can coexist and exacerbate the status of each other.
More recent investigations support the notion that bulimia and psychopathology are separate phenomena which occasionally overlap. A descriptive survey of 316 women who met DSM III criteria for bulimia (Johnson, Stuckey, Lewis & Swartz, 1983) showed that bulimic individuals did not differ clinically from a normal control group on the Hopkins Symptom Checklist (an earlier version of the SCL-90). Despite the wide range in severity of disordered eating, this sample of 316 bulimic patients was relatively symptom-free on a psychiatric index. In another study, 11 bulimic patients were compared to 17 anorectic patients and 10 control subjects for changes in psychologic state (i.e., mood, anxiety) as a result of caloric stimulation (a standardized meal of 400 calories) (Robinson, Tortosa, Sullivan, Buchanan, Andersen, & Folstein, 1983). Robinson et al. did not find any specific area of psychopathology within the bulimic patients. Bulimia was associated with general distress. The results of the present study are consistent with the suggestion that bulimic individuals are indeed distressed, but do not necessarily evidence psychopathology specific to the eating disorder.

An attempt to provide convergent validity data for treatment outcome based on changes in blood electrolyte levels did not succeed. All subjects had normal metabolic functioning during baseline and post-treatment. Frequent vomiting by several subjects in the present sample did not affect blood electrolytes as had been expected (cf. Geller et al., 1978; Harrison, 1980). Apparently, human physiology can adequately compensate for metabolic imbalances caused by frequent vomiting through adjustments in the respiratory and renal systems.
(Guyton, 1981). More data are needed to assess the relationship between blood electrolyte levels and frequent vomiting which occurs over extended periods of time before the utility of electrolyte measures as convergent validation of treatment outcome in bulimia can be established.

**Validity of Self-report Data**

As with all research which utilizes self-monitoring, the accuracy of the data can never be completely verified (Nelson, 1977). For example, it is possible that subjects reported data in the direction of expected outcome once treatment was provided. Also, subjects may not have accurately recorded or may have shifted the accuracy of recording the dependent behaviors with the passage of time. On the other hand, several pieces of evidence converge on the overall accuracy of the self-report data in the present study. Subjects who reported increased tension (SUD) during treatment reported more psychological dysfunction at baseline. Increased urge-to-binge ratings were also positively correlated with measures of psychological dysfunction. During follow-up assessment, subjects rated their control of bingeing as superior to their control of vomiting, which corresponded to the greater difficulty of decreasing vomiting vis-a-vis bingeing. In addition, follow-up ratings of changes achieved in bingeing and vomiting corresponded to reductions in each.

Subjects were less satisfied with reductions in bingeing than with reductions in vomiting even though reductions in bingeing were greater than vomiting. This finding is not inconsistent when it is considered that subjects may have been more concerned with
bingeing than vomiting because of the possibility of weight gain following a binge. This speculation is partially supported by a positive correlation between mean daily bingeing during treatment with the post-treatment BDI (r=.83) while mean daily vomiting during treatment was not associated with depression.

While it is suggested that valid indicies of reported behavior exist, the results must be approached with caution. In interpreting the above data, it should be kept in mind that a low correlation between the self-reported frequency of an unobservable event with the frequency of an observed event cannot be taken as evidence of inaccurate recording. The two sets of behaviors may be only minimally related. The fact that evidence does exist for the accuracy of self-monitoring in the present investigation strengthens the argument for interpreting the overall findings as valid.

Reacted Subjects

Reactivity to self-monitoring is a well-established phenomenon (see Nelson, 1977 for a review). Decreases across a wide range of negative behaviors have been observed as a result of self-monitoring, for example, alcoholic drinking (Sobell & Sobell, 1973) claustrophobic behavior (Leitenberg, Agras, Thompson & Wright, 1968) and reports of ruminative thinking (Frederickson, 1975). In the present investigation, two subjects completely stopped bingeing and vomiting following initiation of self-monitoring, and one subject markedly reduced bulimic eating episodes immediately following initiation of self-monitoring. It is also possible that frequent reporting of data by phone contributed to the effectiveness of self-monitoring. (Unfortunately, records of frequency
of telephone interactions with subjects were not kept.) The therapeutic gains accomplished as a result of self-monitoring were maintained for two subjects contacted at 6-month follow up. The long-term maintenance of reactivity to self-monitoring in general was demonstrated by Nelson, Boykin, and Hayes (1982). The change of bulimic eating patterns by daily self-monitoring has not been documented in the literature prior to this study.

