The Effect of Attention Disengagement Training on Eating Disorder Symptoms in Individuals with Borderline Personality Pathology

by

Monika M. Stojek

(Under the direction of Sarah Fischer)

Abstract

Bulimia Nervosa (BN) is highly comorbid with Borderline Personality Disorder (BPD), and both of these disorder are characterized by reactivity to negative mood states. Attentional disengagement training (ADT) has been shown to reduce attentional bias to threat in individuals with anxiety disorders. The purpose of this study was to examine whether or not attention disengagement training in a population of individuals with BPD features would reduce negative affective states and, consequently, their comorbid bulimic symptoms. Sixty participants were initiated in the ADT program. Twenty-eight participants were assigned to the placebo condition and 32 to the treatment condition. We conducted mixed model Group X Time ANOVAs with repeated measures on the second factor The results indicated that there was a significant decrease in the symptoms of anxiety, depression, anger, and bulimic behaviors over time in both groups, regardless of their group status. We had not found the expected time X group interaction. The reasons for these results are explored.

Index words: Borderline Personality Disorder, Bulimia Nervosa, Attentional Bias, Mood Reactivity

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Chapter 1

Introduction

Borderline personality disorder (BPD) has been the most commonly diagnosed personality disorder since its introduction to the DSM-III in 1980 (Loranger, Janca, & Sartorious, 1997). Individuals with BPD often display significant impairment and a number of comorbid conditions (Skodol et al., 2002). Eating disorders are one of the three most common complaints of individuals with BPD, and bulimia nervosa (BN) is the most common co-occurring eating disorder (Zanarini et al., 1998). Both of these disorders are characterized by mood reactivity and engagement in dysfunctional behaviors, such as binge eating, in order to cope with those negative moods (Gunderson, 2001; Smyth et al., 2007; Koenigsberg et al., 2002). The purpose of this paper is to describe a study in which a brief intervention for anxiety was compared to a placebo intervention in a sample of individuals with BPD and BN symptoms. Variables that affect the maintenance of both BPD and BN have been reviewed, and we have hypothesized a mechanism by which this intervention may affect BN symptoms in individuals with borderline personality pathology.

Borderline PD is characterized by a pervasive pattern of affective instability, difficulties in impulse control, and unstable and intense interpersonal relationships (APA, 2000). The symptoms of BPD may be organized into four areas of psychopathology (Zanarini, Gunderson, Frankenburk, & Chauncey, 1990). The first is affective disturbance characterized by a wide range of dysphoric affect and mood reactivity (Koenigsberg et al., 2002). Individuals with BPD report overall "emotional pain" which makes them distinct from other Cluster B personality disorders (Zanarini et al., 1990). The second is cognitive disturbance characterized by symptoms such as depersonalization, transitory or true delusions and hallucination,

and identity disturbance (Lieb, Zanarini, Schmal, Linehan, & Bohus, 2004). The third core feature is impulsivity, which may include more specific deliberately self-destructive behaviors (e.g., self mutilation and suicide attempts) or more general behaviors of which impulsivity is a hallmark feature, such as substance abuse or disordered eating (Lieb et al., 2004). Finally, the fourth core feature commonly present in BPD is a pattern of unstable relationships marked by profound fear of abandonment and high volatility (Lieb et al.). BPD is characterized by substantial psychosocial impairment and interpersonal difficulties (Skodol et al., 2002), extremely high utilization rate of mental health resources (Bender et al., 2001) and high mortality due to suicide — up to 10% of patients commit suicide (Dolan, Krueger, & Shea, 2001; Perry, 1993).

Bulimia nervosa (BN), which frequently co-occurs with BPD, is an eating disorder whose essential features are binge eating followed by compensatory behaviors to avoid weight gain (APA, 2000). According to the DSM-IV-TR, binge eating encompasses "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 period of time and under similar circumstances" accompanied by "a sense of lack of control over eating during the episode" (p. 594). As a result of a binge episode, an individual feels compelled to engage in inappropriate compensatory behaviors, the most common of which is self-induced vomiting but may also, or exclusively, include the misuse of laxatives or diuretics, fasting, or excessive exercise in order to prevent weight gain. Individuals with BN also attach a distorted value to their body weight and shape, and tend to judge themselves based on those features (APA, 2000).

Chapter 2

Literature Review

2.1 BN, BPD, and Mood Reactivity

Eating disorders are highly prevalent in patients with BPD (Gunderson, 2001). Estimates of patients with co-occurring eating disorders range from 53-62% (Zanarini et al., 1998). BN is the most common type of a comorbid eating disorder in BPD patients: approximately 20% - 30% of BPD patients also present with BN (Gunderson; Zanarini et al.). Several studies have found that BPD may be a predictor of a poor prognosis and chronicity of BN symptoms (Herzog, Keller, Lavori, Kenny, & Sacks, 1992; Matsunaga, Kiriike, Nagata, & Yamagami,1998; Steiger, Thibaudeau, Leung, Houle, & Ghadirian, 1994; Wonderlich, Fullerton, Swift, & Kelin, 1994). Additionally, the presence of a personality disorder contributed to higher rates of purging in several samples (Matsunaga et al., 1998; Wonderlich et al., 1994). Based on these studies, it appears that the comorbidity of BPD and BN may be associated with greater distress and poorer prognosis. Given the high degree of comorbidity between BPD and BN, it is likely that there are underlying shared variables that contribute to this co-occurrence.

For example, BN and BPD share a phenomenological feature of mood reactivity resulting from negative affect (Gunderson, 2001; Smyth et al., 2007; Koeningsberg et al., 2002). Emotion regulation based models of the etiology of both disorders have been posited (Linehan, 1993; Heatherton & Baumeister, 1991). The affective instability (in anger, hostility, depressive symptoms, and anxiety, panic, or fear), also known as emotion dysregulation, characteristic of BPD is hypothesized as the primary etiology of many behaviors associated

with the disorder. Linehan (1993) has argued that this dysregulation leads to identity disturbance, unstable relationships, and maladaptive attempts to regulate emotions through substance abuse, deliberate self-harm, and disordered eating. Similarly, the affect-regulation model of BN postulates that individuals engage in bingeing and purging to distract themselves from internal negative stimuli (e.g., anxiety, anger) with a concrete external behavior (Agras & Telch, 1998; Telch & Agras, 1996; Heatherton & Baumeister, 1991; Johnson, Lewis, & Hagman, 1984; Stice, 1994). In an expanded transdiagnostic model of eating disorders, Fariburn and colleagues (2003) posit that mood intolerance (p. 517), or inability to cope with certain mood states such as anger or anxiety appropriately, leads to "dysfunctional mood modulatory behavior" (p. 517) in the form of binge eating, purging, or intense exercising. Those eating disorder patients may be especially sensitive to the negative mood states that lead them to dysfunctional behaviors (Fairburn, Cooper, & Shafran, 2003).

The emotional lability of individuals with BPD is marked by reactivity to the environment, a feature that distinguishes BPD's emotional instability from emotional instability in other mental disorders (Trull et al., 2008). Recently there have been attempts to measure and quantify affective instability using ecological momentary assessment (EMA) methods (Trull et al., 2008). In EMA, the participants' experiences are measured in their natural environments utilizing ambulatory data collection to assess immediate experiences (Stone & Shiffman, 1994). Studies using EMA to measure affective instability in individuals with BPD have found that, compared to healthy controls, they report significantly greater variability especially for negative mood states (Ebner-Priemer et al., 2007; Stiglmayr, Grathwol, & Bohus, 2001; Woysville, Lackamp, Eisengart, & Gilliland, 1999). When compared to patients diagnosed with major depression or dysthymia, individuals with BPD also displayed higher levels of instability in mood, and higher variability in the frequency and amplitude of mood changes, despite high levels of negative affect in both of those groups (Trull et al., 2008).

EMA methods have also been used to assess mood reactivity and its relationship to eating disordered symptoms in a large sample of women with BN (Smyth et al., 2007). These authors found that on days marked by bulimic behaviors, the participants reported higher levels of negative affect, anger/hostility, and stress, compared to days when bulimic behaviors did not occur. Additionally, the authors traced the trajectory of these mood states and found that, on days marked by BN behaviors, negative affect, anger/hostility, and stress severity ratings all increased leading up to the BN behavior (i.e., bingeing or vomiting), while positive affect decreased (Smyth et al., 2007). Following the BN behavior, negative affect and anger/hostility rapidly decreased while positive affect increased. Recent studies also suggest that state anger in particular, may be an emotion regulated with disordered eating (Meyer et al., 2005; Milligan & Waller, 2000; Waller et al., 2003). In addition, stress has been implicated as a precipitating factor in bingeing (Cattanach, Malley, & Rodin, 1988).

