

BIASES IN AFFECTIVE FORECASTING AND RECALL AS A FUNCTION OF
BORDERLINE PERSONALITY DISORDER SYMPTOMS

By

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ABSTRACT OF THE THESIS

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The present study aimed to advance our understanding of the phenomenology of Borderline Personality Disorder (BPD) by identifying any specific or unique patterns in affective forecasting and recollection of biases that are related to BPD symptoms. In order to assess the accuracy of participants' affective forecasts and recollections, we compared a sample of non-clinical undergraduates' (n=183) predicted and recalled affective states with their actual affect following two emotionally evocative film clips (one amusing and one sad). We predicted that higher levels of BPD symptoms would be associated with greater affective forecasting and recall biases. Results indicated that BPD symptoms predicted a specific pattern of forecasting and recall biases regarding negative, but not positive, stimuli. However, counter to our hypotheses, as BPD symptoms increased affective forecasts and recollections were *more* accurate (less biased). Results from this study indicate that BPD symptoms are related to a specific pattern of affective biases and warrant further study. Furthermore, this study indicates that symptom-specific patterns of forecasting/recall bias can be studied with a laboratory-based paradigm.

Keywords: Borderline Personality Disorder, emotion regulation, affective forecasting, affective biases.

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I. Introduction

Borderline Personality Disorder

Borderline Personality Disorder (BPD) is a severe and debilitating psychological disorder characterized by: chronic unstable and intense affect; disturbed identity; chaotic and unstable interpersonal relationships; and impulsive behavior (APA, 2013). BPD places a heavy burden on society as it is associated with high social, occupational, and educational impairment leading to recurrent job loss/unemployment, interrupted education, divorce, and heavy health service utilization (individual and group therapy, emergency services, and psychiatric hospitalization; APA, 2013; Ritschel & Kilpela, 2015; Rizvi, 2011). BPD affects approximately 2.7 percent of the general population, and accounts for nearly 10% of clinical outpatients and 20% of psychiatric inpatients (APA, 2015; Torgersen, Kringlen, & Cramer, 2001; Trull, Jahng, Tomko, Wood, & Sher, 2010; Zimmerman, Rothschild, & Chelminski, 2005). Rates of non-suicidal self-injury (NSSI) among individuals with BPD are estimated to range between 69 to 80% (Chapman, Derbidge, Cooney, Hong, & Linehan, 2009). Between 60 and 70% of individuals with BPD attempt suicide at least once, and 8-10% die by suicide—a rate 50 times greater than that of the general population (Oldham, 2006; Ritschel & Kilpela, 2015). Complicating the conceptualization and treatment of the disorder is its vast heterogeneity; individuals can meet criteria for diagnosis with any one of 256 different combinations of symptoms (APA, 2015).

Many experts consider BPD a disorder of emotion dysregulation (the inability to effectively control one's affective states; Gratz & Roemer, 2003; Linehan, 1993). Affective instability is defined as intense and volatile emotional shifts/experiences “due to marked reactivity of mood (e.g. intense episodic dysphoria, irritability or anxiety, usually lasting a few hours and only rarely more than a few days)”; (APA, 2013 p663). Affective instability is the

most commonly endorsed diagnostic criterion for BPD. It is considered by many to be the central and defining characteristic of BPD, playing a causal role in many of the other diagnostic symptoms and associated features of the disorder (i.e. emotion dysregulation; Linehan, 1993; Links et al., 2007; Skodol et al., 2002). Supporting this notion, researchers have identified emotion dysregulation as a maintenance factor for BPD, and have even found that it mediated the association between baseline symptoms severity and changes in affective instability and identity disturbance over the course of a year (Stepp, Scott, Morse, Nolf, Hallquist, & Pilkonis, 2013). Affective instability (particularly the magnitude of mood change and the variability from one assessment to the next) has been shown to be one of the strongest predictors of suicidal and self-injurious behaviors among those diagnosed with BPD (Armey, Crowther, & Miller, 2011; Links et al., 2007). Furthermore, emotion dysregulation is a primary target in one of the most empirically supported treatment for BPD, Dialectical Behavior Therapy (DBT; Linehan, 1993; Rizvi et al., 2013). Given its central role in the development, maintenance, and treatment of BPD, as well as its association with suicide risk, furthering our understanding of the nature and source(s) of affective instability found in BPD has been, and should continue to be, a high priority in research.