Anecdotal data provided at follow up by two reacted subjects are suggestive that self-monitoring was the active ingredient for the reductions achieved in their bulimic episodes. One subject noted specifically that she became aware of her eating patterns which allowed her to successfully interrupt bingeing. The second reacted subject indicated that she was motivated to stop bingeing in order to avoid the negative consequences of recording the binge. These anecdotal reports are consistent with the explanation advanced by Kanfer (1970) to account for reactivity of self-monitoring. According to Kanfer (1970), individuals who self-monitor engage in self-evaluation and consequently self-reinforce positive behavior and self-punish negative behavior. In terms of habit reversal, it appears that reacted subjects developed and self-reinforced competing responses to binge eating as a result of self-monitoring. Several authors have argued that one of the critical components contributing to the effectiveness of habit reversal is the increased awareness achieved via self-monitoring (Azrin et al., 1980a, b, c; Ladouceur, 1979). The present data support this argument for the contributing therapeutic effectiveness of self-monitoring. Further-
more, self-monitoring in combination with frequent phone contacts without any further treatment eliminated bulimic eating patterns in two subjects and markedly decreased bulimic episodes in a third subject. Reacted subjects did not appear to differ from treated subjects on baseline measures of psychological functioning or in pre-treatment severity of the eating disorder.

Conclusions and Recommendations

Before discussing the implications of the present research, a major limitation of the study needs to be considered. The present study was limited by the necessity of accepting self-report data regarding both the application of the independent variable and changes in the dependent behaviors. Although it is suggested that valid indicies of reported behavior exist in significant correlations with psychometric measures, the data must be cautiously approached. In light of the afore-mentioned limitation, the following conclusions and recommendations are tentatively made.

1. Habit reversal was effective in reducing and/or eliminating the dysfunctional bulimic habit. Reported reductions in the habit were maintained to a 6-month follow up. As habit reversal was applied to only seven bulimic females in the present study, systematic replications across a broader range of subjects are needed to strengthen confidence in the efficacy of habit reversal for bulimia. Also, the active ingredients of habit reversal for bulimia need to be identified.

2. Treating bulimic individuals with habit reversal was associated with many positive side effects while no negative side
effects were observed. By focusing on reducing the bingeing and vomiting aspects of bulimia, subjects experienced immediate success with treatment even though other psychological problems existed.

3. Daily self-monitoring which focuses on the antecedents of bulimic episodes in combination with frequent reporting of data by telephone produced reactivity for several subjects. The reactive influence of self-monitoring various antecedents of bulimic episodes warrants further study.

4. Individual variability in treatment outcome can be partially accounted for by differences in pre-treatment psychopathology. Habit reversal was more effective for subjects who reported the least pre-treatment psychopathology. Careful assessment of individuals with bulimia is important to help determine additional, simultaneous treatments of other existing psychological problems which might increase the effectiveness of habit reversal.

5. Metabolic monitoring was not effective as a measure of treatment outcome since all subjects demonstrated normal electrolyte levels at baseline. More data on the relationship between frequent vomiting over extended time periods and electrolytic functioning are needed before metabolic monitoring can be established as a useful measure of treatment outcome for bulimia.

6. Habit reversal was not totally effective in eliminating bulimic eating patterns. Future treatment research needs to address improvements in habit reversal techniques. Effectiveness of habit reversal techniques may be increased by: (a) addition of a specific cognitive component to restructure dysfunctional belief systems associated
with bulimia; (b) addition of complete progressive muscle relaxation
training with home practice assignments as competing responses; and
(c) administration of habit reversal in a group therapy context which
would take advantage of the beneficial aspects of group psychotherapy
with bulimia (Boskind-Lodahl & White, 1978).

7. Objective measures of treatment outcome for bulimia remain
to be developed. One possible objective assessment of compliance
to habit reversal is the use of marked cassette tapes of progressive
muscle relaxation for home practice (Martín et al., 1981).
Hillenberg and Collins (1983) noted that the degree of compliance
to home practice of progressive muscle relaxation was associated
with the degree of stress reduction. The degree of compliance to
competing responses could be assessed with this technology in future
research.