Anxiety is one of the affective features characteristic of emotion dysregulation in both BPD and BN (APA, 2000; Gunderson, 2001). Anxiety disorders are among the most prevalent comorbid conditions in BPD (Lieb et al., 2004; Zanarini et al., 1998). In one sample of BPD patients, nearly 90% met criteria for an anxiety disorder (Zanarini et al.). High prevalence rates of anxiety disorders have also been found in BN samples compared to individuals with eating disorders (Bulik, Wade, & Kendler, 2001; Brewerton et al., 1995). Anxiety sensitivity, that is, fear of physiological, psychological, or observable experiences and reactions (Zinbarg, Barlow, & Brown, 1997) has been indicated as a risk factor for developing bulimic symptoms (Anestis, Holm-Denoma, Gordon, Schmidt, & Joiner, 2008). In fact, Bulik and colleagues (2001) concluded that anxiety may be a predisposing trait-like factor for developing an eating disorder. Taken together, the findings support the emotion regulation theory of BN, indicating that a large percentage of individuals with BN display affect dysregulation similar to BPD. This supports the theory that BN symptoms may be maintained because they negatively reinforce behaviors triggered by negative affective states. Therefore, it is probable

that individuals with BPD who also display bulimic symptoms use bulimic behaviors as one of the techniques to regulate their negative affect.

2.2 Attentional Bias and Maintenance of Anxiety

Attentional bias, also referred to as interpretation bias, refers to a tendency to interpret ambiguous stimuli in a threatening manner (Beard & Amir, 2008) and to pay particular attention to threat-relevant stimuli (Mathews & MacLeod, 2002). Research has consistently indicated that individuals with anxiety disorders are particularly prone to interpretation bias and that it may be a contributing factor to their anxiety (e.g., Mogg, Millar, & Bradley, 2000; Amir, Foa, & Coles, 1998). In a seminal study, MacLeod and colleagues (1986) introduced the dot probe detection paradigm to measure attention bias to threat in generalized anxiety disorder (GAD). In this procedure, participants see two words on the screen, one on top and one on the bottom. One word is neutral (e.g., lamp) and the other word has threatening meaning (e.g., accident). Participants are asked to focus on the top word and ignore the lower word. On critical trials, either the upper or the lower word is replaced with dot probe and the participants are asked to signal the location of the probe by pressing the button. In this study, the authors found that participants with GAD signal the presence of the probes that replace the threat words (in either location) faster than the presence of probes that replace neutral words. It demonstrated that anxious individuals consistently showed an attention bias toward threat.

In a more recent study, MacLeod and colleagues (2002) assigned anxious individuals to two dot probe detections conditions: "attend to threat" training condition and "attend to neutral words" training condition. After they had undergone attention training, the participants were subjected to a stress induction task. Participants in the "attend to threat" condition showed greater elevation of negative affect compared to participants in the "attend to neutral words" condition. The two groups did not differ on levels of negative affect prior to the procedure or after the procedure. However, they differed after the stress induction task;

thus participants in "attend to threat" condition were more prone to experience negative affect in a stressful situation. Based on this line of research, Amir and colleagues developed a dot probe intervention to alleviate anxiety in which a participant is trained to divert his or her attention from the threat stimulus and attend to neutral words instead. As a result of the attention modification program in those studies, participants not only showed a decrease in attention bias to threat, but also a decrease in anxiety symptoms (Amir et al., 2008; Amir et al., 2009). In fact, 50% of participants in the attention modification condition no longer met the criteria for GAD, compared to 13% in the control condition (Amir et al., 2009).

One possible explanation for the mechanism of action of the attention modification program is that the training teaches individuals to disengage their attention from threat-relevant information (Amir et al., 2008). Since MacLeod (2002) found a causal link between attentional bias and anxiety symptoms, then an intervention that reduces attentional bias by disengaging individuals' attention from environmental threats should influence anxiety symptoms (Amir et al., 2008). The results from the two studies cited previously (Amir et al., 2008; Amir et al., 2009) support this hypothesis. Attentional biases, or focusing on threatening cues, are also present in individuals with eating disorders (Shafran, Lee, Cooper, Palmer, & Fairburn, 2007).

The attention modification program leads to a decrease in negative affect through modifying individuals' attention to threatening stimuli. Amir and colleagues (2009) reported that in addition to reducing anxiety symptoms, the intervention also led to lower self-reported depressive symptoms. The authors concluded that the finding was not surprising as the two conditions often co-occur. It is possible, then, that in individuals with BPD who display high levels of negative affect, the intervention may lead to reduction not only in anxiety but also in anger, hostility, and depressive symptoms. It is also possible that, as a result of a decrease in negative affect, bulimic symptoms in those individuals will decrease as well.

Chapter 3

Current Study

In this study, a sample of individuals with BPD features underwent an attention disengagement training (ADT) aimed at reducing anxiety by reducing attentional bias. Affective instability is one of hallmark features of individuals with BPD (Lieb, 2004) and those individuals are generally high in negative affect (Zanarini et al., 1998). It is hypothesized that a decrease in anxiety, which this intervention is expected to produce, will be accompanied by a decrease in other negative affect features that co-occur with anxiety in BPD, i.e., anger/hostility and depressive symptoms. The purpose of this study was to examine whether or not attention disengagement training in this population would also reduce concurrent bulimic symptoms via this mechanism.

According to the affect-regulation model of BN, individuals engage in bingeing and purging to alleviate negative mood states (Agras & Telch, 1998; Telch & Agras, 1996; Johnson, Lewis, & Hagman, 1984; Stice, 1994) and negative emotional states have been implicated in EMA studies as contributing to bulimic behaviors (Smyth et al., 2007). Therefore, we propose that a reduction in negative affect due to the intervention will decrease BN symptoms of binge eating and purging, as these symptoms are linked to acute increases in negative affect. Our specific hypotheses were as follows: (1) Attention disengagement training will reduce attentional bias to threat words; (2) Individuals in the intervention condition will experience a reduction in symptoms of anxiety, anger, and depression compared to individuals in the placebo condition; (3) The reduction in anxiety levels will be mediated by changes in attentional bias in the intervention condition; (4) Individuals in the intervention condition will experience a reduction in eating disorder symptoms compared to individuals in the

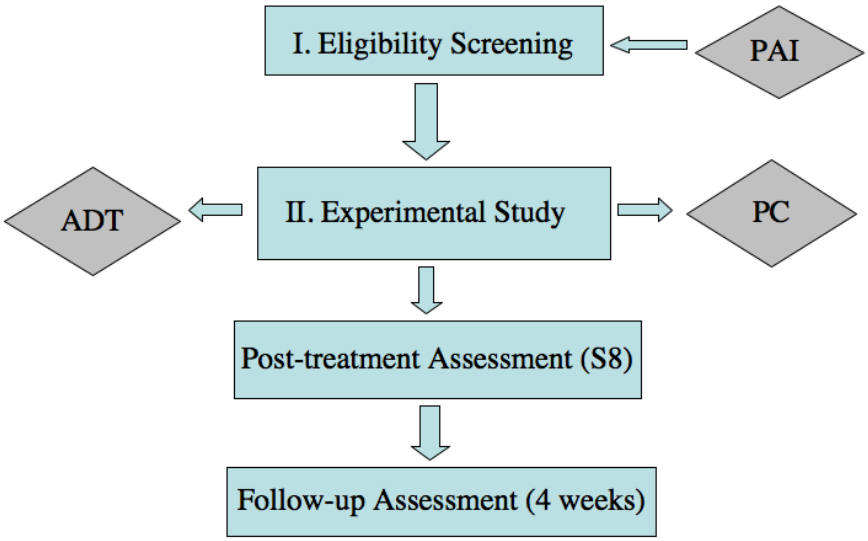
placebo condition; (5) The reduction in eating disorder symptoms will be mediated by the reduction in negative affect.

Chapter 4

Method

The study utilized several procedures at the different stages of the experiment. The timeline of the procedures utilized in this study is depicted in Figure 4.1.

Figure 4.1: Timeline of Procedures



4.1 Eligibility Screening

Prior to the initiation of the treatment paradigm, a large sample of potential participants was screened. Several inclusion and exclusion criteria (described below) were used to determine eligibility for the experimental study.

4.2 Participants

We screened 850 undergraduate students at a large Southeastern university in the eligibility phase of the study. Women comprised 70% of the sample (N = 629). The sample was predominantly White (78%; N = 653). Eight percent of the participants reported their ethnicity as Asian or Asian American, 7% as Black or African American, 3% as Hispanic or Latino, and 3% as Biracial or Other. Approximately one half of the screening sample were first-year college students (55%; N = 465). The modal age of the participants was 18, with the median and mean age of 19.

