

2008

Evaluation of a functional treatment for binge eating associated with Bulimia Nervosa

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Evaluation of a Functional Treatment for
Binge Eating Associated with Bulimia Nervosa

by

Tamela Cheri DeWeese-Giddings

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts in Applied Behavior Analysis
College of Graduate School
University of South Florida

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Date of Approval:
June 30, 2008

Keywords: Eating disorder, Bulimia Nervosa,
Treatment for binge eating, Functional assessment of eating disorder,
Escape extinction

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Dedication

To my brother, who supported me through my eating disorder, regardless. To my family, who believed in me then, and now. To my husband, who has done the dishes tirelessly for two years. To my participants, who have faced their problem heroically and provided me with the ability to complete this project. Thank you does not seem to encompass my gratitude.

Acknowledgments

I would like to take the time to recognize the faculty and staff that have made this project possible. Dr. Ray Miltenberger provided me with the opportunity to explore a behavioral phenomenon close to my heart. I began studying social services and later, behavior analysis, for this exact reason, and you have made my dream come true. You have been supportive, understanding, and helpful to the extent that words can not describe. Dr. English and Mr. Sager, you provided me with valuable advice and asked questions to evoke critical thinking in regards to this fairly new line of study in Applied Behavior Analysis. I can not thank you enough for taking your time to help me explore this area and all of your help in making me a better Behavior Analyst. Also I would like to extend a special thanks to Demetria Arriaga, Jessica Thompson, and Mike Cripe for assisting me on this project.

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Evaluation of a Functional Treatment for Binge Eating
Associated with Bulimia Nervosa

Tamela DeWeese-Giddings

ABSTRACT

Binge-eating disorders are a common problem affecting up to 5 percent of the American population in any given 6-month period. Currently, the most widely accepted treatment is some variation of Cognitive Behavior Therapy. Although there is an abundance of research showing positive effects, the abstinence rates following this type of treatment are currently around 50%. A recent study by Bosch, Miltenberger, Gross, Knudson, and Brower-Breitwieser (2008) explored the effects of extinction on binge-eating behavior that was hypothesized to be maintained by relief from negative emotional responding. The study involved four women who engaged in binge-eating behavior, one of whom met the diagnostic criteria for Bulimia Nervosa. The treatment was successful, with three of the four participants obtaining abstinence. To date, this has been the only study examining this procedure and with only four participants. The purpose of the current study was to further evaluate extinction of binge eating maintained by automatic negative reinforcement with women who met diagnostic criteria for Bulimia Nervosa. Four young women enrolled in the study, three of whom met criteria for Bulimia Nervosa. The results showed that the treatment decreased binge eating to zero for all four women, although one dropped out of the study shortly after beginning the intervention.

Introduction

Binge-eating disorders are socially significant problems which can lead to serious health problems and even result in death. Recent estimates suggest that in a 6-month period, 2 to 5 percent of Americans will experience some type of binge-eating disorder (National Institute of Mental Health, 2006). There are two types of binge-eating disorders currently recognized by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994): Bulimia Nervosa (BN) and Binge-Eating Disorder (BED). For both disorders, a diagnosis requires that one engages in binge eating, defined as eating unusually large amounts of food within a discrete amount of time (two hours or less). Additionally, the diagnostic criteria for BN include engagement in compensatory behaviors, such as vomiting, laxative abuse, and/or excessive exercise (Fairburn, & Wilson, 1993; Psychiatry Online, 2007). Given the current prevalence and harmful long-term health effects such as reproductive problems and diabetes, effective treatments are needed (Sagar, 2005).

Many theories have been postulated regarding the maintaining variables associated with binge-eating disorders (Beebe, 1994). The restraint theory hypothesizes that following severe dietary restriction, binge eating is triggered by disinhibitors, such as alcohol consumption or food rule violations. Studies have shown, however, that restraint by itself may not accurately predict the occurrence of binge eating (Arnou, Kenardy, & Agras, 1992). Arnou et al. found that feelings and mood were the most accurate

predictors of occurrences of binge eating. Grilo, Shiffman, and Carter-Campbell (1994) found that there were two clusters of people who engage in binge eating: those that binge eat alone while experiencing negative affect (87%) and those that binge eat in social situations while experiencing more positive affect (13%). Further, Heatherton and Baumeister (1991) suggested that social situations were inhibitors for binge eating for most binge eaters. The immense range of feelings, moods, and environments potentially predicting binge eating within and across individuals suggests the need for a more comprehensive hypothesis.

Several authors have shown that the affect regulation model appeared to accurately reflect the behavioral mechanisms involved in binge eating (Cooper, 2005; Deaver, Miltenberger, Smyth, Meidinger, & Crosby, 2003; Kotler, Boudreau, & Devlin, 2003; Leitenberg, Gross, Peterson, & Rosen, 1984; Loro & Orleans, 1981; Miltenberger, 2005; Stickney, Miltenberger, & Wolff, 1999; Wegner et al., 2002). The affect regulation/escape model posits that negative emotional responding, which is aversive, precedes binge eating. Binge eating provides relief from this aversive experience, constituting an automatic negative reinforcement function (Bosch, Miltenberger, Gross, Knudson, & Brower-Breitwieser, 2008). Studies have found that negative self-statements precede this type of aversive emotional arousal (Arnold et al., 1992; Bosch et al., 2008; Miltenberger, 2005). In this sense, the self-statements elicit the arousal. The arousal is the establishing operation or event that increases the reinforcing value of escape from that arousal and makes the behavior more likely to occur in the presence of certain environmental stimuli (Michael, 1982). The environmental stimuli, such as presence of food, are the discriminative stimuli that have been present when the behavior was

reinforced in the past and increase the likelihood the behavior will occur in their presence (Miltenberger, 2004). Further, being in public often may be a discriminative stimulus for punishment making binge eating less likely to occur in the presence of others. Together the establishing operation and discriminative stimuli increase the likelihood of binge eating. Although many researchers have agreed on the theory, treatment approaches have varied widely.

Cognitive Behavior Therapy (CBT) has been the treatment of choice for eating disorders (Agras, 1993). CBT and other similar therapies have focused on the mental health aspects of the disorder; some studies have included behavioral techniques, others have not. Fairburn, Kirk, O'Connor, and Cooper (1986) did not find significant differences in treatment outcomes between therapies that included behavioral techniques and ones that did not. Data collection for CBT often includes self-monitoring of food intake, binge episodes, and antecedents to the episodes. The therapist uses this information to promote more regular eating patterns, introduce feared foods into the client's diet, and to identify and change problematic cognitions related to food, body shape, and weight. The final component often focuses on maintenance skills (Agras). Current success rates for participants reaching abstinence at the end of CBT treatment linger around 50% (Agras). Additionally, a one-year follow-up on CBT and weight loss programming treatment effects showed 25-45% maintaining abstinence, leaving maintenance of treatment effects a concern (Agras, Telch, Arnow, Eldredge, & Marnell, 1997). It should be noted however, that CBT is the only treatment with long-term outcome research available for binge-eating disorders.

Some studies have focused solely on the mental health aspects of this disorder. For example, Kotler et al. (2003) used an intervention targeting depressive symptoms and saw a subsequent change in bulimic symptoms. These results must be interpreted with caution as similar changes were seen in the wait-list control group, constituting a threat to internal validity. Other studies have focused solely on the reduction of binge eating with promising results. Consider a recent study of the use of extinction, following which 3 of 4 subjects obtained abstinence by the end of the seventh week of treatment (Bosch et al., 2008). Still others have focused on both aspects of the disorders. For example, Leitenberg et al. (1984) conducted sessions where the participants were introduced to food, engaged in cognitive therapy, and were prevented from leaving the session until the “urge” to vomit decreased. The cognitive component included the therapist focusing the patient’s attention to the immediate feelings, sensations, and thoughts regarding eating in attempts to change irrational beliefs. Although found to be effective, this type of treatment, referred to as exposure and response prevention, currently is not widely used. Dialectical Behavior Therapy (DBT), traditionally used to treat Borderline Personality Disorder, has also shown robust effects, with 90% of participants reaching abstinence (Telch, Agras, & Linehan, 2001). However, little research has evaluated this approach. Each type of treatment has been shown to be effective; however, studies using DBT, response prevention, and extinction have shown more robust changes than traditional CBT.

To this point, CBT approaches have dominated in the treatment of binge-eating disorders, with behavior analytic approaches rarely utilized (Bosch et al., 2008). An applied behavior analytic treatment would consist of altering the antecedents and

consequences associated with the behavior of concern. Behavior analytic approaches have proven extremely effective for many behavior problems across a range of populations; however, they have most often targeted overt, independently observable behavioral phenomena (e.g. Ahearn, Clark, MacDonald, & Chung, 2007; Baker, Hanley, & Matthews, 2006; Derby et al., 1992).