8. A promising paradigm for assessing treatment outcome
with bulimia has recently been developed by Leitenberg and his
colleagues (Leitenberg, Gross, Petersen & Rosen, 1984). Bulimia
was conceptualized in an anxiety model (Rosen & Leitenberg, 1982)
and exposure plus response prevention was administered to five
bulimic subjects while continuous physiological monitoring was
conducted (Leitenberg et al., 1984). All five subjects showed
extinction of physiological arousal to bingeing during treatment
sessions; however, no generalization was observed to the natural
environment. In future research, concurrent validity for self-
reported decreases in bulimic episodes in the natural environment
could be obtained through the physiological monitoring of arousal
to standardized amounts of preferred binge food during weekly
assessment sessions. The utility of physiological assessment in the treatment of bulimia remains to be clearly demonstrated.

9. Last, in order to provide more adequate control in studying the treatment of bulimia with habit reversal, inpatient care could be provided. In this manner, more objective measures of bulimic behavior could be obtained, for example, nurses could rate social behavior or verify the occurrence of bingeing or vomiting. Inpatient treatment would restrict the study of naturally occurring contingencies operating in bulimia, but it would allow careful study of a bulimic's reaction to habit reversal.
REFERENCES


Derogatis, L.R. (1977). The SCL-90 manual I: Scoring, administration and procedures for the SCL-90. Baltimore: Johns Hopkins University School of Medicine, Clinical Psychometrics Unit.


International Journal of Eating Disorders, 2, 43-52.


Williams, J.C., Barlow, D.H., & Agras, S. (1972). Behavioral measure-
ment of severe depression. Archives of General Psychiatry, 27,
331-337.

York: Pergamon Press.

variables as predictors of severity of binge eating and weight.
Addictive Behaviors, 8, 335-344.

(Doctoral dissertation, West Virginia University, 1982).
Dissertation Abstracts International, 43, 2364B.

Wulff, M. (1945). Über einem interessanten oralen symptomenkomplex
und seine behelung zur sucht. In Otto Fenickel (Ed.), The
psychoanalytic theory of neurosis (pp. 87-107). New York:
Norton.
APPENDICES
Appendix A: Advertisement for Subjects
TREATMENT RESEARCH FOR EATING PROBLEM

Individuals are sought to investigate the treatment of an eating problem characterized by binges (rapid consumption of food in a short period of time) followed by self-induced vomiting or fasting. Treatment will be strictly confidential with personal identity known only to qualified medical and psychological researchers. Subjects will be responsible for some costs related to medical evaluations. Not all subjects interested will be eligible for the study. For more information, contact: Ken Small (750-1460) Utah State University Psychology Department, or 753-5451.
Appendix B: Data Card
<table>
<thead>
<tr>
<th>Date</th>
<th>Weight</th>
<th>SOCIAL CONTACTS</th>
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<tr>
<td></td>
<td></td>
<td>Initiated</td>
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<tr>
<td>Time</td>
<td>Where Occurred</td>
<td>Same sex</td>
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**Key**
- ✓ = one occurrence of behavior (include total time beside check)
- SUD = Subjective Units of Discomfort --rank 1 (calm) to 100 (panic)
- SUD and urge-to-binge intensity for each binge occurrence

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**Explanation**

The document is a daily data card designed to record social contacts and related behaviors such as bingeing, vomiting, and fasting. It includes fields for date, weight, time, where occurred, and social contacts initiated and accepted. The key explains the symbols used, where '✓' indicates one occurrence of a behavior and includes total time beside the check. The subjective units of discomfort (SUD) scale ranges from 1 (calm) to 100 (panic) for each binge occurrence.
Appendix C: Subjective Units of Discomfort Training
Imagine each situation that I will describe. I want you to rank each situation on how much tension or stress you would feel if you were actually involved in the setting I describe. The ranking you will use is based on a numbered scale ranging from 1 to 100. The number 1 represents total relaxation. The number 100 represents total panic. The number 50 represents an average amount of stress or tension. You assign a number to each situation I describe which best represents how much tension you feel. For example, estimate how much stress you feel right now by assigning a number based on 1 as totally relaxed and moving up to 100 as totally panic-stricken. Any questions?

1. The moment just before you go to sleep.
2. Being alone in a dark house.
3. At dinner on a first date with the opposite sex.
4. Watching TV in the afternoon.
5. In the middle of taking a driver's license test.
7. Watching a favorite sporting event.
8. Driving a car in big city rush-hour traffic.
9. Meeting with a group of friends for refreshments.
10. First ride in an airplane.