4.3 Measures

Personality Assessment Inventory (PAI; Morey, 1991). The PAI is a multi-scale standardized inventory used for clinical assessment of adults (18 years old and older). It contains 344 items, which encompass 22 non-overlapping scales. The Borderline Scale (BOR) was used to calculate the cut-off scores for eligibility. The BOR scale contains four subscales: Affective Instability (BOR-A), Identity Problems (BOR-I), Negative Relationships (BOR-N), and Self-harm (BOR-S). The scale scores on the PAI are expressed as T-scores with a mean of 50 and a standard deviation of 10 based on a normative sample of 1000 U.S. adults. A score of 60 indicates that a person lies at 84th percentile in terms of experiencing problems, while a score of 70 indicates 96th percentile. Therefore, according to Morey, a score that falls two standard deviations above the normative sample mean likely indicates a problem of clinical significance. The internal consistency of the items on the BOR scale was 0.86.

Emotional Distress-Anxiety, Emotional Distress-Depression, and Emotional Distress-Anger (NIH, 2008). Depression, anxiety, and anger will be measured with self-report scales created by the NIH PROMIS study. The process of selecting items on theses scales included drawing items from well-established measures in five domains (e.g., emotional, physical), sorting them into categories within those wide domains, eliminating redundant items, and

finally subjecting the items to a qualitative review. The measures used in this study are part of the emotional distress domain and are the short versions of the scales created by the NIH PROMIS taskforce. The short versions have been calibrated by the NIH for use. EDANG (Anger) Short Form and EDDEP (Depression) Short Form scale each contains eight items, and the EDANX (Anxiety) Short Form scale contains seven items. The measure assesses those mood states in the past week using a five-point Likert scale ranging from (1) Never to (5) Always. Examples of items from each scale include: "I was irritated more than people knew" (EDANG); "I felt worried" (EDANX); and "I felt hopeless" (EDDEP). The individual raw scores are converted into a T-score using conversion charts available through the NIH PROMIS manual. The internal consistency coefficients for these three scales have been summarized in Table 4.1.

Table 4.1: NIH Scales Internal Consistency

Variable	**Baseline**	**Post-Trtm**	**Follow-up**
ED-ANG	0.84	0.86	0.88
ED-ANX	0.90	0.90	0.87
ED-DEP	0.93	0.92	0.93

Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990). The PSWQ is an inventory designed to measure the frequency, intensity, and uncontrollability of pathological worry. There are three scores that can be derived from 16 items in the questionnaire: the Worry Present score, Worry Absent score, and the total score which is the sum of the two previous scores. The items that comprise the Worry Absent score are reverse-scored. The items in the questionnaire are rated on a scale from 1 (Not at all typical of me) to 5 (Very Typical of me). The internal consistency of the total score was high in our sample at all time points: Cronabchs α at baseline assessment was 0.95 and at the end of treatment assessment and the one-month follow-up assessment it was 0.94.

Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Cooper, 1993). The EDE-Q has been derived from the Eating Disorders Examination interview. It is a 40-item self-report questionnaire that assesses feelings and behaviors related to eating over the past

28 days and can be used to assess diagnostic criteria for eating disorders. It yields four subscale scores: Restraint, Shape Concern (SC), Weight Concern (WC), and Eating Concerns (EC). The four subscales combined yield a Global Score of the overall eating pathology. Additionally, frequency of subjective binges, objective binges, and inappropriate compensatory behaviors are calculated. The internal consistency of the EDE-Q Global scale was 0.93.

Structured Clinical Interview for DSM Disorders-II (SCID-II; First, Spitzer, Gibbon, & Williams, 1997). The BPD interview schedule from the SCID-II was used to assess the symptoms of BPD more specifically after the participants have qualified based on the PAI scores. The interviews were administered by trained graduate students at the university clinic.

4.4 Procedure

The investigators administered the battery of self-report questionnaires described above in groups of approximately 25 participants. The participants received partial class credit in exchange for their participation. The participants were informed that they may be contacted for the second part of the study.

4.5 Exclusion and Inclusion Criteria

Participants who received a raw score of 36 or above (i.e., 1.5 standard deviations above the mean score of the normative reference sample) on the PAI -BOR (Borderline) scale were identified for further participation. Morey (1991) indicated that the score that falls at or above the threshold of two standard deviations above the community sample mean score (i.e., the raw score of 38) is associated with clinically significant borderline features; this cut-off has been used in subsequent studies as well (Trull et al., 1997; Trull et al., 2001). As we are interested in subclinical borderline features as well, we used a less conservative criteria of 1.5 standard deviation above the community sample mean score (i.e., the raw score of 36 and above) (Evershed, Tennant, Boomer, Rees, Barkham, & Watson, 2003). Other exclusion

criteria included, (1) a suicide attempt in the past two years, and (2) initiation of a new medication or psychological treatment within the three months prior to the beginning of the intervention.

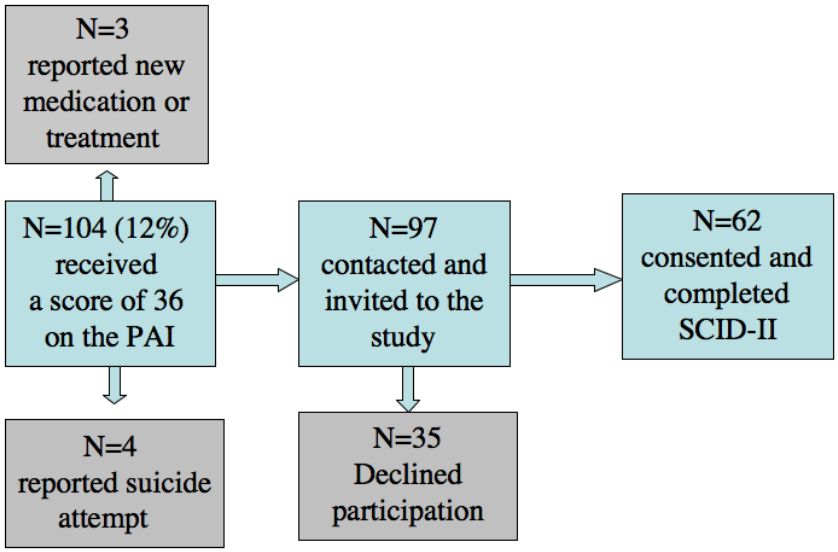
Chapter 5

Results

The majority of individuals in the screening sample did not report binge eating (82%; N=699). The remainder of the sample (18%; N = 151) reported bingeing at least once in the previous month. Ninety-four percent of the screening sample did not report any purging episodes in the past 28 days (N=799). The mean EDE score in the sample was 1.35 (SD=1.22). Regarding anxiety, the mean score on the PSWQ was 47.06 (SD=14.31) and the mean score on the NIH-Anxiety was 14.20 (SD=5.70). The mean score on the NIH-Depression was 12.54 (SD=5.85) and on the NIH-Anger was 15.73 (SD=1.22).

One hundred and four participants received a score of 36 or above on the PAI-BOR assessment. Out of these participants, four reported having a suicide attempt in the past two years, and three reported having initiated a treatment or medication in the past three months. Therefore, these seven participants were excluded. Ninety-seven participants were contacted and invited to participate in the study for payment. Thirty-five participants declined participation. Sixty-two participants agreed to participate in the experimental study. These results are summarized in Figure 5.1.

Figure 5.1: Eligibility Results



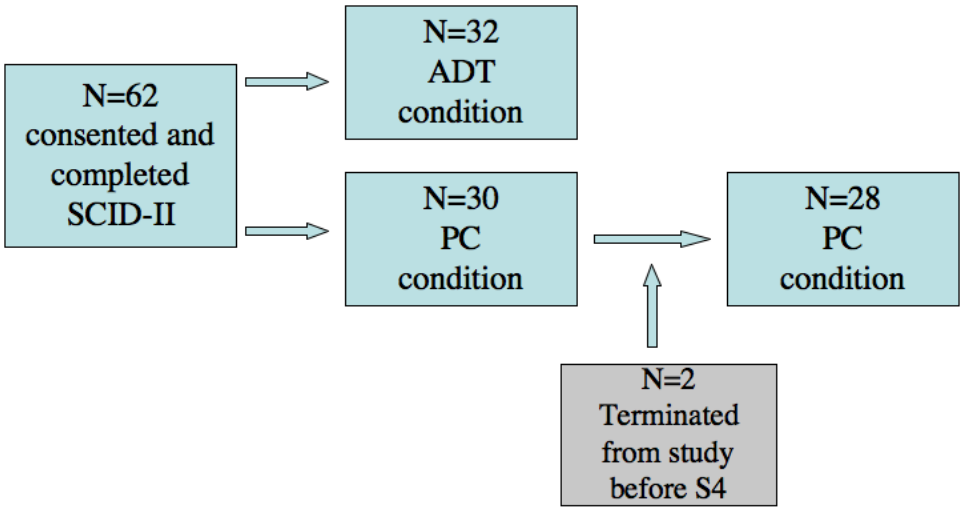
Chapter 6

Experimental Study

6.1 Participants

A total of 62 participants were eligible for the study and agreed to participate in the treatment phase of the study. Of those participants, two did not respond to experimenter's communication following the interview, therefore, their baseline data were dropped from the analyses. Thus, a total of sixty participants initiated the attention training or placebo conditions. These results are summarized in Figure 6.1.