Recent technological innovations have aided in the understanding of BPD symptoms, particularly affective instability, as they are experienced in everyday life using real-time observation and assessment of participants' daily emotional experiences (see Nica & Links, 2009 and Santangelo, Bohus, & Ebner-Priemer, 2014 for reviews). Despite the variety of research methods used, researchers have consistently found that individuals with BPD have more frequent, intense, and distressing negative affect, as well as more frequent and abrupt shifts in mood compared to controls (Brown, Tragesser, Tomko, Mehl, & Trull, 2013; Ebner-Priemer et

al., 2007; Ebner-Priemer et al., 2015; Nica & Links, 2009; Santangelo et al., 2014a; Santangelo et al., 2014b; Solhan, Trull, Jahng, & Wood, 2009; Trull et al., 2008). Less consistently, studies have also shown that BPD patients report more negative affective at baseline (Ebner-Priemer et al., 2015), more complex emotions, and greater difficulty identifying specific emotions experienced (Ebner-Priemer et al., 2007). The mounting evidence that individuals with BPD have rather inaccurate/biased recollections of their emotional experiences has highlighted the need for in-vivo assessment. Solhan and colleagues, (2009) compared participants' indices of affect and affective instability using ecological momentary assessments (EMA) to self-reports of their general affective states and shifts, and found relatively poor agreement between the two forms of assessment. This inconsistency indicates general inaccuracy in retrospective recall of affect among individuals diagnosed with BPD. Researchers found that BPD participants were particularly inaccurate in recalling their most extreme shifts in mood (Solhan et al., 2009), perhaps due to dissociative experiences during moderate stress in everyday life (Stiglmayer et al., 2008; Santangelo et al., 2014). Brown and colleagues (2013) compared participants' recalled affect to that observed using a recorder and found that individuals with BPD demonstrated significant discrepancies between recalled and observed levels of negative and positive affect across all types of interpersonal events. Finally, in a 2007 study, Ebner-Priemer and colleagues found BPD patients demonstrated a dependent recall bias, such that they over-estimated the intensity of recalled negative affect while under-estimating the intensity of positive affect.

Affective Forecasting

People tend to make decisions based on how they predict the anticipated outcomes will affect them—generally trying to maximize happiness and minimize negative emotions. Since

people cannot actually see the outcome of their decisions until they have made them, our decisions are guided largely by our implicit and explicitly predicted emotional responses to said events (Gilbert, Wilson, Pinel, Blumberg & Wheatley, 1998; Hoerger, Chapman, Epstein & Deberstein, 2012; Loewenstein, 2007; Wilson & Gilbert, 2003). These predictions, or affective forecasts (Wilson & Gilbert, 2003), influence individuals' choices and behavior across domains (interpersonal, professional, private, etc.), in different magnitudes (career path, meal choice), and in varying timeframes (short-term and long-term; Gilbert et al., 1998). Affective forecasts consist of predictions of four specific aspects: the overall valence (positive or negative), specific type (sad, anxious, angry, etc.), intensity, and duration of future emotions (Wilson & Gilbert, 2003). Given the impact they have on our lives, the accuracy of these predictions is paramount, as it is critical for effective decision making (Loewenstein, 2007). Affective forecasts even influence the way we interpret, experience, and respond to the predicted emotions themselves once they actually occur (Loewenstein, 2007). Research on the accuracy of affective forecasts within the general population has highlighted surprising levels of inaccuracy in the majority of people's affective forecasts (Gilbert et al., 1998; Loewenstein, 2007; Wilson & Gilbert, 2003). While people are relatively accurate in predicting their general emotional responses to specific events, most people significantly overestimate the intensity and duration of negative affect and slightly overestimate the intensity and duration of positive affect (Finkenauer et al., 2010; Wilson & Gilbert, 2003).