Now, I want you to choose three situations in your own personal life that represent mild, moderate, and extreme stress and assign SUD ranks to each.
Appendix D: Beck Depression Inventory
BECK INVENTORY

On this questionnaire are groups of statements. Please read each group of statements carefully. Then pick out the one statement in each group which best describes the way you have been feeling the PAST WEEK. On the right, circle the number beside the statement you picked. If several statements in the group seem to apply equally well, circle each one. Be sure to read all the statements in each group before making your choice.

1. If I do not feel sad
   1. I feel sad
   2. I am sad all the time and I can’t stop it
   3. I am so sad I can’t stop it

2. If I am not particularly upset about the future
   1. I feel anxious about the future
   2. I feel I have nothing to look forward to
   3. I feel that the future is hopeless and that things cannot improve

3. If I do not feel like a failure
   1. I feel I have failed more than the average person
   2. As long as I try, all I can see is a lot of failures
   3. I feel I am a complete failure as a person

4. If I get as much satisfaction out of things as I used to
   1. I don’t notice things the way I used to
   2. I don’t get real satisfaction out of anything anymore
   3. I am uninterested or bored with everything

5. If I feel particularly guilty
   1. I feel guilty, a good part of the time
   2. I feel guilty all the time
   3. I feel guilty all the time

6. If I feel I am being punished
   1. I feel I am underbused
   2. I expect to be punished
   3. I feel I am being punished

7. If I don’t feel disappointed in myself
   1. I am disappointed in myself
   2. I am disappointed with myself
   3. I hate myself

8. If I don’t feel any worse than anybody else
   1. I am as good as or better than anybody else
   2. I am not as good as I am at all
   3. I am not as good as I am at

9. If I do not have any thoughts of killing myself
   1. I have thoughts of killing myself, but I would not carry them out
   2. I would like to kill myself
   3. I would like to kill myself if I had the chance

10. If I don’t care any more than usual
    1. I care more than usual
    2. I care less than usual
    3. I care less than usual

11. If I am not interested in sex
    1. I am interested in sex
    2. I feel interested all the time
    3. I do not get interested in anything but sex

12. If I have not lost interest in other people
    1. I am less interested in other people than I used to be
    2. I have lost more of my interest in other people
    3. I have lost all of my interest in other people

13. If I make decisions as well as I ever could
    1. I put off making decisions more than I used to
    2. I have increased difficulties in making decisions than before
    3. I can’t make decisions at all anymore

14. If I don’t feel I look any worse than I used to
    1. I am worried that I am looking old or unattractive
    2. I feel I have permanent changes in my appearance
    3. I think I look ugly

15. If I work as well as before
    1. I take an extra effort to get started at doing something
    2. I do not push myself very hard to do anything
    3. I can do any work at all

16. If I am as sleep as normal
    1. I don’t sleep as well as I used to
    2. I wake up 1-2 hours earlier than usual and find it hard to get back to sleep
    3. I wake up several hours earlier than I used to and cannot get back to sleep

17. If I do not get more tired than usual
    1. I get tired more easily than I used to
    2. I get tired sooner than I used to
    3. I am too tired to do anything

18. If my appetite is no worse than usual
    1. My appetite is not as good as it used to be
    2. My appetite is much worse now
    3. I have no appetite at all anymore

19. If I haven’t lost weight if any lately
    1. I have lost more than 10 pounds
    2. I have lost more than 5 pounds
    3. I have lost less than 5 pounds

20. If I am more worried about my health than usual
    1. I am worried about physical problems such as ache and pains, or upset stomach or constipation
    2. I am very worried about physical problems and it’s hard to think of much else
    3. I am worried about my physical problems that I cannot think about anything else

21. If I have not noticed any recent change in my interest in sex
    1. I am less interested in sex than I used to be
    2. I am much less interested in sex now
    3. I have lost interest in sex completely
Appendix E: Symptom Checklist-90 (Revised)
**INSTRUCTIONS**

Below is a list of problems and complaints that people sometimes have. Read each one carefully, and select one of the numbered descriptions that best describes HOW MUCH DISCOMFORT THAT PROBLEM HAS CAUSED YOU DURING THE PAST INCLUDING TODAY. Place that number in the open block to the right of the problem. Do not mark any items, and print your number clearly. If you change your mind, erase your first number completely. Read the example below before beginning, and if you have any questions please ask the technician.