Figure 6.1: Baseline Sample



The mean and modal age in this sample was 19. The majority of the participants (N = 38) were first-year college students. Seventy-two percent of our sample (N=43) reported

their ethnicity as White/Caucasian, 10% (N = 6) as Asian or Asian American, 6% (N =4) as Black/African American, and 5% (N = 3) as Hispanic/Latino. Women comprised the majority of the experimental sample (85%; N = 51).

6.2 Measures

The measures described above in the eligibility screening portion of the study were used in the treatment study.

6.3 Procedure

Prior to randomization to condition and initiation of the intervention, participants were first asked to complete the SCID-II for BPD. In the interview session, the investigator informed the participants that they may be assigned to a treatment or a control condition of the attention disengagement training for symptoms of anxiety. All participants signed an informed consent form. Participants were randomly assigned to the attention disengagement training (ADT; treatment) condition and the placebo control (PC) condition. Participants were screened and randomly assigned to condition throughout a one year period, at different points throughout the year. Initially, 30 participants were assigned to the PC condition and 32 to the ADT condition.

The participants and research assistants working with the participants were blind to the condition. In order to ensure that the research assistant administering the training remained blind to condition, every participant received a slip of paper with a unique code for the computer training software which also contained a code for their condition.

Participants in both groups engaged in training twice a week for four weeks comprising eight sessions, each lasting approximately 30 minutes. At the beginning of each session, the research assistant gave standardized instructions to the participant. In their last computer training session (approximately four weeks after initiating the computer training program), participants were asked to complete a battery of self-report measures identical to the baseline

assessment measures with the exception of the PAI. Similarly, the participants were asked to complete the same battery online four weeks after they completed the computer training. The participants were reimbursed a total of $100 for their participation in the study.

Attention Disengagement Training (ADT). ADT is a computer delivered attention retraining program aimed at disengaging from anxiety-provoking stimuli. During each session, the participants were exposed to 384 trials that consisted of various combinations of probe type (E or F), probe position (top or bottom), and emotion word type (Neutral or Threatening). The trials were presented at a presentation interval of 500 ms. Out of 384 trials in each session, the first 48 trials and final 48 trials (trials 337—364) assessed participants' reaction times to neutral and threat words, while the intermediary 288 trials (trials 49—336) trained participants' attention away from the threatening words. The first and the final 48 trials consisted of a combination of threat and neutral word pairs (x 6), probe type (E or F) x 2, threat word position (top or bottom) x 2, and probe position x 2 (following the threat or the neutral word). The probe appeared in place of threat and neutral words with equal frequency, therefore, there was no contingency between the position of either the threat or neutral words and the position of the probe. The 288 training trials consisted of a combination of threat and neutral word pairs (x12), probe type (E or F) x 2, threat word position (top or bottom) x 2, and probe position (following threat or neutral word) x 2. This combination was repeated three times (x 3). On the 288 training trials, the probe always followed the neutral word, i.e., away from the threat word.

Placebo Control (PC). The PC procedure is identical to the ADT protocol except that probe follows the threat word with equal frequency as it follows the neutral word. Therefore, attention training theoretically does not occur because neither threat nor neutral words have valence regarding the position of the probe.

Chapter 7

Power Analysis

A priori power analysis was conducted using the GPOWER software to determine appropriate sample size. Power was calculated based on analyses needed to conduct a test of the main hypothesis; that is, that the intervention group would exhibit a significantly greater reduction in eating disorder symptoms than the control group. Thus, power was calculated for a mixed ANOVA; repeated measures, within and between groups interaction. In order to detect a medium effect (f = 0.25) with $\alpha = 0.05$ and the power set to the recommended level of 0.8, the total recommended sample size is 34. The critical F value for detecting a medium effect is F(1, 32) = 4.15. In order to detect a large effect (f = 0.5) with $\alpha = 0.05$ and the power set to the recommended level of 0.8, the total recommended sample size is 12. The critical F value for detecting a large effect is F(1,10) = 4.96.

Chapter 8

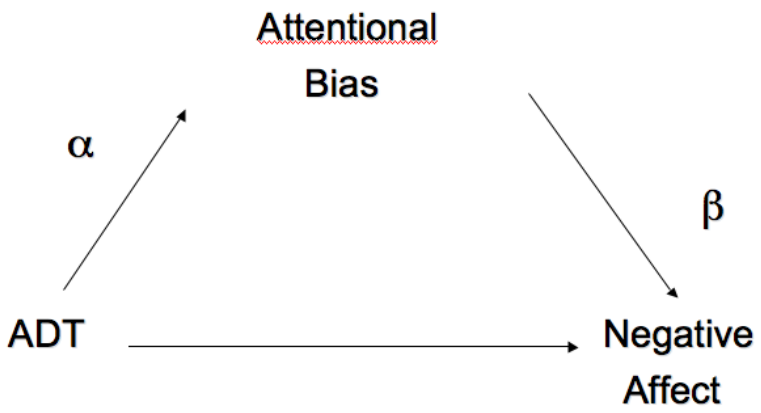
Plan for Data Analysis

First, we compared the intervention and placebo group on pre-treatment measures to determine if there are any pre-treatment differences. We hypothesized null findings, as participants were randomly assigned to groups. We next examined descriptive statistics on the frequency of eating disorder symptoms in the sample using the EDE-Q scores. Additionally, we examined the frequency of objective and subjective binges, and inappropriate compensatory measures such as self induced vomiting.

Next, we planned to conduct a series of analyses to test whether a reduction in negative affect due to the intervention decreases BN symptoms of binge eating and purging, as these symptoms are linked to acute increases in negative affect. To test the hypothesis that (1) attention disengagement training reduces attentional bias to threat words, we planned to follow the statistical procedure outlined by Amir and colleagues (2009). The participants' reaction times from the first 48 trials and the last 48 trials for each of the eight sessions were calculated. We calculated these reaction times by subtracting participants' reaction times on the trials in which the probe followed the threatening word from the sum of trials in which the probe followed the neutral word. The mean attentional bias score was calculated for each participants for each of the eight sessions. Subsequently, we planned to conduct a 2(condition: ADT, PC) X 8(time: each of the eight sessions) ANOVA with attentional bias as a dependent variable to examine whether an interaction between the time and condition is present. If the ADT group's attentional bias has changed, then their attentional bias scores should decrease compared to the PC group.

To test the hypothesis that (2) individuals in the ADT condition experience a decrease in the symptoms of anxiety, anger, and depression compared to individuals in the PC condition, we planned to conduct a repeated-measures two by three ANOVA, testing a Group by Time interaction. In order to detect differences in negative affect between ADT and PC group, we used 2(Group: ADT, PC) x 3(Time: Pre, Post, Follow-up) ANOVAs. Scores on PSWQ, NIH-Anxiety, NIH-Anger, NIH-Depression, were used as dependent variables. If a statistically significant interaction exists, it would indicate that one group experienced different levels of change on symptoms from pre to post assessment. We planned to conduct a follow up independent samples t-tests to compare the means of the ADT and PC groups on the aforementioned scales at pre- and post-intervention.

Figure 8.1: Mediational Model 1



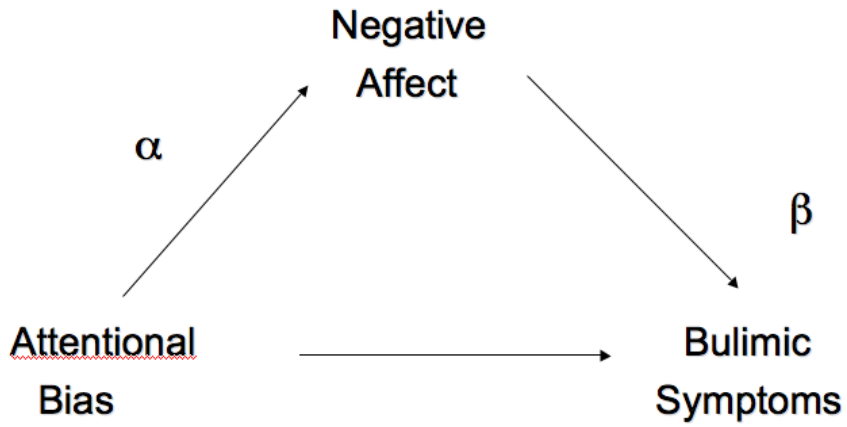
To test the hypothesis that (3) reduction in anxiety and negative affect levels is mediated by reduction in attention to threat words, we planned to conduct a mediational analysis based on the procedure used by Amir and colleagues (2009) and outlined by MacKinnon and colleagues (2007). We planned to test the product of the coefficients for the effects of the IV (ADT or PC) to the mediator (attention bias expressed as the mm-score) on the α path. We then planned to test for the effects of the mediator to the DV (change from pre- to post-intervention in scores on PSWQ, NIH-ANG, NIH-DEP, NIH-ANX) when the IV is

taken into account — the β path. This proposed mediational model is depicted in Figure 8.1.