Research has also found evidence for biases in our retrospective recall of affective states, such that individuals overestimate both their positive and negative emotional intensity and slightly underestimated the frequency of positive affect, evidencing a bias towards the recall of negative emotions (Thomas & Diener, 1990). People also tend to demonstrate inaccuracies in

recalled affect, such that they tend to be biased towards their most intense and most recent emotional experiences (Wilson & Gilbert, 2003).

Subsequent research on affective forecasting and recall has identified a number of sources and mechanisms of forecasting errors/biases. Biases in affective forecasting can be divided into two major domains: 1) impact bias: the tendency to overestimate the intensity of an emotional response; and 2) durability bias: the tendency to overestimate the duration of an emotional response (Wilson & Gilbert, 2003). The primary processes responsible for these biases are: *misconstrual* (inaccurate predictions of the event itself), *focalism* (the tendency to make predictions based on details of the target event without taking the other events bound to unfold over that time period into account), *mental contamination* (the tendency to make mood-congruent predictions, causing current emotions to skew forecasts in their direction), *immune neglect* (the tendency to fail to account for their ability to cope with the emotion), and *motivated distortions* (the tendency to make forecasts based on what one would like to experience; see Gilbert et al., 1998 or Wilson & Gilbert, 2003 for a comprehensive review). Beyond potentially leading to suboptimal decisions, forecasting errors (e.g. over-prediction of negative affective response) could lead to unnecessary avoidance of situations or events (Marroquin, Nolen-Hoeksema, & Miranda, 2013). Additionally, affective forecasts have been linked to choices in emotion regulation strategies, such that inaccurate affective forecasts can potentially lead to maladaptive responses to the focal event when it is actually encountered (Loewenstein, 2007).

Affective Forecasting and Recall Biases Relating to Depression and Anxiety

While the vast majority of research on affective forecasting and recall has focused on biases and their mechanisms in the general population, there is an emerging body of research

investigating the patterns of bias in the context of psychopathology—specifically mood disorders (Hoerger, Quirk, Chapman, & Deberstein, 2012; Wenze, Gunthert, Ahrens, & Bos; Wenze, Gunthert, & German, 2013). Preliminary research investigating the role of depression, anxiety, and hypomania symptoms in forecasting and recall biases has identified a consistent pattern of biases relating to symptoms of psychopathology. In one study by Hoerger and colleagues (2012), undergraduates were asked to make affective forecasts regarding their response to Valentine's Day. Compared to their reported actual responses, participants in dysphoric states during the prediction demonstrated an over-prediction of negative affect and under-prediction of positive affect (Hoerger et al., 2012). Wenze and colleagues (2012) used experience sampling to monitor undergraduates' affect over the course of a week and compare them to participants' predictions and recollections to determine accuracy as a function of their depression and anxiety symptoms. Participants with heightened depression symptoms showed: a stronger (more pessimistic) bias in the prediction and recollection of negative affect, and a weaker (less optimistic) bias in the prediction and recollection of positive affect. Participants with more anxiety symptoms also demonstrated a more pessimistic bias in the prediction of negative mood, but demonstrated no bias in recall, and bias in the prediction of positive mood that was equivalent to individuals with lower levels of anxiety symptoms (Wenze et al., 2012). While this study did not use a clinical sample, the overall pattern of biases was comparable to that of the subset of participants who exceeded the clinical cutoff score indicative of diagnosis—suggesting that the presence of these biases is not limited to clinical severity, but rather is a dimensional construct. In a subsequent analysis, Wenze and colleagues (2013) found that elevated depression symptoms predicted similar patterns of bias in short-term affective forecasts (based on predictions made during one

assessment regarding the subsequent assessment), however, short-term recall accuracy was not assessed (Wenze et al., 2013).