**EXAMPLE**

<table>
<thead>
<tr>
<th>HOW MUCH WERE YOU DISTRESSED BY?</th>
<th>DESCRIPTIONS</th>
<th>HOW MUCH WERE YOU DISTRESSED BY?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex. Body Aches</td>
<td>0 Not at all</td>
<td>28. Feeling blocked in getting things done</td>
</tr>
<tr>
<td></td>
<td>1 A little bit</td>
<td>29. Feeling lonely</td>
</tr>
<tr>
<td></td>
<td>2 Moderately</td>
<td>30. Feeling blue</td>
</tr>
<tr>
<td></td>
<td>3 Quite a bit</td>
<td>31. Worrying too much about things</td>
</tr>
<tr>
<td></td>
<td>4 Extremely</td>
<td>32. Feeling no interest in things</td>
</tr>
</tbody>
</table>

1. Headaches
2. Nervousness or shakiness inside
3. Repeated unpleasant thoughts that won't leave your mind
4. Fears or distress
5. Loss of sexual interest or pleasure
6. Feeling critical of others
7. The idea that someone else can control your thoughts
8. Feeling others are to blame for most of your troubles
9. Trouble remembering things
10. Worrying about foolishness or carelessness
11. Feeling easily annoyed or irritated
12. Pains in heart or chest
13. Feeling afraid or alone in public or on the streets
14. Feeling low in energy or slowed down
15. Thoughts of ending your life
16. Hearing voices that other people do not hear
17. Trembling
18. Feeling that most things cannot be trusted
19. Poor appetite
20. Gaining weight
21. Feeling shy or uneasy with the opposite sex
22. Repeating things you want to do
23. Guilt about something you did in the past
24. Feelings you are not in control
25. Feeling afraid to go out of your house alone
26. Blushing, sweating, or trembling
27. Pains or noises in ears
28. Feeling blocked in getting things done
29. Feeling lonely
30. Feeling blue
31. Worrying too much about things
32. Feeling no interest in things
33. Feeling fearful
34. Your feelings being easily hurt
35. Other people being aware of your private thoughts
36. Feeling others do not understand you or are unsympathetic
37. Feeling that people are unfriendly or dislike you
38. Having to do things very slowly to keep correct number
39. Heart pounding or racing
40. Nausea or upset stomach
41. Feeling inferior to others
42. Soreness of your muscles
43. Feeling that you are watched or talked about by others
44. Trouble falling asleep
45. Having to check and double-check what you do
46. Difficulty making decisions
47. Feeling afraid to travel on buses, subways, or trains
48. Trouble getting your breath
49. Hot or cold sweats
50. Having to avoid certain things, places, or activities because they frighten you
51. Your mind going blank
52. Stiffness or tingling in parts of your body
### SCL-90-R

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53. A lump in your throat
54. Feeling hopeless about the future
55. Trouble concentrating
56. Feeling weak in parts of your body
57. Feeling tense or keyed up
58. Heavy feelings in your arms or legs
59. Thoughts of death or dying
60. Overeating
61. Feeling uneasy when people are watching or talking about you
62. Having thoughts that are not your own
63. Having urges to hurt someone or harm someone
64. Awakening in the middle of the night
65. Having to repeat the same actions such as touching, counting, washing
66. Sleeping too little or disturbed
67. Having urges to break or smash things
68. Having ideas or beliefs that others do not share
69. Feeling very unimportant with others
70. Feeling anxiety in crowds, such as shopping or at a movie
71. Feeling everything is an effort
72. Spells of terror or panic
73. Feeling uncomfortable about eating or drinking in public
74. Getting into frequent arguments
75. Feeling nervous when you are left alone
76. Others not giving you proper credit for your achievements
77. Feeling lonely even when you are with people
78. Feeling so restless you couldn’t sit still
79. Feelings of hopelessness
80. The feeling that something bad is going to happen to you
81. Shouting or throwing things
82. Feeling that you will faint in public
83. Feeling that people will take advantage of you if you let them
84. Having thoughts about sex that bother you a lot
85. The idea that you should be punished for your sins
86. Thoughts and images of a frightening nature
87. The idea that something serious is wrong with your body
88. Never feeling close to another person
89. Feelings of guilt
90. The idea that something is wrong with your mind
Appendix F: Personal History Questionnaire
This questionnaire is designed to help me understand your eating habits. Your responses will help in the planning and evaluating a treatment program.