To test the hypothesis that (4) participants in the ADT condition experienced a reduction in eating disorder symptoms compared to the PC group, we conducted another repeated-measures two by two ANOVA of Group by Time interaction. In order to detect differences in disordered eating symptoms between ADT and PC group, we used 2(Group: ADT, PC) x 2(Time: Pre, Follow-up) ANOVAs. Scores on EDE-Q Global Scale, frequency of binge eating, and frequency of inappropriate compensatory behaviors were used as dependent variables. If a statistically significant interaction existed, it would indicate that one group experienced different levels of change from the other from pre to post assessment. We then planned to conduct a follow up independent samples t-tests to compare the means of the ADT and PC groups on these scales at pre- and post-intervention.

Finally, to test the hypothesis that (5) a reduction in bulimic symptoms is mediated by a reduction in anxiety and negative affect, we planned to test the product of the coefficients for the effects of the IV (attentional bias) on the mediator (scores on PSWQ, NIH-ANG, NIH-DEP, NIH-ANX) on the α path and of the mediator to the DV (scores on EDE-Q and frequencies of bulimic behaviors) when the IV is taken into account on the β path. This proposed mediational model is depicted in Figure 8.2.

Figure 8.2: Mediational Model 2



Chapter 9

Results

9.1 Sample Characteristics

The treatment and placebo groups did not differ on age, years at school, or gender at pre-training. These results are summarized in Table 9.1.

Table 9.1: Demographic Characteristics of the Experimental Study Sample by Condition

Variable	**ADT**	**PC**
Women (%)	29 (90%)	22 (79%)
Age *SD*	19 (1.15)	18.7 (0.78%)
Year at school (SD)	1.6 (.72)	1.4 (.74)
N	32	28

9.2 Measures of Anxiety, Depression, and Anger

Symptoms of anxiety were measured using the NIH-Anxiety scale and PSWQ, while the symptoms of depression were measured using the NIH-Depression scale. The groups did not differ on any of these measures in the initial assessment. These results are summarized in Table 9.2.

Table 9.2: Means and Standard Deviations of Affect Measures by Condition

Variable	**ADT**	**PC**
NIH-Anxiety	20.78 (5.14)	19.96 (7.48)
PSWQ	60.63 (12.03)	55.68 (15.14)
NIH-Depression	19.81 (7.61)	20.96 (8.37)
NIH-Anger	22.91 (4.24)	22.18 (5.79)
N	32	28

Standard deviations in parentheses

The overall score of NIH-Anxiety in both samples combined was 20.2 (6.29). Based on the NIH PROMIS study norms, the score of 20 is the equivalent of T-score of 60, indicating that participants in our sample were one standard deviation above the community sample mean on anxiety levels. The mean PSWQ in our sample combined was 58.28 (13.71), which is elevated compared to the college students' mean of 48.8 (13.8) in Meyer and colleagues' normative assessment of this scale. The mean score of NIH-Depression in our sample combined was 20.35 (7.93), which is equivalent with a T-score of 57. It appears then that depression levels were only slightly elevated in our sample compared to the general population of U.S. adults.

Anger and aggression characteristics were measured by the NIH-Anger scale and the BAQ. The mean BAQ total score in our sample was 73.37 (SD = 18.22). However, the placebo and treatment groups differed significantly on their BAQ scores. The ADT group (M = 68.65, SD = 15.38) scored significantly lower than the PC group (M = 78.96; SD = 19.96), t = 2.24, $p < 0.05$. The mean score on the NIH-Anger scale in our sample was 22.6 (SD = 4.99), which is the equivalent of a T-score of 59. This indicates that the participants in our sample were approaching a score of one standard deviation above the the score of the general population of U.S. adults. The groups did not differ on NIH-Anger at baseline.

9.3 Measures of Disordered Eating

Disordered eating symptoms were assessed using the EDE-Q. Table 9.3 reports the number of participants in our sample who reported binge eating, purging, or another compensatory behavior.

Table 9.3: Disordered Eating Characteristics by Condition

Variable	**ADT**	**PC**
Binge eating (%)	11 (34%)	7 (25%)
Purging (%)	6 (19%)	6 (21%)
Compens. Beh. (%)	12 (38%)	11 (39%)
N	32	28

Overall, 30% of the sample reported engaging in at least one binge eating episode (objective or subjective) in the past 28 days and 38% of the sample reported engaging in some form of compensatory behavior. The groups did not differ on the frequency of disordered eating behaviors and EDE scores. These results are summarized in Table 9.4.

Table 9.4: Means and Standard Deviations of the Disordered Eating Symptoms by Condition

Variable	**ADT**	**PC**
Binge eating (SD)	2.25 (4.78)	1.79 (3.90)
Purging (SD)	1.03 (3.68)	1.29 (3.68)
Compens. Beh.	4.16 (8.28)	5.18 (7.78)
EDE Global	2.16 (1.28)	2.28 (1.23)
N	32	28

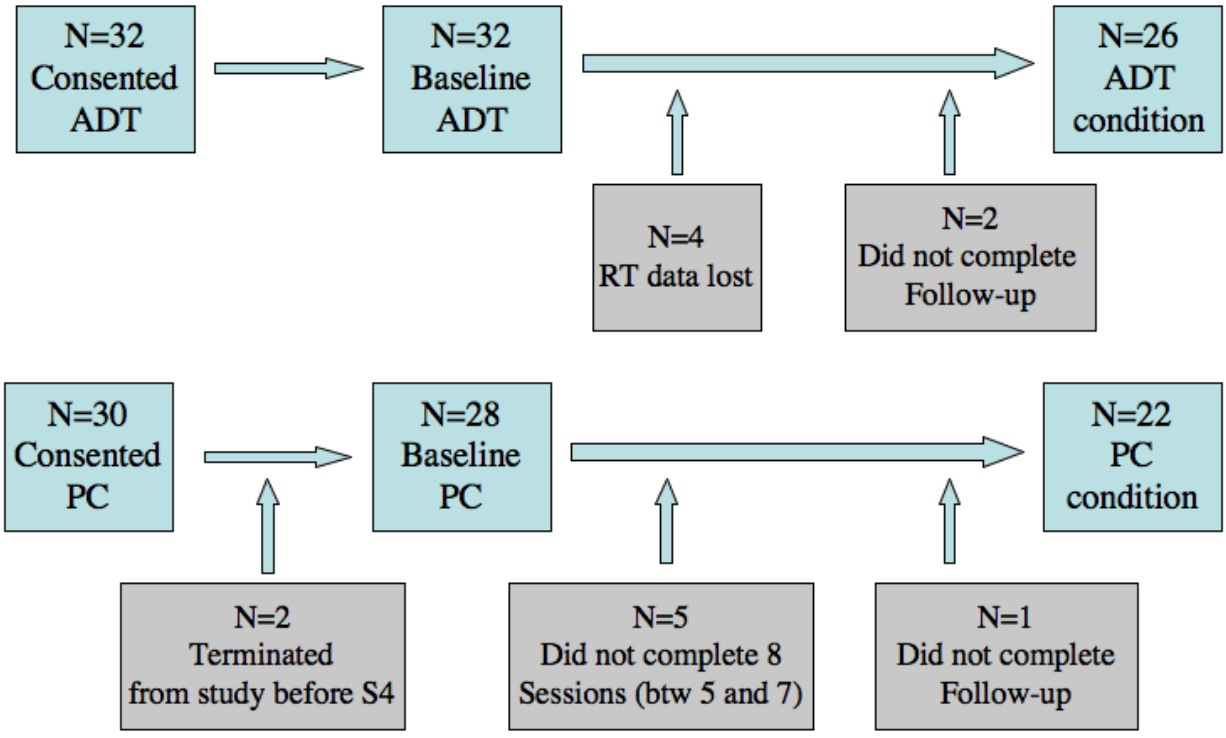
9.4 Borderline Personality Disorder Ratings

Sixty-two participants were invited for the SCID-II interview after determining eligibility. Six participants (10%) met the diagnosis for borderline personality disorder. However, two of these participants were dropped from the study due to non-attendance. The mean number of definite symptom ratings (rating of 3) was M = 2.05, SD = 1.84. The mean number of sub-threshold and definite symptom ratings was M = 5.40 (SD = 2.19). The BPD ratings on the SCID were significantly correlated with the BOR-Total scale on the PAI (r = 0.284, $p < 0.05$). The ADT and PC groups did not differ on their BPD symptomatology (t = 1.58, ns).