Due to the typically private nature of binge eating, it has been necessary to develop tools to obtain the most accurate and timely information for assessment and treatment. Self-report has been found to be less than accurate (Smyth et al., 2002). The Eating Disorder Examination (EDE) was developed in an attempt to operationally define variables associated with binge-eating disorders and measure feelings and mood as objectively as possible (Fairburn, & Cooper, 1993). Anderson and Maloney (2001) found that the EDE was the most valid tool available however; the problem remains that the tool was designed for participants to report on their behavior over the previous 28 days, leaving reliability a concern.

Several authors have worked on developing functional assessment methods to examine the private events associated with binge eating (Lee, & Miltenberger, 1997; Redlin, Miltenberger, Crosby, Wolff, & Stickney, 2001; Stickney, & Miltenberger, 1999). Ecological Momentary Assessment (EMA) has been developed to gather information related to the behavior and other variables in the natural environment at the time it is occurring (Wegner et al., 2002). Deaver et al. (2003) found that EMA was effective at identifying changes in covert responses that may only be detected at the time the behavior is occurring. They found that positive changes in pleasantness occurred during the behavior of binge eating, however, the level of pleasantness quickly returned

to pre-binge levels (more negative affect) following binge eating. These findings support the hypothesis that it is the immediate change that maintains behavior because the negative emotional arousal returns shortly after the binge. That is, the immediate, albeit momentary, relief is what keeps the behavior occurring over time, regardless of the long-term negative social and health effects. Wegner et al. (2002) found that the change in the aversive condition may not be absolute, but may be relative. For example, a change from strong anger feelings to moderate guilt feelings may be enough change to constitute the negative reinforcement suggested to maintain the binge-eating behavior. Given these findings, a behavioral approach to understanding and changing the covert, private events associated with binge eating continues to warrant further study.

A behavior analytic approach to treatment of problem behavior begins with the identification of the maintaining variables which then leads to the development of a functional treatment. Functional treatments include the use of antecedent manipulations, extinction, and differential reinforcement (Miltenberger, 2004). However, these procedures have most commonly been shown to be effective with overt and independently observable behavior. It has been hypothesized that binge eating can be maintained by automatic negative reinforcement through changes in the covert behavior (emotional responding) of the individual. It has been further suggested that behavior maintained by automatic negative reinforcement may not be amenable to extinction procedures because it may be impossible to exert independent control over the emotional variables controlling the behavior (Miltenberger, 2005). That is to say, it may be impossible to prevent binge eating from providing relief or escape from aversive emotional responding. However, Bosch et al. (2008) showed that the covert variables

may be manipulated through the use of technology. In this study, the participants were required to make an audio tape of their private negative self-statements. The participants then played the tape back each time they engaged in binge eating. The hypothesis was that, by playing the tape during binge eating they could not escape from the aversive variables preceding binge eating. If the negative self-statements elicit the aversive emotional arousal which in turn evokes the binge eating, and the arousal continues to be elicited through the pre-recorded statements, binge eating would no longer produce escape. Bosch et al. (2008) evaluated this extinction procedure with four participants: one woman clinically diagnosed with BED, two women meeting criteria for BED, and the last meeting criteria for Bulimia Nervosa. The authors found this procedure to be largely effective as three women stopped binge eating and one decreased binge eating to near zero levels.

Although the results of the preliminary study by Bosch et al. (2008) are promising, it is the only study to date to evaluate this functional intervention. As this initial evaluation of extinction has been conducted with only four individuals, one with bulimia and three with binge eating disorder, more research evaluating the use of extinction for binge eating disorders is needed to establish the efficacy and generality of this procedure. In particular, it is important to establish the effectiveness of the procedure with bulimics as Bosch et al. evaluated the procedure with only one bulimic individual. The purpose of the current study was to extend this research by evaluating extinction for the treatment of binge eating maintained by automatic reinforcement by women who met diagnostic criteria for Bulimia Nervosa.

Method

Participants

The participants were four young women, ages 19 to 24, three of whom met the diagnostic criteria for Bulimia Nervosa based on their responses on the Questionnaire for Eating Disorders Diagnosis (to be described later - Q-EDD; Mintz, O'Holloran, Mulholland, & Schneider, 1997; Appendix A) and one who was previously bulimic but currently met the criteria for Binge Eating Disorder. The Q-EDD has been shown to have good validity in comparison to the Structured Clinical Interview for Diagnosis (SCID). The Q-EDD was chosen in order to obtain independent verification of the individuals' eating patterns.

Upon confirmation of the participants' scores on the Q-EDD, the Binge Eating Interview (to be described later - BEI; Stickney et al., 1999; Appendix B) was conducted. Based on the participants' self-report of antecedents and consequences related to their binge eating, those participants who endorsed that they experienced relief from aversive emotional responding through binge eating (automatic negative reinforcement) were invited to participate in the study.

Participants were accepted into the study following these two assessments unless they were currently receiving treatment for an eating disorder, actively engaging in substance abuse, and/or reported or exhibited behavior consistent with bi-polar disorder or psychosis. Due to the fact that the vast majority of eating disorders are experienced by women, men were excluded from participation in order to rule out confounding variables

possibly associated with gender. Finally, due to potential health risks, women who were pregnant were excluded from participation.

Participants were recruited through flyers posted around the University campus and an advertisement in the school newspaper. No monetary or educational compensation was given for participation in the study. There were no penalties for declining participation at any time throughout the course of the study.

April was a 24 year-old, Caucasian female graduate student who met the criteria for BN. April reported being 5'8" and weighing 135 pounds. She had been bingeing and purging for approximately four years. On the Q-EDD, April reported binge eating on average six or more times per week for the previous four months. She reported purging between daily and two times per week for the last fourth months. She did not report the use of laxatives, diuretics, enemas, or diet pills. She did report strict dieting and exercising daily. April reported that her body weight/shape extremely influenced how she felt about herself. She did not report any other medical concerns or taking any medications. Answers to the BEI revealed that a typical binge lasted between 30 and 45 minutes. Foods upon which she binged were typically carbohydrates and sweets. An example of a binge for April would include one large pizza. She reported being most likely to binge at home, when alone, and in the evening. She highly endorsed feelings of loneliness and/or sadness as being triggers for binge eating. She stated that preparing for a period of restriction would also trigger a binge. On the Conditions Associated with Binge Eating scale (to be described later-CABE; Stickney, & Miltenberger, 1999), April rated high levels of boredom, concern with body weight/shape, physical hunger, loneliness, frustration, sadness, and preoccupation with food approximately 60 minutes

prior to bingeing. Each of these ratings decreased significantly during the planning stage and actual binge episode, and then returned to their original score or higher immediately following the binge. This information suggested that April's binge eating provided relief from aversive emotional responding. On the Emotional Eating Scale (to be described later-EES; Arnow, Kenardy, & Agras, 1995; Appendix E), April reported several feelings that led her to experience the urge to eat.

Colbie was a 19 year-old female from Columbia. She was also a student at the University. She reported being 5'4" tall and weighing 118 pounds. On the Q-EDD, Colbie reported binge eating on average five times per week for the last 6-12 months. She reported vomiting two times per week for the last 5-11 months. However she stated that she was unable to purge any longer as her family and boyfriend noticed her flushed face following vomiting. She reported taking laxatives two times per week for the last four months. She did not fast or use enemas but did endorse chewing food and spitting it out to prevent weight gain. Colbie reported dieting strictly daily and exercising at least two times per week. She exercised more if she had binged. Further, Colbie reported that her exercise interfered with other important activities and she exercised despite an injury. Colbie reported that her body weight/shape extremely influenced how she felt about herself and that she felt fat all over. She did not report any medical problems or taking any medication. On the BEI, a typical binge was reported to include carbohydrates and sweets and would be greater than 2000 calories. She reported bingeing between 15 minutes and 4 hours. Colbie reported bingeing and engaging in compensatory behaviors for about five years, beginning when her brother had passed away. She reported being most likely to binge eat at home, in the kitchen, and at night. She reported that anxiety

was a huge trigger to bingeing. For example, Colbie reported that she would be anxious about planning an upcoming event or assignment. She reported that bingeing took away these thoughts, but that afterward, she had feelings of guilt. On the CAGE, Colbie reported high levels of anxiety, boredom, worry, physical hunger, sadness, and guilt. Each of these scores was reported to decrease while bingeing, and either return to baseline or increase immediately following the binge. These scores suggested that Colbie's binge eating was providing temporarily relief from negative emotional responding. On the EES, Colbie reported several feelings led to a strong or overwhelming urge to eat.