Name_________________________________ Date_________________________________

Age_________ Date of Birth___________ Marital Status____________

Education_________________________ Occupation__________________________

Children____________________________________________________________

Height_________ Weight___________ Goal Weight__________

1) When did your bingeing/vomiting/fasting behavior begin? Please give the month, year, and circumstances. ____________________________________________________________

2) How did you "discover" the vomiting/fasting habit/ (illness? seeing or learning of others with this habit?) _________________________________________________

3) What were the circumstances surrounding the onset of this habit? (dieting, stress related, problems) _________________________________________________

(b) How much did you weigh at that time? __________________

For you, was this overweight?_________

underweight?_________

normal weight?_________

4) Briefly describe your eating/vomiting/fasting behavior. (Please describe your typical behavior in the three months before this day.)

(a) How many times a week do you eat/vomit (or fast) or binge/vomit (or fast)?__________________________
(b) If you binge eat, how often do you do so?

(c) What do you eat when you binge that leads you to vomit/fast? Please give examples and estimate the total number of calories in a typical "binge."

(d) Are there typical times of the day that you binge? If yes, describe.

(e) Where do you usually binge? (list several common settings)

(f) Are you usually alone? _____ or with people you know? _____ with "anonymous" others? _____

(g) How long after you eat do you usually vomit/fast? _____

(h) What methods do you use to get rid of the food and/or weight? (forced vomiting, over-the-counter or prescribed medicines, fasting, etc. Please describe in detail).

(i) Where do you usually vomit/fast? (list common settings)
(j) What is the longest period of time that you have been able to refrain from bingeing and vomiting/fasting?

(k) What is your knowledge of dieting? (describe diets attempted, current diets, and knowledge of calories)

(l) At what times of the day do you usually eat?

   Breakfast
   Lunch
   Dinner
   Snacks

(m) What do you eat when your meals and snacks do not lead to bingeing? In other words, what is an acceptable meal or snack? (give examples and calorie estimates)

(n) Before you began bingeing and vomiting/fasting, describe an average acceptable monthly menu. (include when you ate, how many times, and some typical foods eaten)

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5) Who knows of your bingeing/vomiting/fasting behavior and how have these persons reacted to the problem?

6) When did you first seek help for this eating problem or a related eating problem?
7) Describe previous help you have sought for this problem (therapy, friends, physician, parents, pastor, nutritionist, etc.)

8) How would you rate your current motivation to kick this habit?

I Don't Care

0 1 2 3 4 5 6

I Definitely Want to Quit

9) How confident are you that you will succeed in quitting with this treatment?

No Chance

0 1 2 3 4 5 6

I Will Definitely Succeed

If you think that there are other things I should know about your binging/vomiting/fasting pattern in planning a treatment program, please summarize them in the space below:

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
Appendix G: Consent to Participate in Study
CONSENT FORM

I hereby consent to participate as an experimental subject in a study of the treatment of bingeing and vomiting/laxative use. I understand that my identity will be kept in strict confidence. Only those individuals to whom I sign a release of information from can communicate about my participation in the study with the experimenter. I understand that audio tapes will be made of the treatment sessions for the purpose of evaluating the experimenter's performance, and that such tapes will not reveal my identity to unauthorized parties. The tapes will be erased as soon as the study is completed.

I understand that participation in the study involves attempting to reduce and/or eliminate my inappropriate eating patterns, but that there is no guarantee of treatment outcome. I have been informed that I will be financially responsible for three (3) blood and urine analyses over the course of treatment. I am expected to attend weekly sessions, record information daily on cards, and practice daily homework assignments related to treatment. I understand that treatment will terminate upon a mutually agreed time no less than two months from beginning, although I will continue to record information daily up until a 3-month follow up contact.

I agree to complete two (2) different psychological inventories at three different times during the study.

I understand that the experimenter and Utah State University and its employees are not responsible for any medical complications due to my eating disorder, but that I will consult with a medical physician in such cases.
Appendix H: Habit Inconvenience Review and Possible Answers
Habit Inconvenience Review

and Possible Answers

1) List the common reasons for wishing to eliminate the habit. Include any personal reasons specific to your habit.

Medical consequences: electrolyte imbalances which can cause lethargy, loss of motor-coordination, amenorrhea, urinary infections, swollen salivary glands, chest-pain, chronic hoarse voice, throat infections, decay of tooth enamel.

Psychological consequences: preoccupation with food, weight, and body size, depression (self-deprecating thoughts, guilt).