Information-processing biases are a hallmark of cognitive behavioral conceptualizations of psychopathology (Mineka & Sutton, 1992). A more accurate conceptualization of psychological disorders allows for better classification and diagnosis of psychological disorders. The disorder-specific pattern of bias provided by Wenze and colleagues' work has supported the conceptualization of anxiety as a future-oriented threat-focused emotion and depression as a globally pessimistic, bi-directional emotion (Wenze et al., 2013). Furthermore, the results lend support to the tripartite model of depression and anxiety (Clark & Watson, 1991), which argues that negative affect is important in both disorders while low positive affect is specific to depression. A better understanding of the cognitive biases involved in specific disorders can also enhance the efficacy of treatments by allowing better identification of treatment targets. This is particularly true for cognitive- and behaviorally-based treatments, since cognitive biases are often their primary targets. For example, one component of Cognitive Behavioral Therapy (CBT) involves addressing patients' dysfunctional beliefs (catastrophizing, mindreading, etc.), so a deeper understanding of the nature, source, and mechanisms of information-processing biases helps inform interventions. Distinguishing the cognitive biases specific to different disorders could be particularly helpful in tailoring the treatment approaches to patients' unique presentation of psychopathology/comorbidity

Affective Forecasting and Symptoms of BPD

Even though research has not directly investigated affective forecasting biases as a function of BPD symptoms, there are indications that individuals with BPD might present a

specific or unique pattern of biases. For example, rumination has been identified as a key component in the maintenance of BPD (Selby, Anestis, Bender, & Joiner, 2009; Selby & Joiner, 2009). Rumination has also been empirically linked to biases in affective forecasting: when participants were instructed to ruminate before making affective forecasts, they demonstrated a more pessimistic bias (D'Avanzato, 2010). In addition to rumination, other maladaptive cognitive processes in BPD include habitual attention to negative stimuli, disproportionate access to negative memories, and overall negative beliefs about the self, world, and other people (see Baer, Peters, Eisenlohr-Moul, Geiger, & Sauer, 2012 for a review of these processes). Therefore, it stands to reason that individuals with elevated BPD symptoms would demonstrate a more pessimistic bias in both the prediction and recall of experienced affective states.

BPD symptoms strongly correlate with higher scores on the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2003) and clinical BPD populations demonstrate the highest scores on the scale compared to other diagnostic groups (Neacsiu, Herr, Fang, Rodriguez, & Rosenthal, 2014). Based on research using the DERS, a few tentative predictions can be made. Emotional intelligence (cognitive processes related to the perception, understanding, using, and managing of emotions; Hoerger et al., 2012) has been found to positively correlate with affective forecasting accuracy (Hoerger et al., 2012). Emotional intelligence could be conceptualized as polar to emotion dysregulation measured by the DERS; therefore, individuals with elevated BPD symptoms may be expected to exhibit greater inaccuracy in their affective forecasts. High DERS scores are associated with a propensity for experiential avoidance (Chapman, Dixon-Gordon, & Walters, 2011) which could be the result of more pessimistic (either accurate or inaccurate) affective forecasts (Marroquin & Nolen-Hoeksema, 2013). Individuals scoring highly on the DERS (especially on the strategies subscale,

which indicates limited access to emotion regulation strategies) might make more biased affective forecasts (particularly in the length of their predicted emotions) due to an increased susceptibility to immune neglect (Gilbert et al., 1998; Gratz & Roemer, 2003). Alternatively, they might be correctly predicting that their negative emotions will last longer than they do for the average person due to their impaired ability to strategically regulate their emotions. Based on these findings, we believe that individuals with BPD may experience a unique pattern of affective forecasting and recall biases, which could contribute to some of the emotional and behavioral dysregulation characteristic of the disorder.

Present Study

Given the severe, impairing, and potentially life-threatening consequences of emotional dysregulation associated with BPD, research expanding our understanding of contributing mechanisms of affective instability and emotion dysregulation is of critical importance. Such research could help to enhance the efficacy of treatment by allowing for more informed and targeted forms of intervention. The existing literature can be synthesized in such a way as to support the hypothesis that BPD symptoms may contribute to greater biases in affective forecasting and recall. However, no studies have explicitly investigated the pattern of affective forecasting and recall biases as a function of BPD symptoms. Furthermore, while research has begun to investigate the disorder specific patterns of affective biases, researchers have yet to replicate findings in the controlled conditions of a laboratory. The present project aims to address these limitations by examining the nature of affective forecasting and recall biases as a function of BPD symptoms in a laboratory setting.