Sasha was a 21 year-old, Caucasian female who met the criteria for BED. She was a junior at the local University. Sasha reported being 5'7" tall and weighing 145 pounds. Sasha stated she was binge eating approximately two times per week for more than the last year. She was not currently purging, using laxatives, enemas, or diuretics to offset the binge but did report fasting the day following a binge. She reported dieting and exercising strictly each day. Sasha reported that her body shape/weight extremely influenced how she felt about herself and that she felt certain parts of her body were too fat. On the BEI, Sasha described a binge as eating until she was physically full and said she typically binged on foods that she restricted herself from, such as pizza and ice cream. A binge episode typically lasted one hour. Sasha did not report any other medical concerns or taking any medications. She stated that she was most likely to binge in the middle of the day, alone, in her room or car, and least likely to binge in front of others. She reported that when she was feeling sad or bored, or when she ate "bad foods" she was more likely to binge. Sasha also reported that feelings of anxiety often occurred prior to bingeing and she was able to block these thoughts out while bingeing. Following a

binge, she felt depressed and guilty. On the EES, Sasha reported high levels of anxiety, boredom, concern with body shape, worry, preoccupation with food, and guilt before bingeing. These levels dissipated during bingeing and assumed the same or higher levels following a binge. Sasha rated several feelings as leading to a strong urge to eat, and guilt and boredom leading to an overwhelming urge to eat on the EES.

Samantha was a 19 year-old, Caucasian female attending the local University. Samantha met the criteria for BN and reported bingeing and purging for approximately 4 ½ years. On the Q-EDD, Samantha reported being 5'5" tall and weighing 132 pounds. She reported binge eating approximately 3 times per week for more than the last year. She primarily engaged in vomiting as a compensatory behavior, but did endorse using laxatives and spitting food out to prevent weight gain. Samantha reported dieting daily and exercising at least two times per week. She further reported that her body weight/shape extremely influenced how she felt about herself and that certain parts of her body were too fat. She did not report any other medical concerns or taking any medications. On the BEI, Samantha, reported that typical binges included sugary snack foods and amounted to 800 to 1500 calories. Binges lasted approximately 30 minutes and typically occurred at home, alone, and in the afternoon. Samantha reported that she experienced stress related to keeping up her appearance and had feelings of inadequacy that tended to trigger bingeing. She endorsed that during a binge there was a decreased awareness of her body and thoughts associated with daily pressures, and an increased distraction beginning with planning the binge, then the binge itself, and the television. On the CABE, Samantha reported boredom, worry, frustration, and sadness being elevated before bingeing. These scores decreased during bingeing and re-elevated

following the episode. This pattern suggested that Samantha's binge eating was providing escape from negative feelings or self-talk. Finally on the EES, Samantha endorsed many feelings that led to a strong urge to eat.

Three other women initially participated in the study but declined participation before reaching the treatment phase. One other young lady began her first week of treatment, however, due to other mental health problems, was unable to continue participation in the study. Upon declining participation, three of four women were provided contact information for the University's counseling center, where services could be obtained. The researcher was unable to reach the fourth.

Sessions were conducted in a 4m x 4m research room of the Applied Behavior Analysis Program at USF. Other data collection and implementation of the treatment procedures occurred in the participants' natural environments.

Dependent Variable Measures

The primary dependent variable was binge eating reported in frequency per week. An episode of binge eating was defined as eating at least 500 calories in a discrete amount of time (2 hours or less) accompanied by a sense of lack of control. Although this operational definition leaves room for subjective interpretation, it was most consistent with the DSM-IV criteria (Fairburn & Wilson, 1993; Rossiter & Agras, 1990). Due to the typically private nature of the target behavior, the measures used were primarily self-report scales and questionnaires previously found to be valid in eating disorder research.

Questionnaire for Eating Disorder Diagnoses (Q-EDD). The Questionnaire for Eating Disorder Diagnosis (Mintz et al., 1997) was a 50-item self-report assessment

designed to identify eating-disorder diagnoses according to the DSM-IV criteria. This measure was used as a screening tool to ensure that participants were experiencing Bulimia Nervosa or Binge Eating Disorder at a clinical level.

Binge Eating Interview (BEI). The BEI (Stickney et al., 1999) was a 32-item, semi-structured interview to further assess antecedents and consequences associated with binge eating. Additionally, information regarding potential setting events and participant history was gathered using this tool. This measure was used at the initial appointment with participants.

Conditions Associated with Binge Eating (CABE). The CABE (Stickney & Miltenberger, 1999) was a self-report assessment of 14 emotional states. Using a 5-point Likert-type scale, the participants rated the degree to which they experienced each state before, during, and immediately following a binge-eating episode. This measure was used to determine the emotional antecedents and consequences related to binge eating. During selection, responses consistent with an automatic negative reinforcement function determined inclusion into the study.

Self-Monitoring Form. The self-monitoring form (Bosch et al., 2008; Appendix D) included daily caloric intake and binge frequencies. Other information on the form included variables related to eating: start and stop times, location, social context, whether the intake was a meal or a binge, and if a binge occurred, whether or not they engaged in compensatory behavior (s). Participants were asked to complete the form following meals and binges each day. At the end of each day, participants recorded, using a Likert-type scale, how well they implemented data collection. During treatment they also recorded several other measures including, how easy the treatment was to follow, how

time consuming the treatment was, how disruptive the treatment was, how helpful the treatment was, and finally, how well or consistently they implemented the treatment that day.

Emotional Eating Scale (EES). The EES (Arnold et al., 1995) was a 25-item self-report measure designed to assess the relationship between emotional responding and subsequent eating. The Likert-type scale included three subscales: anxiety, depression, and anger/frustration. This measure was shown to have good psychometric properties when evaluated with a clinical sample of individuals meeting the criteria for Bulimia Nervosa with the exception of purging behavior (Arnold et al.). Because this study did not specifically target purging behavior, this discrepancy should not have compromised the results. A modified version of this scale, the Effect Test Form (Appendix H) was used to conduct the effect tests (see procedure section). The full-scale EES was also administered at the end of treatment to determine if there were any collateral changes in reported urges to eat related to emotional responding.

Experimental Design

Treatment was implemented using a multiple-baseline across participants design. Following a stable baseline phase, April began treatment following three weeks, Colbie after four weeks, Sasha after five, and Samantha after six baseline points. This design was used to rule out any confounding variables such as the passage of time or number of assessments that could be associated with the change in frequency of binge eating.

Procedure

Interested individuals contacted the researcher by phone or email and were given an initial phone assessment (Appendix F) to determine if they met the initial criteria (i. e., age, sex, current treatment participation, pregnancy). Following satisfactory answers to these questions, the initial interview was scheduled. At the initial interview, the individual was given a description of the rationale and treatment and informed consent was obtained. After providing consent, individuals completed the Q-EDD to determine diagnostic criteria for inclusion into the study. Participants who did not meet the diagnostic criteria for Bulimia Nervosa or Binge Eating Disorder were given a referral to a local eating disorders clinic (s). Participants meeting criteria then completed the BEI, CABE, and EES with the primary researcher. Participants whose responses suggested that their binge eating was maintained by relief from negative emotional responding were invited to participate in the study. Each individual interviewed met this criterion. During the initial interviews, responses were audio recorded so that a second person could later independently score responses to the assessments in order to ensure reliability of scoring.

Following acceptance into the study, the participant was educated on the use of the self-monitoring forms, including instruction on recording calories consumed. The researcher and participant practiced scenarios for data collection until both parties were comfortable with the recording procedure and the researcher and participant agreed on at least 80% of the responses on the form regarding calories consumed and the whether the scenario constituted a binge (see Appendix G). The participant was instructed to begin completing the self-monitoring forms for the coming week. Contact information for the

primary researcher was given to each participant and a second meeting was scheduled for the following week.

During the second meeting, the self-monitoring forms were reviewed, questions answered, and problems with data collection resolved. The participant and primary researcher discussed the emotional variables and private self-talk associated with their binge eating. The participant was assisted in verbalizing these responses aloud. The participant was then provided an audio recorder to make recordings of the self-statements occurring at the time of her binge eating. The participant was instructed to continue using the self-monitoring form and begin tape recording for the week ahead. Tapes were to be made prior to binge eating and other times when similar emotional responding and self-statements were occurring. They were further instructed not to listen to their recordings. Similar weekly meetings were repeated until the treatment phase began.

Baseline. During the baseline phase, each participant was instructed to complete the self-monitoring forms daily and to record self-statements associated with aversive emotional responding related to binge eating on the tape recorder provided. They were further informed that they would be the only person listening to the recording; this was done to avoid any potential effects of observation reactivity. Weekly meetings occurred with the primary researcher to review the forms and progress on the recordings. A goal was set for the participants to record at least five minutes of self-talk. This would allow for the recording to be looped approximately 6-8 times resulting in a recording 30-40 minutes in length. Problems or inconsistencies with data collection were discussed and participants were encouraged to consistently complete the forms daily. Forms were collected and new ones distributed at each weekly meeting. Phone calls to participants

having difficulty with recordings or data collection were made as needed. The baseline phase lasted between three and six weeks.