2) List any situations or people you have avoided because of the habit.

Situation: dinner invitations, recreational outings, being alone, any activity turned down in order to perform the habit.

People: physician, anyone in general in order to perform the habit.

3) List the efforts that you have undergone to conceal the habit.

Planning ahead to be alone, thinking about available food, hiding food.

4) I sometimes start telling lies to explain away my habit. These are:

Missing food has spoiled or was given away, incorrect reasons for wanting to be alone, explain away any medical consequences.
Appendix I: Binge Awareness Questions
Binge Awareness Questions

1) What are your gastric (stomach) sensations that you feel just before eating? Include feelings related to emptiness, tension, pain, etc.

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

2) What are the physical sensations taking place elsewhere in your body: head, neck, shoulders, back, face, mouth, throat?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

3) What is your mood when hungry?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

4) What do you think about prior to eating/bingeing?

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

5) Describe your general overall sensation.

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________
6) Describe your urge to eat prior to eating. ______________________

____________________

____________________

____________________

7) State one most important reason to stop eating. ________________

____________________

____________________

____________________

8) What are your gastric (stomach) sensations during eating? After?

____________________

____________________

____________________

9) What are the physical sensations taking place elsewhere in your body during eating? After? ______________________

____________________

____________________

____________________

10) What is your mood during eating? After? ______________________

____________________

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11) What are your thoughts during eating? After? ______________________

____________________

____________________

____________________
12) What is your overall physical sensation during eating? After?

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

13) Describe your urge to eat during eating. After.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

14) Describe the will power it takes for you to stop eating.

__________________________________________________________________________

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__________________________________________________________________________
Appendix J: Follow up Questionnaire for Treated Subjects
Follow-up Questionnaire

Instructions. Listed below are questions which relate to your experience with the treatment program administered for your original eating problems. Please answer each question as fully and honestly as you can. Remember, it is important to evaluate how you are functioning now, regardless of any negative or positive aspects of current eating behavior. Without a careful analysis, we cannot determine the actual effectiveness of the treatment in order to be more helpful to others with the same eating difficulties. As before, your individual responses will be kept strictly confidential.

For those questions below which list choices underneath, please circle the appropriate response for you. Please provide an answer to every question; when undecided, make a best guess. For example:

very unsatisfied unsatisfied uncertain satisfied very unsatisfied

Other questions require you to write answers in sentence form. Please give as much detailed information as you can regarding these more open-ended questions. Feel free to continue any writing for a question on the back of each page if a question is particularly relevant for you. In answering, use only the past month to evaluate your status.

1. As a result of treatment, how changed would you rate yourself now as compared to pre-treatment:

A) Overall evaluation of total daily functioning (e.g., mood, work, social, emotional)?

completely changed moderately changed no change moderately unchanged completely unchanged

B) Binge eating?

completely changed moderately changed no change moderately unchanged completely unchanged
C) Vomiting/Laxative Use?

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2. How satisfied are you with the reductions you have achieved in your:

A) Binge eating?

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B) Vomiting/Laxative Use?

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3. How much control of your eating patterns did you have prior to treatment:

A) For binge eating?

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B) For vomiting/laxative use?

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4. How much control of your eating patterns do you have now?

A) For binge eating?

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B) For vomiting/laxative use?

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5. What specifically did you learn from the treatment? (if you need more space, use the back of the page)

6. Are you still using any part of the treatment? If so, describe what you are doing (to help you remember more specifically what we did, here is a list of treatment components: habit inconvenience review, definition of binge in calorie amounts, binge awareness, competing response, abbreviated relaxation, daily public practice, data keeping, reviewing progress with a significant other). Use back of page if you need more space.
7. What was the most important part of the treatment for you?

8. Have you at any time since treatment during the past several months recorded data on your eating patterns? If so, for how long? Why did you keep it?

9. What, if any, benefits in your life have resulted from this treatment?

Any detriments?
10. Have you sought any other interventions for your eating problems since termination of official treatment with me? If so, describe.

11. Can you think of anything else that might be helpful for my understanding of your reaction to the treatment?

12. What suggestions would you make to improve treatment as I work with other individuals of similar problems?
Appendix K: Follow up Questionnaire for Reacted Subjects
Instructions. Although we engaged in no formal treatment, you indicated completely stopping your binge eating and/or self-induced vomiting shortly after entering the study. Listed below are questions which relate to your experience with the daily data recording administered for your original eating problems. Please answer each question as fully and honestly as you can. Remember, it is important to evaluate how you are functioning now, regardless of any negative or positive aspects of current eating behavior. Without a careful analysis, we cannot determine the actual effectiveness of the daily data recording in order to be more helpful to others with the same eating difficulties. As before, your individual responses will be kept strictly confidential.