Aims & Hypotheses

The present study sought to investigate biases in affective forecasting and recall in the context of BPD symptoms. We assessed the accuracy of participants' affective forecasts and recollections by comparing their predicted and recalled affective experiences in response to two emotionally evocative film clips (one amusing and one sad) with their in actual affective experiences. We predicted that individuals' biases in affective forecasts and recollections would be related to their levels of BPD symptoms in a pattern similar to that found with depression (Wenze et al., 2013). Specifically, we hypothesized that:

- 1) Individuals with higher levels of BPD symptoms would demonstrate a significantly greater pessimistic bias in their affective *recollections* regarding a sad film clip (i.e., recall more sadness and worse overall affect than actually experienced).
- 2) Individuals with higher levels of BPD symptoms would demonstrate a significantly greater pessimistic bias in their affective *forecasts* regarding a sad film clip (i.e., predict more sadness and worse overall affect than actually experienced).
- 3) Individuals with higher levels of BPD symptoms would demonstrate a significantly greater pessimistic bias in their affective *recollections* regarding an amusing film clip (i.e., recall less amusement and worse overall affect than actually experienced).
- 4) Individuals with higher levels of BPD symptoms would demonstrate a significantly greater pessimistic bias in their affective *forecasts* regarding an amusing film clip (i.e., predict less amusement and worse overall affect than actually experienced).

The present study aimed to advance our understanding of the phenomenology of BPD, specifically identifying any specific or unique patterns of biases in affective forecasting and recollection that exist as a function of BPD symptoms. The findings of the present study could

inform and guide subsequent research investigating affective forecasting and recall biases (e.g. providing a paradigm for examining forecasting biases regarding other emotions and for investigating biases in clinical BPD samples, beginning to identify which emotions to track in ecological momentary assessment studies of biases).

II. Method

Procedure

Participants were recruited from Rutgers University psychology department's undergraduate participant pool during the fall and spring semesters of the 2015-2016 school year. An ad was posted on the website for the psychology department's participant pool describing the study and its inclusion requirements. Interested participants were provided with a link to take an online survey (Part 1). Following informed consent, participants were prompted to make predictions about their affective response to two film clips based on a description of the events depicted in them. Participants then completed a series of questionnaires (outlined below under materials). Next, participants scheduled a time to come in for the laboratory-based portion of the study (Part 2). Due to the effect of expectations on actual affective experiences—which were inherently be created with their affective forecasts (Finkenauer et al., 2007; Wilson & Gilbert, 2003)—the three parts of the study were temporally separate sessions, five to seven days apart. This temporal separation was aimed to reduce the influence of their predictions on their actual experiences, and their responses on their recollections. In Part 2 of the study, participants' baseline affective states were assessed upon arrival to the lab, they then watched the first of two emotionally evocative film clips (order randomized), their current affective states were assessed again. Participants were then asked to sit and wait for five minutes, after which, their affective states were assessed again, which, based on previous research, should be sufficient time for them to return to baseline affective states. Following a five-minute rest period, participants' affective states were assessed again, if they were not within two points of their baseline state, they were instructed to wait another five minutes and assessed again (no participants required more than two rest periods to return to their baseline states). Participants then repeated this procedure with

the other film clip. Finally, participants were told to respond to an email containing a follow-up survey five to seven days later (Part 3), after which they would be compensated for their participation. Part 3 consisted of an online survey containing a depression and anxiety measure and descriptions of the two film clips (identical to that of Part 1) followed by prompts for participants to recall their affective states following each of the film clips.

Participants

Individuals under the age of 18, who could not read and speak English, and/or who had significant, uncorrected, hearing or vision impairments were excluded from participation in the study. Eligibility criteria were included in the recruitment posting on the participant pool website as well as included in the demographic questions asked during the first portion of the study (the pre-lab visit online survey). Subjects who met the requirements for participation were offered course credit for their participation upon completion of the third portion of the study; participants who withdraw from the study prematurely received pro-rated course credit based on how many parts they completed.

A statistical power analysis was performed for sample size estimation, based on previously published data ($n=120$) investigating the relationship between depressive symptoms and the accuracy of affective forecasts (Wenze et al., 2013), which reported a medium effect size (Cohen's $f^2 = .05$). With an alpha of .05 and a power of 0.95, the required final sample size needed to detect a medium sized effect was estimated to be approximately 138 participants (G*Power 3.1). Individuals not completing the lab portion were replaced and their Part 1 data were not included in analyses. We attempted to reduce attrition by sending reminder emails to participants 24 hours prior to their appointments.