Effect tests. During baseline, tests were conducted to ensure that the participants' negative self-talk recorded onto the tapes produced similar aversive emotional responding previously reported by the participant as occurring prior to binge eating. During at least one weekly meeting, each participant was asked to report on her emotional states by completing the modified version of the EES, the Effect Test Form (Appendix H). The participants then privately listened to the pre-recorded tape and completed the form a second time. Increases in negative emotional arousal indicated that the pre-recorded statements were most likely responsible for eliciting the emotional arousal. These tests were conducted to ensure that listening to the tapes would prolong the aversive emotional arousal while binge eating during treatment. If a participant's initial scores indicated that she was already experiencing aversive emotional responding, the effect test was rescheduled for the next week. Finally, during the effect test session, participants used a simple Likert-type scale to identify whether the emotional responding produced by the taped recordings was similar to the responding experienced prior to binge eating. For example, the participant was asked on a scale from 0 to 7, 0 being not at all similar and 7 being completely, how similar she felt as compared to immediately preceding a binge. Responses that did not endorse a feeling similar to when the participant engaged in binge eating indicated the need to re-evaluate the self-talk recorded and a new tape of different responses was made.

Treatment. Following baseline and completion of the effect test, the participant began treatment. The researcher explained to the participant that based on the

information gathered, her binge eating was likely maintained by relief from negative emotional responding and that the treatment procedure, technically called extinction, would not allow this relief to occur and would therefore make the behavior ineffective. The tapes previously recorded by the participants were looped into 30-45 minute electronic recordings. Each participant had access to a personal MP3 player and the recordings were formatted to be used on these devices. The participant was instructed to listen to the tape each time she started to engage in binge eating for the duration of the episode using ear plugs in order to compete with other noises. The participant was further educated about the importance of consistency when using the procedure. The participant was instructed to continue completing the self-monitoring forms daily. The participant recorded whether binge eating occurred, whether she listened to the tape for each binge for the duration of the binge, and whether she engaged in compensatory behavior(s). In addition several measures of social validity and treatment integrity were recorded (see Self-Monitoring Form; Appendix D). The participant was given the recording on a CD to transfer to her personal MP3 player (or an MP3 player provided by the researcher) and the next weekly meeting was scheduled.

Weekly meetings continued with each participant throughout the course of treatment to collect the week's data and discuss any problems associated with implementation. Phone calls and emails were made to participants to encourage consistent data collection and procedural implementation, and to discuss any other variables that might influence their ability to comply with the procedures.

During the final treatment meeting, participants completed the full-scale EES for the final time to determine any changes in the reported urge to eat related to emotional

responding. Any participant who requested further treatment or had not reached abstinence was given a referral to the University's counseling center as well as, dietary and nutrition service.

Results

All initial assessments (Appendixes A, B, C, and E) were recorded and then later scored verbatim by an independent observer. 100% interobserver agreement for each participant's assessments was obtained.

After engaging in binge eating a number of times per week during baseline, all four of the participants decreased their binge eating to zero occurrences per week during treatment suggesting a strong relationship between the procedures and the changes in binge-eating behavior. Using the multiple-baseline design, it was shown that binge eating did not decrease until treatment was implemented, showing a functional relationship between the treatment procedures and the changes in binge-eating behavior.

April collected three weeks of baseline data resulting in frequencies of binge eating per week of 6, 3, and 7 respectively. During the fourth weekly meeting, the effect test was conducted. Prior to listening to the recording, April ranked her overall feelings of similarity to pre-binge as a 2. After listening to the recording, she reported a similarity of 3.5, showing increases in most of the domains on the EES. Once treatment was implemented, there was not a consistent decrease in binge eating for April. She was able to achieve abstinence from binge eating only after the use of a second recording (see Figure 1). April was instructed to make a second recording because she reported that the first recording did not seem to mimic the thoughts and elicit the feelings she typically experienced before binge eating. Although the original recording produced only a small change in emotional responding (from 2 to a 3.5, with 7 being most like a binge),

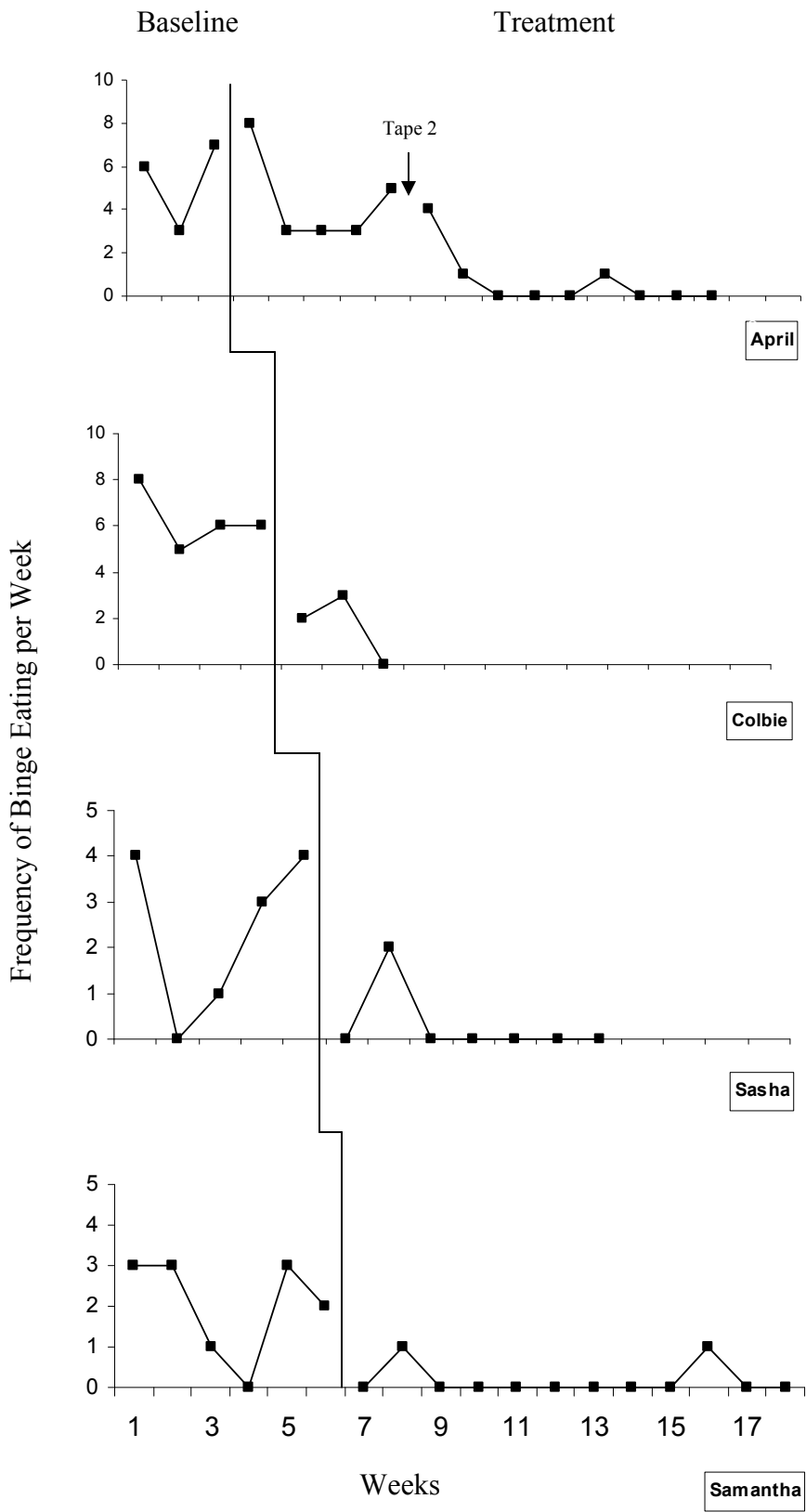


Figure 1. Frequency of Binge Eating per Week

her second recording produced a greater change from a 2 to a 5 on the effect test. During week 14, she engaged in binge eating one time followed by a return to zero occurrences per week for the final two weeks of treatment. At the end of treatment, the Emotional Eating Scale was repeated with April and she endorsed several changes in the urge to eat given emotional responding. Whereas on the initial EES, April reported several feelings leading to an overwhelming urge to eat, all responses on the final EES were between 1 and 2 (no desire to small desire). Anecdotally, April recalled that she remembered completing the EES during baseline and stating to herself that eating would make her feel better in comparison; however in to post-treatment, when emotional responding led to a small urge to eat, she stated to herself that it wouldn't make her feel better.

Colbie collected four weeks of baseline data with frequencies of binge eating per week of 8, 5, 6, and 6 respectively. An effect test was conducted at meeting four (third week of baseline) however, the scores on the EES resulted in reported decreases in negative emotional responding. Colbie was further coached as to what types of self-talk should be recorded and baseline was continued for another week. At the next weekly meeting, the effect test was conducted with a new recording. Prior to listening to the new recording, Colbie reported a feeling similarity of 3 which increased to a 6 following listening to the new recording. Colbie, was able to reach zero occurrences per week in her third week of treatment. However, she discontinued participation in the study so no further data were collected.