For those questions below which list choices underneath, please circle the appropriate response for you. Please provide an answer to every question; when undecided, make a best guess. For example:

very unsatisfied unsatisfied uncertain satisfied unsatisfied

Other questions require you to write answers in sentence form. Please give as much detailed information as you can regarding these more open-ended questions. Feel free to continue any writing for a question on the back of each page if a question is particularly relevant for you. In answering, use only the past month to evaluate your status.

1. As a result of daily data recording, how changed would you rate yourself now as compared to pre-data collection?

A) Overall evaluation of total daily functioning (e.g., mood, work, social, emotional)?

completely changed moderately changed no change moderately unchanged completely unchanged

B) Binge eating?

completely changed moderately changed no change moderately unchanged completely unchanged

C) Vomiting/Laxative Use?

completely changed moderately changed no change moderately unchanged completely unchanged
2. How satisfied are you with the reductions you have achieved in your:

A) Binge eating?

very unsatisfied unsatisfied uncertain satisfied very satisfied

B) Vomiting/Laxative Use?

very unsatisfied unsatisfied uncertain satisfied satisfied

3. How much control of your eating patterns did you have prior to treatment?

A) For binge eating?

complete moderate occasional moderate complete control control control uncontrol uncontrol

B) For vomiting/laxative use?

complete moderate occasional moderate complete control control control uncontrol uncontrol

4. How much control of your eating patterns do you have now?

A) For binge eating?

complete moderate occasional moderate complete control control control uncontrol uncontrol

B) For vomiting/laxative use?

complete moderate occasional moderate complete control control control uncontrol uncontrol

5. What specifically did you learn from the daily data recording?

(if you need more space, use the back of the page)
6. What was the most important part of the daily data recording for you?

7. Have you at any time since ending contact with the study during the past several months recorded data on your eating patterns? If so, for how long? Why did you keep it?

8. What, if any, benefits in your life have resulted from this treatment?

Any detriments?
9. Have you sought any other interventions for your eating problems since termination of official contact with me? If so, describe.

10. Can you think of anything else that might be helpful for my understanding of your reaction to the daily data recording?

11. What suggestions would you make to improve daily data recording as I work with other individuals of similar problems?
Appendix L: Habit Reversal Treatment Procedure Checklist
HABIT REVERSAL TREATMENT PROCEDURE CHECKLIST

Habit Inconvenience Review

A. Four questions asked

B. Information given for each question

A  B
1. yes no 1. yes no
2. yes no 2. yes no
3. yes no 3. yes no
4. yes no 4. yes no

Definition of Binge

A. Daily caloric needs calculated for subject yes no
B. Normal eating defined for subject by calories per meal yes no
C. Subject determines correctly when binge occurred for a previous occasion yes no

Binge Awareness and Programmed Binge

A. Thirteen questions asked and replies given on binge awareness questionnaires prior to eating yes no
B. Food eaten yes no
C. New information requested on binge awareness questionnaire yes no

Competing Response Procedure

A. Instructions provided on five minute response yes no

Abbreviated Relaxation Response

A. Practice three trials of regular deep breathing yes no
B. Practice tapes provided yes no

Public Display Procedure

A. Subjects instructed to practice daily yes no

Symbolic Rehearsal

A. Three different practice situations imaged

Social Support

A. Instructions given on daily review of successes yes no
B. Graphing explained and paper provided yes no

Designate appropriate category with a check (√).
VITA

Ken Small

Candidate for the Degree of
Doctor of Philosophy

Dissertation: The Treatment of Bulimia Nervosa with Habit Reversal

Major Field: Professional-Scientific Psychology

Biographical Information:

Personal Data: Born at Harrisburg, Pennsylvania, June 14, 1956, son of Dennis Keith Small and Gloria Straub Small, the second oldest of four males.

Education: Graduated from East Pennsboro Area High School (Enola, Pa.) in 1974; received Bachelor of Arts degree from Gettysburg College with a double major in Psychology and Religion in 1978; received a Master of Science Degree from Utah State University in Psychology in 1982.

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