Due to the structure of the psychology department's participant pool, administrative errors and oversights (e.g. research assistants not showing up for scheduled times to run participants' lab visit; research assistants running participants' lab visit when they hadn't taken the pre-lab visit online survey) a number of unanticipated issues arose regarding recruitment and retention. First, students were able to take the pre-lab visit online survey (Part 1) without necessarily scheduling their lab visit (Part 2) leading to a high number of participants only completing Part 1 (456 participants completed Part 1, while only 385 scheduled a Part 2 appointment). Second, students were able to schedule Part 2 of the study without necessarily having completed Part 1 of the study, leading to several participants' Part 2 data having to be excluded. Third, students were able to take the online surveys multiple times, making it difficult to accurately keep track of the number of participants for each part of the study. Fourth, some participants' data was excluded because they failed to participate in Part 2 or 3 within the time frame required. Fifth, some participants failed to provide necessary information for follow-up contact (e.g., some participants did not provide a working email in Part 1, and therefore could not be sent the survey for Part 3; some students provided the wrong ID number and therefore could not have their Part 1 and 2 results linked properly). Sixth, the enrollment rate of participants was much higher than anticipated and study personnel were not able to keep an accurate/up-to-date account of the study sample. Lastly, the attrition rate was much higher than anticipated; of the 385 participants scheduled to participate in Part 2 of the study, only 220 attended their appointments as scheduled. Of the 466 participants who completed at least one portion of the study (Part(s) 1, 2, and/or 3), 188 completed all three portions of the study (three of which were identified as outliers and removed) leaving a final sample of 185 participants. Despite all of the

aforementioned issues, researchers were still able to attain a final sample that exceeded the recruitment goal suggested by the power analysis.

Of the final sample of 185 participants, 113 (61%) were female, 72 (39%) were male, and none identified as transgendered. Sixty-seven (36%) of participants identified as Asian, 63 (34%) identified as non-Hispanic white, 22 (12%) identified as Hispanic, 15 (8%) identified as African-American/black, 13 (7%) identified as multi-racial, and 5 (3%) identified as “other.” Participants ranged in age from 18 to 26 with a mean age of 18.85 ($SD = 1.27$); 117 were in their first year of college, 35 had completed one year of college, 18 had completed two, 10 had completed three, four had completed four or more, and one participant declined to answer.

Measures and Materials

Symptoms of Depression and Anxiety. The Mini Mood and Anxiety Symptoms Questionnaire (Mini-MASQ; Clark & Watson, 1995) was used to assess symptoms of anxiety and depression. Participants used a 5-point Likert-type scale (1 = not at all to 5 = extremely) to indicate the extent to which they have experienced feelings, sensations and problems related to anxiety and depression during the past week (e.g. “Felt dizzy or lightheaded.”). This scale has demonstrated high internal consistency, good retest reliability, and good construct and predictive validity (Clark & Watson, 1995). Participants completed the Mini-MASQ at Part 1 and Part 3.

BPD symptoms. The Personality Assessment Inventory-Borderline Features Scale (PAI-BOR; Morey, 1991) was used to assess features of borderline personality disorder. Participants used a 4-point Likert-type scale (0 = false to 3 = very true) to indicate how true they feel each of 24 statements apply to them (e.g. “My mood can shift quite suddenly.”). Responses were summed to produce an overall total (ranging from 0 to 72) as well as four six-item subscales:

affective instability, identity problems, self-harm, and negative relationships. However, only the total score was used for primary analyses. This scale has demonstrated high internal consistency, good retest reliability, and good construct and predictive validity (Morey, 1991).

Social Desirability. The Social Desirability Scale-17 (SDS-17; Stober, 2001) was used to assess level of social desirability. Participants responded to 16 true/false questions to indicate whether or not the statements applied to them (e.g. “I sometimes litter.”). This scale has demonstrated high internal consistency, good retest reliability, and good construct and predictive validity (Stober, 2001).