Sasha completed five weeks of baseline with frequencies of binge eating per week of 4, 0, 1, 3, and 4 respectively. Sasha was on vacation for spring break during week two which may have accounted for the dramatic change in behavior. Further, Sasha reported

that having to record and be accountable to the researcher seemed to deter her from binge eating. During the fourth week of baseline, Sasha completed the EES both before and after listening to her recording and reported no change in emotional responding. She was further coached on what types of self-talk should be included on the recording and baseline was extended. The following week, the effect test was again conducted with Sasha's new recording at which time she endorsed a change from 2, prior to listening to the recording, to a 6, following listening to the recording. Sasha, reached zero occurrences of binge eating immediately following the implementation of treatment. She returned to pre-treatment levels during week two, but recovered to zero occurrences for the final five weeks of treatment. During her last session, Sasha again completed the full-scale EES to determine any changes in reported urges to eat given emotional responding. Sasha reported major changes from pre-treatment on several items. During baseline, Sasha endorsed 14 out of 25 emotions as leading her to feel a moderate to overwhelming urge to eat. However, following treatment all 25 emotions were ranked as leading either to no desire or only a small desire to eat.

Samantha collected baseline data for 6 weeks with frequencies of binge eating per week of 3, 3, 1, 0, 3, and 2. Samantha was sick during weeks 3 and 4 of baseline which may have accounted for the decrease in binge eating. Further, she reported that once she made the recording, even though she was instructed not to listen to it, she knew that she could, due to its presence, and this was a partial deterrent to binge eating. On the effect test, Samantha reported an increase in feeling similarity from 1 to 5. Samantha initially reduced her binge eating to zero during the first week of treatment. This was followed by one week with one occurrence and then six weeks of zero occurrences of binge eating.

She engaged in binge eating one time during week 16 followed by a return to zero for the final two weeks of treatment. Following treatment, Samantha reported significant decreases on several measures of the Emotional Eating Scale suggesting that her emotional responding did not trigger the urge to eat at the same intensity as it did prior to treatment. It is important to note that the procedure itself did not target the compensatory behaviors associated with Bulimia Nervosa and Samantha did report continuing to engage in some purging behavior even in the absence of bingeing.

During treatment, each participant was instructed to complete the self-monitoring forms daily. The forms included Likert-type scales on six variables: consistency of data collection, treatment effort, time consumption, disruptiveness, and helpfulness, and finally, treatment implementation consistency. The scales were ranked from a 1 (not at all easy, not at all disruptive, not at all time consuming, and not at all helpful) to 7 (extremely easy, extremely disruptive, extremely time consuming, and extremely helpful). Table 1 shows the total mean scores across the participants. Shaded areas indicate where lower scores represent a positive outcome.

Table 1. Social Validity and Treatment Integrity.

Measure	April		Colbie	Sasha	Samantha
	First tape	Second tape			
% of time self-monitoring was completed daily	89%	100%	94%	93%	94%
Treatment integrity (% of time treatment used)	92%	95%	85%	100%	100%
Treatment helpfulness	2.0	5.3	1.7	4.9	1.8
Treatment ease	5.3	6.5	6.4	6.8	7.0
Treatment disruptiveness	1.7	1.4	3.4	1.6	1.0
Treatment time consumption	1.1	1.4	2.4	1.9	1.0

Discussion

Overall, the results indicate that the treatment procedure was effective at eliminating binge-eating behavior maintained by automatic negative reinforcement. The immediate reductions in binge eating for all of the participants suggest that the treatment was both effective and efficient. All participants reached zero occurrences by the third week of treatment (except for April who achieved zero by the third week using the second tape) and, with the exception of one binge each for April and Samantha, maintained a zero rate of binge eating for periods of 5 to 10 weeks. Acknowledging that 100% of the participants reached abstinence within this time frame provides important information regarding the efficacy, efficiency, and possible long-term outcome of best practices in treatment of eating disorders. Studies have shown that a typical treatment course using Cognitive Behavior Therapy can last substantially longer (e. g., 24 weeks), with only 40% of participants reaching abstinence (Agras, 1993).

All four of the participants stated that they believed their reduction in binge eating was primarily due to the treatment they implemented. April was not able to decrease her levels of binge eating to zero following the implementation of the first tape. She reported that she was able to block the recording out and continue to binge eat without experiencing the aversive arousal that was present pre-binge. April also reported being inconsistent using the treatment procedure. Several times the researcher explained the importance of consistency in implementation in order to avoid intermittent reinforcement. Once a second recording was created and implemented consistently, her

levels of binge eating decreased to zero occurrences per week. This finding may have important implications regarding treatment outcomes in future research and application. April did engage in one episode of binge eating during week fourteen, possibly due to spontaneous recovery. Following the episode, April anecdotally reported that she remembered why she hated binging so much, that it did not make her feel better, and that she was determined not to engage in the behavior again.

Colbie's data appear to show the least amount of experimental control due to the fact that there are only 3 data points during the intervention. Although Colbie's binge eating was decreased to zero by the third week of intervention, she chose not to participate further in the study so maintenance of the treatment effect could not be assessed. Interestingly, Colbie was the only participant who routinely engaged in binge eating in public. She reported that for the first two weeks of treatment, her binge eating while alone was reduced to one occurrence per week, however, she was unable to implement the treatment procedure when dining in public with family or friends, therefore showing minimal changes in the frequency of binge eating overall. Following the second week of treatment, Colbie was instructed to listen to the recording immediately prior to dining, after which, her binge eating reduced to zero occurrences in the third week of intervention. These data reflect the difficulty with implementation of the treatment procedure when binge eating may also occur in public, as it does with approximately 13% of binge eaters (Grilo et al., 1994).

Sasha's data perhaps shows the strongest degree of experimental control. Although she did experience binge eating during week 2 of treatment, her reduction and maintenance of zero occurrences per week was impressive. Sasha reported that she

listened to the tape during those two occurrences of binge eating and did not feel it was necessary for the remainder of the treatment phase, where she maintained zero occurrences for the final five weeks of treatment. Note that during week two of baseline, Sasha's frequency dropped to zero. At that time she was on spring break in Jamaica, which may have been an environment where she experienced a decrease in negative emotional responding and in the opportunity to engage in binge eating. Further, she reported that having to record her binge eating and report these data to the investigator had affected her eating patterns. This may also suggest that reactivity to the data collection process occurred, as her levels of binge eating increased for the remainder of baseline. Also note that in the past, Sasha had engaged in compensatory behaviors; however at the time of the current study, she met the criteria for BED. Interestingly, on the overall social validity measures, Sasha reported finding the treatment the most helpful out of the four participants. Further research should compare the efficacy of this treatment procedure between the two diagnostic categories.

Finally, Samantha's data suggest that the treatment procedure was effective at eliminating her binge eating behavior for several weeks of treatment. As discussed, Samantha reported an illness during weeks 3 and 4 of baseline which may account for the low frequencies reported. However, binge eating increased again before treatment started. During week 2 of treatment, Samantha engaged in binge eating one time and reported using the treatment 100% accurately and terminating the binge earlier than she would have prior to treatment. Following six weeks of abstinence, Samantha engaged in binge eating one time during week 16, which she reported was influenced by increased stress with school and her roommates being away from home. Unfortunately, Samantha

reported that even with the absence of bingeing, she continued to engage in purging behavior at a low frequency. Two of the other three participants stopped engaging in compensatory behavior with the cessation of binge eating. Future research should look at the relationship between bingeing and compensatory behaviors to determine if they belong to the same functional response class, as currently hypothesized (Leitenberg et al., 1984). Lerman and Iwata (1996) found that when extinction was applied with one behavior, other behaviors in the same response class may increase.

Although the treatment procedure was successful at eliminating binge eating for all four participants, it remains unclear why the procedure worked. The procedure was intended to act as extinction by not allowing participants to escape from negative emotional responding while binge eating. However, Bosch et al. (2008) found that half of the participants in their study reported feeling worse after listening to the recording, supporting a positive punishment effect. April reported that she was able to “block out” her first recording but not the second, suggesting that while the second tape was playing she could not escape from her negative thoughts and feelings thus supporting the extinction hypothesis. In contrast, Colbie reported stopping bingeing to further listen to the tape and to focus on her feelings. Sasha reported not wanting to listen to the tape, similar to Samantha who reported avoiding bingeing in order to avoid listening to the recording. These reports represent mixed findings as to whether the procedure functioned as extinction or positive punishment and suggest that it most likely differs among binge eaters and across binge episodes for the individual binge eater.

Further research is needed to determine when and with whom the procedure is most likely to function as extinction or punishment. In the current study, the results of

the Conditions Associated with Binge Eating showed significant decreases in negative emotional responding during binge eating for all four participants. However, as Wegner et al. (2002) found, there may be relative differences in the emotional changes. That is to say, perhaps the procedure functioned as extinction for emotional responding classified as anxiousness but not for that classified as boredom.