9.5 Attrition

In the placebo condition, four participants were terminated from the study before completion (one due to attending sessions under the influence of drugs, and three due to non-attendance). The attrition results at follow-up are reported in Figure 9.1.

Figure 9.1: Atrition at Follow-Up



9.6 Reaction Times — Descriptive Statistics

Participants completed a total of 3072 training trials each, which is the equivalent of 384 trials in a course of eight sessions. Any participants who did not complete all eight sessions were dropped from the analyses. Also, any trials that were not accurate were dropped from the analysis. On average, participants were accurate on 95% of the trials. The means and standard deviations of the response latencies are reported in Table 9.5.

	ADT				**PC**			
	Pre-Train		**Post-Train**		**Pre-Train**		**Post-Train**	
Probe Position	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
Top								
Threat Word								
Top	540	78	405	61	492	90	399	43
Bottom	533	96	423	63	496	93	405	47
Bottom								
Threat Word								
Top	527	98	423	63	479	80	399	42
Bottom	517	87	412	59	485	70	401	43

Table 9.5: Means and Standard Deviations of Response Latencies by Group on the Probe Detection Task

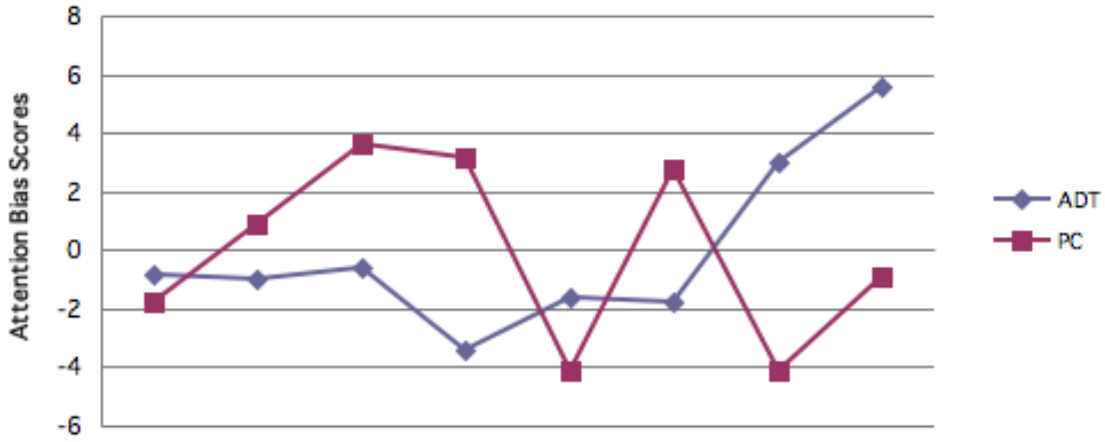
9.7 Hypotheses Testing

9.7.1 Hypothesis 1: Attention disengagement training reduces attentional bias

We included analyses for participants who completed all eight training sessions. We conducted a repeated measures ANOVA, using participants' bias scores for words in the test set as the dependent variable. This analysis was a 2 (condition: ADT, PC) X 8 (time: sessions 1 through 8) ANOVA. The main effects for Condition $F(1, 46) = 0.11$, $p = 0.74$, and Time $F(6, 41) = 0.35$, $p = 0.906$ were not significant. The interaction of Condition X Time, $F(6, 41) = 0.695$, $p = 0.66$, was also not significant. Therefore, in our sample, the attentional bias

of participants did not change over time, and there was no effect of ADT on attentional bias. The attention bias scores by session are depicted in Figure 9.2.

Figure 9.2: Attention Bias Scores By Group and Session Number



9.7.2 Hypothesis 2: Participants in the ADT condition will experience a decrease in negative affect

In order to test this hypothesis, we conducted separate 2 (condition: ADT, PC) X 3 (time: pre-training, post-training, and follow-up) repeated measures ANOVAs for each dependent variable. These results are summarized in Table 9.6. There was a significant main effect of time for each measure of negative affect. Scores on each measure of negative affect significantly decreased for all participants from pre test to follow up. However, there were no main effects for condition, and condition did not significantly moderate the effect of time on negative affect (refer to Figures 9.2 — 9.6 for these results). Therefore, it appears that participants in both the ADT and the PC condition experienced a decrease in negative affect over time, but that this decrease was not due to assignment to intervention or placebo.

We calculated effect sizes for decreases in each outcome variable. Effect sizes ranged from d = 0.11 to d = 1.07. See Table 9.6 for these results. The largest effect sizes were present for reductions in anxiety and anger.

Figure 9.3: Change in Anxiety Levels By Group (NIH-Anxiety)

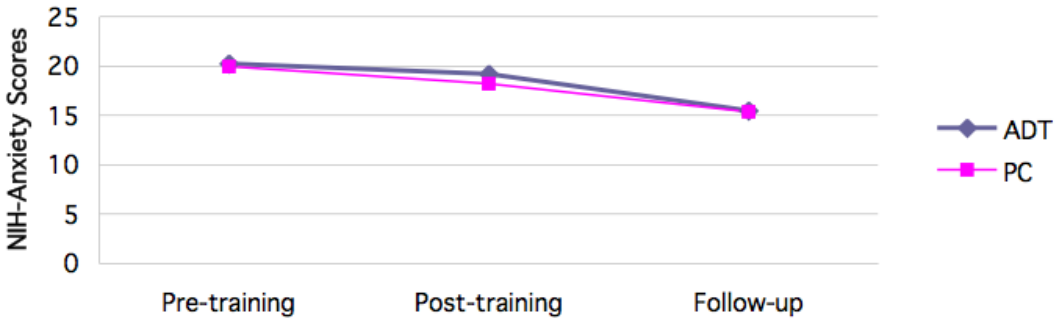


Figure 9.4: Change in Anxiety Levels By Group (PSWQ)

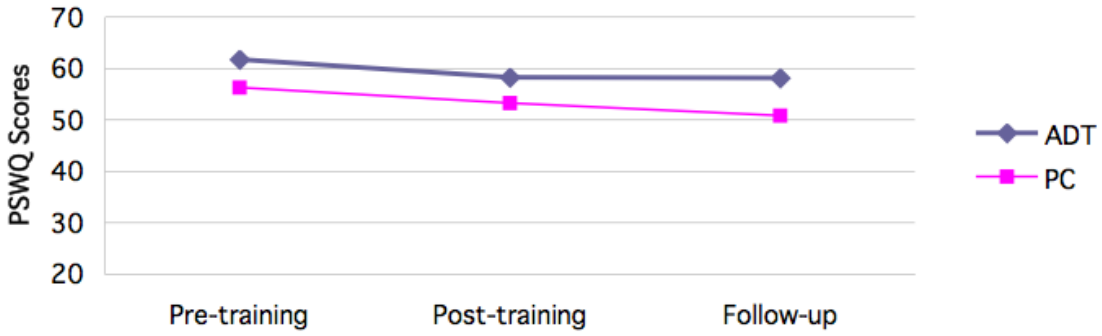


Figure 9.5: Change in Depression Levels By Group

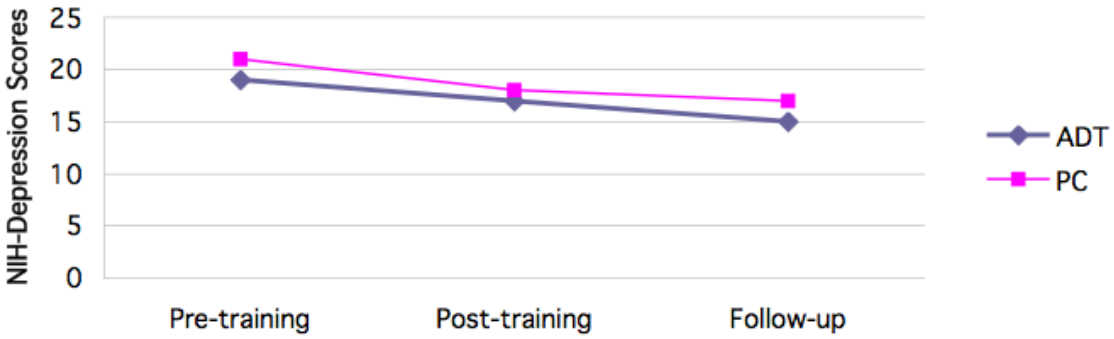
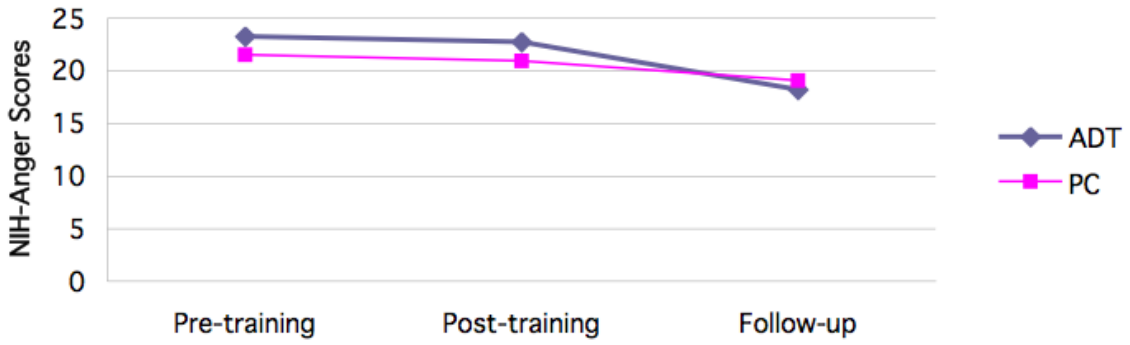