Affective Ratings. Participants completed versions of the post-film questionnaire used in previous studies involving emotionally evocative film clips (Rottenberg, Ray, & Gross, 2007). During their part 1 online survey, participants were asked predict the peak intensity at which they would feel each of 12 emotions following the film clip. They were asked to do so on a Likert-type scale ranging from 1 (not at all/somewhat) to 9 (Extremely/a great deal). Participants were also asked if they predict experiencing any other emotions (absent from the list of 12), and when they did they were asked to identify the emotion and rate the peak intensity they predict on the same scale. Lastly, participants were asked to rate their anticipated overall affect on a pleasantness scale ranging from 1 (unpleasant) to 9 (pleasant). Participants’ retrospective recollection of their affective experience was assessed during an online follow-up questionnaire in part 3 of the study. The affect rating questions were identical to the baseline version with the temporal phrasing adjusted to ask about the past. Participants’ affective states in the lab visit at baseline and post-film viewing were assessed using a paper form identical to the post-film questionnaire (Rottenberg et al., 2007). Participants were asked all of the questions listed above (corrected for appropriate time) as well as two additional questions: one asking if they had seen

the film before and the other asking if they looked away from the screen or closed their eyes during the clip.

Emotionally Evocative Video Clips. Participants watched two video clips validated and used to elicit specific emotions in previous studies (See Rottenberg et al., 2007 for review). The clips for this study were selected based on the strength and specificity of the emotions they elicit based on the results of comprehensive reviews conducted by Hewig and colleagues (2005) and Rottenberg and colleagues (2007). To elicit sadness, we selected a short scene from the film *The Champ* (Lovell & Zeffirelli, 1979), in which a boxer dies in front of his son after being severely wounded in a boxing match. The description provided to participants describes the scene as: “A boxer is lying on a table badly injured from a fight. His young son enters and soon after the boxer/his father dies. The child cries over his father’s body shouting ‘wake up’ and asks other people in the room to wake him up, until another man in the room tells him ‘he’s gone.’” To elicit positive affect (specifically amusement) we selected a clip called “helping hands” from the TV show *Whose Line is it Anyway* (McCarthy, Forrest, Gowers, & de Maraes, 2001), in which two comedians act out a scene with one providing the arms for the other. The description provided to participants describes the scene as: “Two comedians improvise a scene, only one can’t use his own arms and a third comedian provides them for him. The scene is: one comedian is a frustrated customer trying to get through the express checkout at a super market and the other (with someone else’s arms) is the loudmouth busybody cashier.”

Analysis Plan

All analyses were conducted using SPSS 24.0. First, descriptive statistics for all measures of interest were conducted, assumptions of normality and independence were checked,

potential outliers were identified and appropriate removals and transformations were made. To determine if there were any differences between study completers and those with partial data, independent samples t-tests were conducted comparing dropouts to completers on all measures of interest.

Next, we calculated participants' affective change scores by subtracting their post-film affective ratings from their pre-film affective ratings. We also calculated participants' affective forecasting and recall bias scores by subtracting their post-film affective ratings from their predicted/recalled affect. The accuracy of participants' affective forecasts and recollections was assessed by conducting repeated-measures t-tests comparing their forecasted/recalled affect with their actual post-film reported affective states. To determine the relation between symptoms of psychopathology (depression, anxiety, and BPD) and biases in affective forecasts/recollections we examined the extent to which each psychopathology measure correlated with affective forecasts, recollections, actual affective experiences, changes in affect, and forecast and recall biases.

The primary outcome measures of this study, biases in affective forecasts/recollections, were calculated by subtracting their post-clip affective reports from their forecasted/recalled affective states. Scores closer to zero indicate greater accuracy, negative values indicate an over-prediction/recollection (prediction/recall > actual), and positive values indicate an under-prediction/recollection (actual > prediction/recall). A series of hierarchical multiple regression analysis were conducted in order to determine whether forecasting/recall biases could be predicted by BPD symptoms after controlling for potential confounds (depressive symptoms, anxious symptoms, gender, and social desirability). Forecasting/recall biases were entered as the criterion variable; BPD symptoms were entered as the predictor on the first step, then gender,

depressive symptoms, anxious symptoms, and social desirability were entered sequentially in steps two through five. We were also interested in identifying which model was the best fit, as indexed by the adjusted R^2 (aR^2). As exploratory analyses, we conducted a series of mixed model regressions (Raudenbush & Bryk, 2002) with affect ratings as the outcome variable and time, BPD symptoms, and their interaction entered as fixed effect predictor variables.