Both April and Samantha reported that there were times during treatment that they did not listen to the recording as instructed even though they were home alone. Future research should focus on what variables may contribute to treatment integrity, or lack thereof, in the natural environment where participants are responsible for implementing the treatment independently.

Additionally, given the results from the current study and that of Bosch et al. (2008), further considerations need to be given to addressing and treating binge eating that occurs in public where the current procedure may be considered unreasonable and therefore result in low levels of treatment integrity.

In the previous study, Bosch et al. (2008) examined changes in the scores of the CAGE following treatment. They found that several items for all participants decreased, that is, following treatment the women experienced less intense emotional responding pre-binge. The authors hypothesized that this change could have been due to a disruption of the negative emotions-binge-relief cycle or a positive change in the participants' overall emotional responding due to the decrease in binge eating. In the current study, the EES was conducted both pre and post-treatment to determine any collateral changes in emotional responding and reported increases in the urge to eat. The three participants who completed treatment all reported substantial changes in the relationship between

emotional responding and urge to eat on the EES. Researchers evaluating traditional psychotherapy have suggested that changes must be made to the underlying thought processes as well as the overt behaviors involved in eating disorders in order for treatment to be successful (Mitchell, Raymond, & Specker, 1993). The findings here suggest that treatment of the behavior of binge eating alone was also effective at changing the participants' urges to eat in response to negative emotional responding. April reported that, after treatment, even when she was feeling negative, she knew that eating wouldn't make her feel better. Sasha reported that she had taken up leisure reading as an alternative response to decrease negative emotional responding. Both reported being happier and feeling better about themselves as a result of the decreases in binge eating.

Finally, there were limitations to the current study that warrant discussion. The attrition rate of the current study was extremely high. In all, eight women participated in the study, with only three fully completing treatment. Future studies might examine the individual variables potentially associated with participants who complete treatment versus those that do not. In this study, those women who made at least one statement regarding wanting to discontinue, were also those women who eventually dropped out of the study. An associated limitation of the current study was the small number of participants. Future research should consist of direct and systematic replications of this procedure with individuals with Bulimia Nervosa and BED to establish the robustness of the procedure. Another limitation was the use of self-monitoring to collect data on binge eating. Although independently verifiable data would have been preferable, it is difficult if not impossible to collect such data on a behavior that occurs primarily when the

participant is alone. A final limitation noted by this author concerns the availability of service to those individuals who may not live near the research site. In the current study, extraordinary efforts were made to accommodate the participants by making meeting times and places convenient for the participants (i. e., evening hours and weekends), thereby lowering the response effort to make meetings. However, if the treatment were to be offered in a clinic with standard business hours, many participants may not have been able to complete the weekly visits.

In summary, this study showed that a functional intervention based on the principle of extinction was successful in decreasing or eliminating binge eating experienced by four participants. As this is only the second study evaluating this procedure, more research is needed to establish the generality of the procedure. Nonetheless, this study and the findings of Bosch et al. (2008) suggest that extinction might be an effective and efficient treatment for binge eating.

List of References

- Agras, W. S. (1993). Short-term psychological treatment for binge eating. In C. G. Fairburn & G. T. Wilson (Eds.), *Binge eating: Nature, assessment, and treatment* (pp. 173-205). New York: Guilford Press.
- Agras, W.S., Telch, C.F., Arnow, B., Eldredge, K., & Marnell, M. (1997). One year follow up of cognitive-behavioral therapy for obese individuals with BED. *Journal of Consulting and Clinical Psychology, 65*, 343-347.
- Ahearn, W.H., Clark, K.M., MacDonald, R.P.F., & Chung, B. (2007). Assessing and treating vocal stereotypy in children with autism. *Journal of Applied Behavior Analysis, 40*, 263-275.
- Anderson, D. A., & Maloney, K. C. (2001). The efficacy of cognitive-behavioral therapy on the core symptoms of bulimia nervosa. *Clinical Psychology Review 21*(7), 971-988.
- Arnow, B., Kenardy, J., & Agras, W. S. (1992). Binge eating among the obese: A descriptive study. *Journal of Behavioral Medicine, 15*(2), 155-170.
- Arnow, B., Kenardy, J., & Agras, W. S. (1995). The emotional eating scale: The development of a measure to assess coping with negative affect by eating. *International Journal of Eating Disorders, 18*(1), 79-90.

- Baker, J.C., Hanley, G.P., & Mathews, R.M. (2006). Staff-administered functional analysis and treatment of aggression by an elder with dementia. *Journal of Applied Behavior Analysis*, 39, 469-474.
- Beebe, D. W. (1994). Bulimia nervosa and depression: A theoretical and clinical appraisal in light of the binge-purge cycle. *The British Journal of Clinical Psychology/The British Psychological Society*, 33(Pt 3), 259-276.
- Bosch, A., Miltenberger, R.G., Gross, A., Knudson, P., & Brower-Breitwieser, C. (2008). Evaluation of extinction as a functional treatment for binge eating. *Behavior Modification*, 32, 556-576 .
- Cooper, M. J. (2005). Cognitive theory in anorexia nervosa and bulimia nervosa: Progress, development and future directions. *Clinical Psychology Review*, 25(4), 511-531.
- Deaver, C.M., Miltenberger, R.G., Smyth, J., Meidinger, A., & Crosby, R. (2003). An evaluation of affect and binge eating. *Behavior Modification*, 27, 578-599.
- Derby, K.M., Wacker, D.P., Sasso, G., Steege, M., Northup, J., Cigrand, K., & Asmus, J. (1992). Brief functional assessment techniques to evaluate aberrant behavior in an outpatient setting: a summary of 79 cases. *Journal of Applied Behavior Analysis*, 25, 713-721.
- Fairburn, C.G., & Cooper, Z. (1993). The Eating Disorder Examination (12th Edition). In Fairburn, C.G. & Wilson, G.T. (Eds.), *Binge eating: nature, assessment and treatment* (pp.317-360). New York, NY: Guilford Press.

- Fairburn, C.G., & Wilson, G.T. (1993). Binge Eating: definition and classification. In Fairburn, C.G. & Wilson, G.T. (Eds.), *Binge eating: nature, assessment and treatment* (pp.317-360). New York, NY: Guilford Press.
- Fairburn, C.G., Kirk, J., O'Connor, M., & Cooper, P.J. (1986). A comparison of two psychological treatments for bulimia nervosa. *Behaviour Research and Therapy*, 24, 629-643.
- Grilo, C. M., Shiffman, S., & Carter-Campbell, J. T. (1994). Binge eating antecedents in normal-weight nonpurging females: Is there consistency? *The International Journal of Eating Disorders*, 16(3), 239-249.
- Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as escape from self-awareness. *Psychological Bulletin*, 110(1), 86-108.
- Kotler, L. A., Boudreau, G. S., & Devlin, M. J. (2003). Emerging psychotherapies for eating disorders. *Journal of Psychiatric Practice*, 9(6), 431-441.
- Lee, M. I., & Miltenberger, R. G. (1997). Functional assessment and binge eating: A review of the literature and suggestions for future research. *Behavior Modification*, 21(2), 159-171.
- Leitenberg, H., Gross, J., Peterson, J., & Rosen, J. C. (1984). Analysis of an anxiety model and the process of change during exposure plus response prevention treatment of bulimia nervosa. *Behavior Therapy*, 15(1), 3-20.
- Lerman, D.C., & Iwata, B.A. (1996). Developing a technology for the use of operant extinction in clinical settings: An examination of basic and applied research. *Journal of Applied Behavior Analysis*, 29, 345-382.

- Loro, A. D., & Orleans, C. S. (1981). Binge eating in obesity: Preliminary findings and guidelines for behavioral analysis and treatment. *Addictive Behaviors, 6*(2), 155-166.
- Michael, J. (1982). Distinguishing between the discriminative and motivational functions of stimuli. *Journal of Experimental Analysis of Behavior, 37*, 149-155.
- Miltenberger R.G. (2004). *Behavior Modification: Principles and Procedures (3rd ed.)*. Belmont, CA: Wadsworth.
- Miltenberger, R. G. (2005). The role of automatic negative reinforcement in clinical problems. *International Journal of Behavioral and Consultation Therapy, 1*(1), 1-11.
- Mintz, L. B., O'Halloran, M. S., Mulholland, A. M., & Schneider, P. A. (1997). Questionnaire for eating disorder diagnoses: Reliability and validity of operationalizing DSM--IV criteria into a self-report format. *Journal of Counseling Psychology, 44*(1), 63-79.
- Mitchell, J.E., Raymond, N., & Specker, S.M. (1993). A review of the controlled trials of pharmacotherapy and psychotherapy in the treatment of bulimia nervosa. *International Journal of Eating Disorders, 14*(3), 229-247.
- National Institute of Mental Health. The numbers count: mental disorders in America. *Eating Disorders*. Retrieved June 12, 2007 from <http://www.nimh.nih.gov>.
- Psychiatry Online. (n.d.). *Diagnostic and statistical manual of mental disorders, fourth edition: eating disorders*. Retrieved June 13, 2007 from <http://www.psychiatryonline.com>.