Figure 9.6: Change in Anger Levels By Group



	ADT		PC	
Measure	**Cohen's *d***	*r*	**Cohen's *d***	r
NHI-Anxiety	1.07	0.47	0.72	0.34
PSWQ	0.32	0.16	0.35	0.17
NIH-Depression	0.59	0.28	0.54	0.26
NIH-Anger	1.07	0.47	0.51	0.25
BAQ	0.31	0.15	0.11	0.06
Binge Eating	0.46	0.23	0.20	0.10
Purging	0.27	0.13	0.44	0.22
Comp. Behavior	0.53	0.25	0.59	0.28

Table 9.6: Effect sizes of the Change in Affect and Disordered Eating

9.7.3 Hypothesis 3: Reduction in negative affect levels is mediated by reduction in attentional bias

Participants in neither condition experienced a significant reduction in attentional bias, and participants in both conditions improved over time. Additionally, participants' attentional bias scores were not significantly correlated with measures of affect (these correlations are

reported in Table 9.7). Therefore, conditions for testing mediation of reduction in negative affect by change in attentional bias were not met.

9.7.4 Hypothesis 4: Participants in ADT condition will experience a decrease in disordered eating symptoms while those in PC group will not

We conducted separate repeated measures ANOVAs 2 (condition: ADT, PC) X 2 (time: pre-training, follow-up) using Global EDE-Q scores, binge eating, and purging, as dependent variables. These results are summarized in Table 9.8. Overall, there not a significant main effect of condition on any disordered eating variable. Additionally, scores on the EDE-Q did not significantly decrease over time. However, there were main effects for time for the frequency of binge eating, purging, and engaging in compensatory behaviors, in that they decreased significantly both for ADT and PC groups from pre-training to the follow-up. There were no interactions between Time and Condition. Therefore, it appears that participants in both the ADT and the PC condition experienced decreases in disordered eating symptoms.

9.7.5 Hypothesis 5: Reduction in disordered eating symptoms will be mediated by reduction in anxiety and negative affect.

Participants in both conditions experienced a decrease in the frequency of their bulimic symptoms. However, frequency of bulimic symptoms was not significantly correlated with any measure of negative affect. These correlations are presented in Table 9.9.

Therefore, conditions for testing the mediation of reduction of bulimic symptoms by reductions in negative affect were not met. Figures 9.7 - 9.9 depict the change in the frequency of bulimic symptoms by group. The effect sizes for each of these outcome variables are reported in Table 9.6 above.

Figure 9.7: Change in Binge Eating Frequency by Group

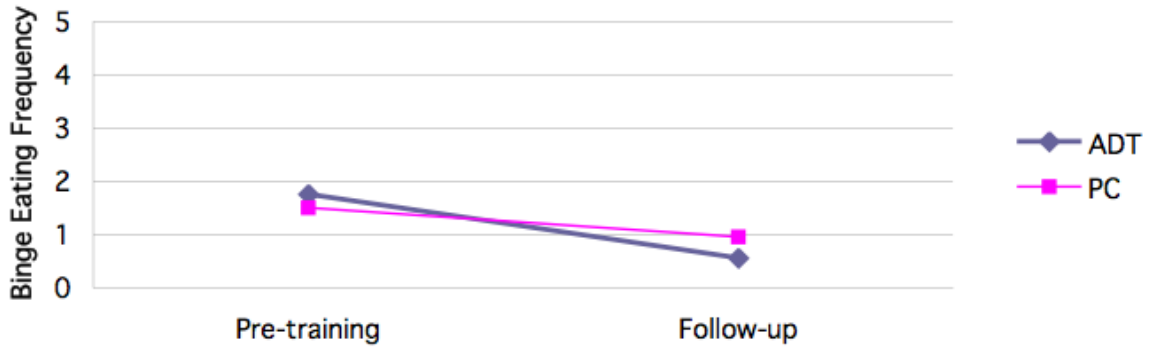


Figure 9.8: Change in Purging Frequency by Group

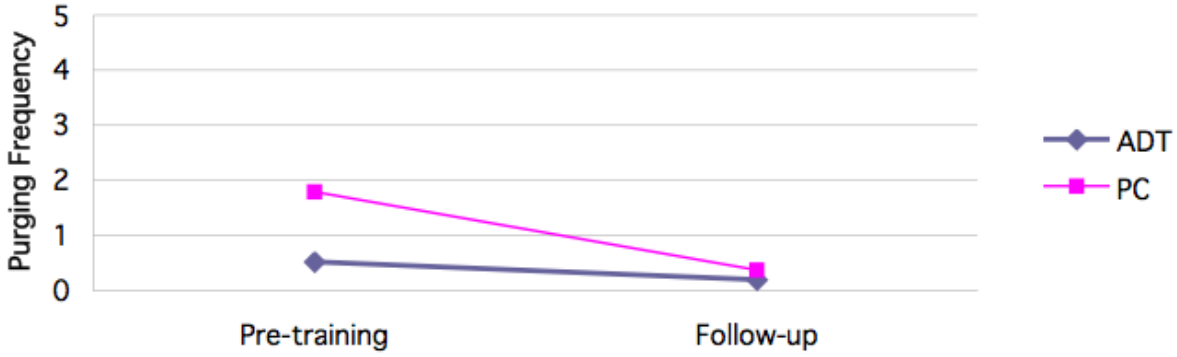
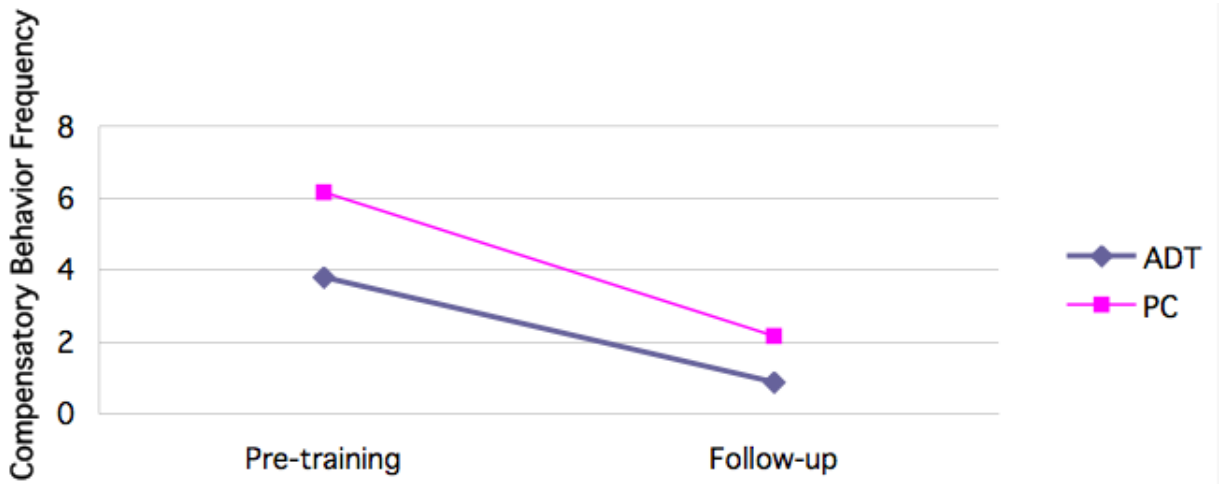


Figure 9.9: Change in Compensatory Behavior Frequency by Group



9.8 Exploratory Follow-up Analyses

We conducted several follow-up analyses to further understand the results. As the intervention was designed to lower individuals' attentional biases to threat, we selected only individuals with a MacLaeod & Mathews pre-training score above 5 for further analysis. A score above 5 indicates that individuals displayed a bias toward threat words. This restriction yielded 9 participants in each condition. We conducted a 2(Condition: ADT, PC) X 8(Time: sessions 1 through 8) ANOVA with levels of attentional bias as the dependent variable. The main effects for time $F(6, 11) = 1.39$, $p = 0.30$ and condition $F(1,16) = 0.61$, $p = 0.45$ were not significant. The sample size of nine may be too small to detect meaningful differences. Therefore, it is possible that if we included more participants with attentional bias, we would find treatment effects over time.