- Redlin, J. A., Miltenberger, R. G., Crosby, R. D., Wolff, G. E., & Stickney, M. I. (2001). Functional assessment of binge eating in a clinical sample of obese binge eaters. *Eating and Weight Disorders, 7*, 106-115.
- Rossiter, E.M., & Agras, W.S. (1990). An empirical test of the DSM-III R definition of binge. *International Journal of Eating Disorders, 9*(5), 513-518.
- Smyth, J., Wonderlich, S., Crosby, R., Miltenberger, R.G., Mitchell, J., & Rorty, M. (2001). The use of ecological momentary assessment approaches in eating disorder research. *International Journal of Eating Disorders, 30*, 83-95.
- Stickney, M. I., & Miltenberger, R. G. (1999). Evaluating direct and indirect measures for the functional assessment of binge eating. *International Journal of Eating Disorders, 26*, 196-204.
- Stickney, M. I., Miltenberger, R. G., & Wolff, G. (1999). A descriptive analysis of factors contributing to binge eating. *Journal of Behavior Therapy and Experimental Psychiatry, 30*, 177-189.
- Sagar, A. (2005). Long term health risks due to impaired nutrition in women with a past history of bulimia nervosa. *Nutrition Noteworthy, 7* (8). Retrieved on July 28, 2007 from <http://repositories.cdlib.org/uclabiolchem/nutritionnoteworthy/vol17/iss1/art8>.
- Telch, C.F., Agras, W.S., & Linehan, M.M. (2001). Dialectical behavior therapy for binge eating disorder. *Journal of Consulting and Clinical Psychology, 69*, 1061-1065.

Wegner, K.E., Smyth, J.M., Crosby, R.D., Wittrock, D., Wonderlich, S.A., & Mitchell, J.E. (2002). An evaluation of the relationship between mood and binge eating in the natural environment using ecological momentary assessment. *International Journal of Eating Disorders*, 32, 352-361.

Appendices

Appendix A: Questionnaire for Eating Disorder Diagnoses

Please complete the following questions as honestly as possible. The questions refer to current behaviors and beliefs, meaning those that have occurred in the past 3 months.

Sex: (Please circle) Male Female

Age: _____

School/Occupational Status: (Please circle)

Junior High or younger (specify grade: _____)

High School Freshman

High School Sophomore

High School Junior

High School Senior

College Freshman

College Sophomore

College Junior

College Senior

Not in School/Employed (specify: _____)

Race/Ethnicity: Caucasian/White

(Please circle) African-American/Black

Hispanic/Latino/Mexican-American

American Indian

Asian American/Pacific Islander

Other: _____ (specify)

Present height: _____ feet _____ inches

Present weight: _____ pounds

My body-frame is: small medium large
(Please circle)

I would like to weigh _____ pounds.

1. Do you experience recurrent episodes of binge eating, meaning eating in a discrete period of time (e.g. within any 2-hour period) an amount of food that is definitely larger than most people would eat during a similar time period?

YES NO

If YES: Continue to answer the following questions.

If NO: Skip to Questions # 4 (on the next page)

2. Do you have a sense of lack of control during the binge eating episodes (i.e., the feeling that you cannot stop eating or control what or how much you are eating)?

YES NO

3. Circle the answers within the two sets of [bold brackets] below that best fit for you:

On the average, I have had [1, 2, 3, 4, 5, 6 or more] binge eating episodes a WEEK for at least

[1 month, 2 months, 3 months, 4 months, 5 months, 6-12 months, more than one year]

Appendix A: (Continued)

4. Please circle the appropriate responses below concerning things you may do currently to prevent weight gain. If you circle yes to any question, please indicate how often on the average you do this and how long you have been doing this.

- a) Do you make yourself vomit to prevent weight gain? YES NO
How often do you do this?
Daily Twice/Week Once/Week Once/Month
How long have you been doing this?
1 month 2 months 3 months 4 months 5-11 months More than a year
- b) Do you take laxatives to prevent weight gain? YES NO
How often do you do this?
Daily Twice/Week Once/Week Once/Month
How long have you been doing this?
1 month 2 months 3 months 4 months 5-11 months More than a year
- c) Do you take diuretics (water pills) to prevent weight gain? YES NO
How often do you do this?
Daily Twice/Week Once/Week Once/Month
How long have you been doing this?
1 month 2 months 3 months 4 months 5-11 months More than a year
- d) Do you fast (skip food for 24 hours) to prevent weight gain? YES NO
How often do you do this?
Daily Twice/Week Once/Week Once/Month
How long have you been doing this?
1 month 2 months 3 months 4 months 5-11 months More than a year
- e) Do you chew food but spit it out to prevent weight gain? YES NO
How often do you do this?
Daily Twice/Week Once/Week Once/Month
How long have you been doing this?
1 month 2 months 3 months 4 months 5-11 months More than a year
- f) Do you give yourself an enema to prevent weight gain? YES NO
How often do you do this?
Daily Twice/Week Once/Week Once/Month
How long have you been doing this?
1 month 2 months 3 months 4 months 5-11 months More than a year
- g) Do you take appetite control pills to prevent weight gain? YES NO
How often do you do this?
Daily Twice/Week Once/Week Once/Month
How long have you been doing this?
1 month 2 months 3 months 4 months 5-11 months More than a year
- h) Do you diet strictly to prevent weight gain? YES NO
How often do you do this?
Daily Twice/Week Once/Week Once/Month
How long have you been doing this?
1 month 2 months 3 months 4 months 5-11 months More than a year
- i) Do you exercise a lot? YES NO
How often do you do this?
Daily Twice/Week Once/Week Once/Month
How long have you been doing this?
1 month 2 months 3 months 4 months 5-11 months More than a year

Appendix A: (Continued)

5. If you answered YES to "exercise a lot" please answer questions #5a, 5b, 5c & 5d. If you answered NO to "exercise a lot" skip to question #6.

5a. Fill in the blanks below:

I _____ (types of exercise, e.g., jog, swim) for an average of _____ hours at a time.

5b. My exercise sometimes significantly interferes with important activities.

YES NO

5c. I exercise despite injuring and/or medical complications.

YES NO

5d. Is your primary reason for exercising to counteract the effects of binges or to prevent weight gain?

YES NO

For the following questions, circle the response that best reflects your answer:

6. Does your weight and/or body shape influence how you feel about yourself?

1 2 3 4 5

Not at all A little A moderate Very Much Extremely or
amount Completely

7. How afraid are you of becoming fat?

1 2 3 4 5

Not at all A little A moderate Very Much Extremely or
amount Completely

8. How afraid are you of gaining weight?

1 2 3 4 5

Not at all A little A moderate Very Much Extremely or
amount Completely

9. Do you consider yourself to be:

1 2 3 4 5 6
Grossly Moderately Overweight Normal Low Severely
Obese Obese Weight Weight Underweight

10. Certain parts of my body (e.g., my abdomen, buttocks, thighs) are too fat.

YES NO

11. I feel fat all over.

YES NO

12. I believe that how little I weigh is serious problem.

YES NO

13. I have missed at least 3 consecutive menstrual cycles (not including those missed during a pregnancy). YES NO

Appendix B: Binge Eating Interview

Description of Binge Eating Behavior

The goal of this section is to gather general information regarding your typical binge episode.

1. Would you please describe what a typical binge is like for you? What foods and how much do you typically eat?

2. On the average, how many times do you binge eat per week?

3. Approximately how long does an episode of binge eating last for you?

4. Do you feel a sense of lack of control over your eating during the binge? **(rate on scale with 1=not at all-7=extreme lack of control)**

Factors Related to Binge Eating

The goal of this section is to gather information regarding the events in the environment which may be related to your binge eating behavior such as side effects of medications, coexisting medical conditions, sleeping patterns, daily schedule, living arrangements, etc.

4. Are you currently taking any medications?
 - a. What is the name of the medication(s)? _____
 - b. For what reason was it prescribed? _____
 - c. What is the dosage? _____
 - d. How long have you been taking the medication(s)? _____
 - e. Are you aware of any side effects related to appetite or weight gain which may be associated with taking this medication **(if yes, describe)**?

5. Are you currently under a physician's care for any medical conditions?
(If yes, indicate condition and discuss whether you think it is related to your binge eating)

Appendix B: (Continued)

6. Typical Daily Schedule: **(Indicate when you wake up, time you go to bed, time you typically eat meals, and timing of other typical activities)**

5:00 _____	3:00 _____
6:00 _____	4:00 _____
7:00 _____	5:00 _____
8:00 _____	6:00 _____
9:00 _____	7:00 _____
10:00 _____	8:00 _____
11:00 _____	9:00 _____
12:00 _____	10:00 _____
1:00 _____	11:00 _____
2:00 _____	12:00 _____

7. Indicate the activities you engage in and find rewarding, and how frequently you engage in these activities.

Activity	Frequency
_____	_____
_____	_____
_____	_____
_____	_____

8. Do you live alone or with others **(how many)**? _____

a. **(Who do you live with):**

(If you live with others):

b. Are your roommates or family aware of your binge eating? _____

c. **(If yes)** Does anybody you live with also engage in binge eating? _____

Describe:

Appendix B: (Continued)

Antecedents

The goal of this section is to gather information regarding feelings, thoughts, behaviors, events, etc. which may serve as triggers of your binge eating.

9. What time of day are you most likely to binge eat?

10. What time of day are you least likely to binge eat?

11. Where are you most likely to binge eat?

12. Where are you least likely to binge eat?

13. Do you binge eat in the presence of others?
 - a. If so, who are you most likely to binge eat with?

14. Are there particular situations which tend to trigger binge eating for you or which cause you to want to binge?

15. Are there particular situations which never trigger a binge for you?

16. Are there particular feelings, thoughts, or emotions which tend to trigger a binge or which cause you to want to binge?

Appendix B: (Continued)

17. Are there particular feelings, thoughts, or emotions which never trigger a binge or which cause you to want to binge?

Function of Binge Eating

The goal of this section is to gather information regarding what is maintaining the binge eating behavior for the client. In other words, what is rewarding about engaging in the binge for him/her?

19. What is going on with you before you binge? **(feelings, thoughts, emotions)**

20. What is going on with you while you are binge eating?
(How does it contrast with before the binge?)

21. What is going on with you immediately after you binge?
(How does it contrast with before the binge and during the binge?)

22. Please describe how a binge may be satisfying for you or how a binge may bring relief in some way from some unpleasant feelings, thoughts, or emotions.

23. Is there anything you do besides binge eating which brings the same satisfaction or the same sense of relief?

History of Binge Eating Behavior

24. How long have you been engaging in binge eating behavior?

Appendix B: (Continued)

25. When did it first start?
26. What was happening in your life at that time?
27. Have you engaged in any other eating patterns which were of concern to you?
28. Have you ever sought treatment for your concerns related to your eating patterns?
 - a. If yes, where/ from whom?
29. What kind of help did you receive?
30. Did you find it to be helpful?
 - a. Why or why not?

Appendix C: Conditions Associated with Binge Eating

Using the following scale, please rate the degree to which each of the following

statements are true for you:

- just prior to when you begin to binge eat
- during binging (about 5 minutes into eating)
- immediately after binge eating

Rating Scale

Not at all	Somewhat	Moderately	Very Much So	Extremely
1	2	3	4	5

Prior/During/After

____ / ____ / ____ Anxious/Nervous
(tense heart beating
fast, hands shaky or
sweaty)

____ / ____ / ____ Bored
(nothing I can do right
now that I am
interested in doing)
want/need to do)

____ / ____ / ____ Angry
(upset with myself or
others)

____ / ____ / ____ Dissatisfied/Concerned
with my body
shape/weight

____ / ____ / ____ Feel Guilty
(thinking I have done
something wrong)

____ / ____ / ____ Agitated or Irritable

____ / ____ / ____ Physically Hungry

Prior/During/After

____ / ____ / ____ Happy/Satisfied

____ / ____ / ____ Lonely
(miss being with people
I care about)

____ / ____ / ____ Frustrated
(I am being prevented
from doing something I

____ / ____ / ____ Down/Sad

____ / ____ / ____ Preoccupied
with/Focused on Food
or Eating

____ / ____ / ____ Worrying
about my problems or
responsibilities

____ / ____ / ____ Other
(Specify):

Appendix D: Self-Monitoring Form

Day _____ Date _____

Time Start Eating	Time Stop Eating	Place	Social Context	Lack of control (YN)	Purge (Y/N)	Procedure used	Meal (Y/N)	Calories consumed

Appendix D (Continued)

1. Indicate the percentage of times you completed the **self-monitoring** form today

0-10% 11-20% 21-30% 31-40% 41-50%
51-60% 61-70% 71-80% 81-90% 91-100%

2. How easy was the **treatment procedure** to follow?

1 2 3 4 5 6 7
not at all easy extremely easy

3. How disruptive did you find the **treatment procedure** to be?

1 2 3 4 5 6 7
not at all disruptive extremely disruptive

4. How time consuming did you find the **treatment procedure** to be?

1 2 3 4 5 6 7
not at all extremely time
time consuming consuming

5. How helpful has the **treatment procedure** been in helping you change your eating patterns today?

1 2 3 4 5 6 7
not at all helpful extremely helpful

10. Indicate the percentage of time you followed the **treatment procedure** as you were instructed.

0-10% 11-20% 21-30% 31-40% 41-50%
51-60% 61-70% 71-80% 81-90% 91-100%

Appendix E: Emotional Eating Scale

We all respond to different emotions in different ways. Some types of feelings lead people to experience an urge to eat. Please indicate the extent to which the following feelings lead you to feel and urge to eat by checking the appropriate box.

	No Desire to Eat	A Small Desire to Eat	A Moderate Desire to Eat	A Strong Urge to Eat	An Overwhelming Urge to Eat
Resentful					
Discouraged					
Shaky					
Worn out					
Inadequate					
Excited					
Rebellious					
Blue					
Jittery					
Sad					
Uneasy					
Irritated					
Jealous					
Worried					
Frustrated					
Lonely					
Furious					
On edge					
Confused					
Nervous					
Angry					
Guilty					
Bored					
Helpless					
Upset					

Appendix F: Initial Phone Interview

“I am glad you called. You are responding to a request for individuals to participate in a research study at the University of South Florida on a treatment for binge-eating disorders. My name is ___ and (relation to study). The study is being conducted as part of the requirements for a Master’s Degree in Applied Behavior Analysis. The study is an extension of a previous study that found the treatment to be largely effective. Are you currently experiencing Bulimia? Are you over 18 years of age?”

“It took a lot of courage for you to call. We would like to meet with you to gather some more information regarding your situation and if this treatment would be helpful to you. Sessions will be conducted at the University of South Florida campus in Tampa. The initial appointment should last around two hours. After that, you should expect to spend about one hour with the researcher or assistant each week. Depending on your success and the start date of actual treatment, you should expect to participate for no more than fifteen weeks. Does this sound like something you would be interested in pursuing further?”

“Great, we would like to meet with you as soon as possible.”

“A few more questions to make sure you are right for this study. Are you currently receiving treatment for your eating disorder? Are you currently experiencing symptoms of bi-polar disorder or psychosis? Finally, are you pregnant?”

Any positive answers to the above questions will result in exclusion from the study. If that is the case, give participants the following information:

“Unfortunately due to some of the criteria we have set for this particular study, it would not be a good match for your needs. We would like to give you a phone number for you to call to follow up on treatment for your eating disorder. The University of South Florida offers services for eating disorders at:

USF Counseling Center East Fowler Avenue, SVC 2124 4202, Tampa, Florida
33620 **(813) 974-2831**

Set up time, ensure they have accurate directions. Take name and phone number. Call the day before scheduled appointment to confirm.

Appendix G: Interobserver Agreement Scenarios

Scenario 1: At 12pm, you were in your bedroom watching TV and ate one Twinkie and drank one Coke.

-Calories consumed: $145 + 100=245$

-Binge: No

Scenario 2: At 8pm, you were in the kitchen, looking through the refrigerator and ate one bowl of pasta, one bowl of couscous, one bowl of ice cream, two ice cream bars. At 9pm, you cooked and ate a package of oodles of noodles.

-Calories consumed: $150 + 100 + 200 + 400 + 300=1150$

-Binge: Yes

Scenario 3: At 9am, you go the pantry and eat two pop-tarts and one-half of an English Muffin.

-Calories consumed: $400 + 50=450$

-Binge: No

Scenario 4: At 3pm, you are in the kitchen and eat a handful of chips, two handfuls of cheetos, and several cheezits with bruschetta on top. About 30 minutes later you eat a bag of caramel popcorn and drink a sprite. About 15 minutes later you eat half of a large container of macaroni salad.

-Calories consumed: $100+200+200+100+100+1050=1750$

-Binge: yes

Appendix H: Effect Test Form

Using the following scale, please rate the degree to which you are experiencing each of the following emotions right now:

Not at all Somewhat Moderately Very Much So Extremely
1 2 3 4 5

Resentful _____

Discouraged _____

Shaky _____

Worn Out _____

Inadequate _____

Excited _____

Rebellious _____

Blue _____

Jittery _____

Sad _____

Uneasy _____

Irritated _____

Jealous _____

Worried _____

Frustrated _____

Lonely _____

Furious _____

On edge _____

Confused _____

Nervous _____

Angry _____

Guilty _____

Bored _____

Helpless _____

Upset _____

****Right now, on a scale of 0-7 (0 being absolutely not and 7 being total agreement) rate the extent to which you feel similar to times when you engage in binge eating**** _____