We also correlated participants' ratings on the PAI-BOR scale with their scores of initial attentional abias (mmPre scores). We found a positive relationship between participants' magnitude of attentional bias and their PAI-BOR scale, $r = 0.31$, $p < 0.05$. Therefore, it appears that in our study, participants with more borderline features were more likely to have the attentional bias at the outset of the training. However, none of the measures of affect or disordered eating were correlated with the PAI-BOR scale and the initial attentional bias scores. Finally, we had a wide range of BPD symptoms in our sample. Therefore, we examined the possibility that level of BPD severity would moderate the effect of condition and time on any outcome measure. There was not a statistically significant effect of severity of BPD symptoms in any analysis.

	Pre-training				**Post-training**				**Follow-up**			
	NIH Anxiety	NIH Depres	NIH Anger	PSWQ	NIH Anxiety	NIH Depres	NIH Anger	PSWQ	NIH Anxiety	NIH Depres	NIH Anger	PSWQ
Attention Bias	0.11	-0.05	0.20	0.18	-0.09	-0.08	0.18	0.01	0.05	0.16	0.12	0.12

Table 9.7: Correlations Between Attentional Bias and Negative Affect Measures at Pre-Training, Post-Training, and Follow-up

	ADT				PC				Results					
		Pre-training		Follow-up		Pre-training		Follow-up	Condition		Time		GroupTime	
Measure	**M**	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**F**	p	**F**	p	**F**	p
EDE-Q Global	2.13	1.2	2.05	1.09	2.33	0.96	1.94	0.96	0.06	0.814	1.76	0.185	0.80	0.457
Binge Eat	1.76	3.47	0.56	1.21	1.50	3.42	0.95	1.7	0.19	0.664	4.67	0.016	0.35	0.708
Purge	0.52	1.36	0.20	1.00	1.79	4.39	0.37	1.12	0.76	0.388	3.39	0.044	2.24	0.119
Comp Eat	3.8	7.51	0.88	2.24	6.16	8.55	2.16	4.44	0.77	0.385	5.57	0.007	0.886	0.42

Table 9.8: Means and Standard Deviations for Disordered Eating Measures by Group at Pre-Treatment and Follow-up

		NIH Anxiety	NIH Depres	NIH Anger	PSWQ	NIH Anxiety	NIH Depres	NIH Anger	PSWQ	NIH Anxiety	NIH Depres	NIH Anger	PSWQ	Attn. Bias
		Pre-Train				**Post-Train**				**Follow-up**				
Pre Train	EDE Global	0.12	0.03	0.02	0.15	-0.02	0.12	-0.03	0.16	-0.4	-0.07	0.16	0.05	-0.09
	Binge Eat	0.17	0.05	-0.15	0.01	0.16	0.27	0.03	-0.07	-0.01	0.05	-0.07	0.09	-0.18
	Purge	-0.16	-0.23	-0.19	-0.23	-0.01	0.08	-0.16	0.29*	-0.39	-0.21	-0.31*	-0.28	0.04
	Comp Beh.	0.06	-0.16	-0.21	-0.06	-0.13	0.04	-0.12	-0.19	-0.44*	-0.22	-0.10	-0.32	0.17
Follow Up	EDE Global	-0.17	0.16	-0.01	-0.03	0.02	0.23	0.022	0.14	-0.21	0.11	0.16	0.05	-0.11
	Binge Eat	-0.06	0.05	-0.30*	-0.11	0.20	0.36*	0.05	0.12	-0.17	0.10	-0.08	0.06	-0.16
	Purge	-0.25	-0.21	-0.02	-0.80	0.17	0.12	0.16	-0.05	-0.33*	-0.18	-0.30*	-0.02	-0.01
	Comp. Beh.	-0.06	-0.06	-0.17	-0.12	0.18	0.27	-0.16	-0.08	-0.33*	-0.15	-0.28	-0.17	-0.11

** denotes significance at p=0.05 level*

Table 9.9: Correlations Between Disordered Eating, Negative Affect and Attentional Bias at Pre-Treatment, Post-Treatment, and Follow-up

Chapter 10

Discussion

This study examined the effects of attention disengagement training vs. placebo on measures of negative affect and eating disorder symptoms in a sample of individuals with borderline personality features. In this sample, self report ratings of anxiety, anger, and depression significantly decreased from pre to post treatment and again from post treatment to follow up. Self report ratings of disordered eating symptoms decreased from pre treatment to follow up as well. However, both the treatment and placebo groups experienced decreases in symptoms. Additionally, there was not a statistically significant decrease in attentional bias in the group who underwent the attention disengagement training. Thus, it appears that the training did not have any significant effects on either group's attentional bias to threat.

These results were not consistent with our hypotheses. Amir and colleagues (2009; 2008) have repeatedly found a significant effect of attention disengagement training in individuals with anxiety disorders. While our participants were not diagnosed with anxiety disorders, their ratings on anxiety were considerably higher than the mean of the large sample of college students from which they were selected. Anxiety disorders are prevalent in individuals with borderline personality disorder, thus, it makes sense that our experimental sample had higher scores than the screening sample. However, our participants' anxiety ratings were not as high as those of participants in previous studies using ADT, nor were they two standard deviations above the normative sample, which is often considered a clinically significant cut-off (Morey, 1991; NIH PROMIS). The meta-analytic review of Bar-Haim and colleagues (2007) suggests that individuals with clinical levels of anxiety display attention bias while control participants do not. However, that same meta-analysis finds that individuals with high self-reported state

anxiety do not differ significantly from individuals with a diagnosis of an anxiety disorder on the presence of attentional bias. Individuals in our sample had lower levels of anxiety than individuals with diagnosed anxiety disorders, though they were more anxious than normal controls. Thus, it may be that attention disengagement training is more effective for individuals with higher levels of anxiety or diagnosed anxiety disorders. Further analyses revealed that not all participants in our study displayed attentional bias in the first session. Therefore, these participants may be skewing the reaction times and obscuring the effects of treatment.

Another explanation of the null finding in attentional bias change is that the participants had difficulties staying engaged in the task or did not fully engage in it. As mentioned in the introduction, individuals with BPD are often impulsive and experience cognitive disturbance, such as dissociation and depersonalization (Lieb et al., 2004; Linehan, 1993). Thus it is possible that our participants completed the training sessions in an impulsive manner. However, we also examined accuracy ratings for each individual on each trial. On average, participants missed 5% of the trials. These trials were excluded from the analyses. Therefore, it appears that participants accurately responded on the overwhelming majority of the trials.

We examined the use of a very specific treatment for anxiety, previously successfully used for Generalized Anxiety Disorder, in a relatively heterogeneous sample. More recent studies have utilized threat words or probes that are more sample specific. For example, a recent study of ADT vs. placebo in Social Anxiety utilized threatening facial expressions previously found to have high valence in individuals with SAD (Schmidt, Richey, Buckner, & Timpano, 2009). It is possible that the words that we used were not as salient to a sample of individuals with BPD features.

Considering that there were no changes in participants' attentional bias, why did they experience a decrease in their negative affect and disordered eating symptoms? One possibility is that the attention training simply served as a form of behavioral activation for participants, and in turn positively influenced their mood. Participants were sent reminder

emails before each session which may have created more structure in their possibly chaotic lives. These non-specific factors may have contributed to participants' improvement in mood. Unfortunately, none of the measures of mood was correlated with participants disordered eating symptoms, therefore, it does not appear that a decrease in bulimic symptoms was mediated by a decrease in anxiety, anger, or depression. Additionally, it is possible that reductions in these symptoms, such as binge eating and purging, represent regression to the mean. However, studies of the short term stability of eating disorder symptoms indicate that they are fairly stable over periods of weeks and months (Wear & Pratz, 1987; Baell, & Wertheim, 1992).

Considering present findings, there are several directions for future studies using ADT. First, it would be helpful to use words that are more specific to the pathology of the population studied. For example, in a sample of individuals with bulimic features, it may be more effective to use words related to body weight and shape or certain feared foods. It may also be useful to have a control group who does not receive any type of treatment to control for any behavioral activation effects that the PC condition may have. Overall, while this study did not find significant effects of attention training in individuals with borderline personality features and disordered eating symptoms, it generated results that warrant further study.

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