III. Results

Recruitment & Retention

The final sample included in analyses consisted of 185 participants. A total of 466 students completed at least one part of the study (Part 1, Part 2, and/or Part 3), however only 188 participants completed all three parts of the study while following all other requirements (outlined in the Participants section). Of those 188 completers, three were identified as outliers and were subsequently removed due to implausible responses to the video clips (e.g., decreasing the maximum change possible in happiness following the amusing clip).

Descriptive Analyses

Descriptive statistics for all measures and relevant subscales are displayed in table 1.0. Skew and kurtosis were analyzed, and histograms and Q-Q plots were visually inspected; the data did not violate the assumptions of normality or independence. Study completers did not significantly differ from those with only partial data on any measures (all p -values > 0.05). Of note, there were a total of 36 (19.5%) participants who exceeded suggested clinical cutoff of 36 for the PAI-BOR, indicating that they would likely meet criteria for a diagnosis of BPD.

Next, participants' forecasted, experienced, and recalled affective experiences were analyzed; descriptive statistics of the primary emotions for each clip (sadness for the sad clip and amusement for the amusing clip) are reported in tables 2.1 and 2.2.

The accuracy of participants' predictions/recollections (results from repeated measure t -tests) are displayed in tables 3.1 and 3.2. Participants' biases in all affective forecasts and recollections were statistically significant; their predicted/recalled affective states differed significantly from the affective states they actually experienced following film clip viewings.

While these differences were statistically significant, it should be noted that the discrepancies were all less than 1.3 points (out of a possible 8).

Participants' affective change and bias scores are displayed in tables 4.1 and 4.2. For the sample as a whole, participants showed a pessimistic affective forecasting bias for both film clips. That is, they predicted a worse overall affective state and more sadness than they actually reported experiencing following the sad film clip and predicted a worse overall affective state and less amusement than they actually reported experiencing following the amusing film clip. There were more mixed findings in terms of their affective recollections. Participants tended to recall having experienced a worse overall affective state, and less amusement, than they actually reported experiencing following both the sad and amusing film clips. However, participants tended to recall experiencing less sadness than they actually reported experiencing following the sad film clip.

Psychopathology and Affective Ratings and Biases

Results from the correlation analyses are displayed in tables 5.1 through 5.4. A number of significant correlations were found between BPD symptoms and affective reports, changes, and biases. Specifically, higher levels of BPD symptoms were associated with: worse overall affect following the sad film clip; greater predicted and experienced levels of sadness following the sad film clip; greater increases in levels of sadness following the sad film clip; lower biases in forecasted and recalled levels of sadness following the sad film clip; more positive bias scores in forecasted overall affect and recalled overall affect following the sad film clip (as seen in Figures 1.1 and 1.2) While the correlation coefficients for BPD symptoms are positive, participants with greater BPD symptoms had less negative forecasting bias, and were therefore more accurate

(their scores were closer to zero) than participants with fewer BPD symptoms. BPD symptoms were not, however, related to any affective states, changes, or biases regarding the amusing film clip.

There were also several significant correlations between participants' levels of depression (measured by the Anhedonic Depression subscale of the Mini-MASQ given in Parts 1 and 3) and affective variables. Specifically, higher levels of depressive symptoms (as measured at Part 1) were associated with: greater change in overall affective state following the sad film clip; lower levels of predicted sadness following the sad film clip; less change in sadness following the sad film clip; and less predicted and experienced overall affect and levels of amusement following the amusing film clip. Greater levels of depressive symptoms (measured at Part 3) were associated with: lower levels of recalled sadness following the sad film clip; less bias in recalled level of sadness following the sad film clip; lower recalled overall affective state and levels of amusement following the amusing film clip; and less bias in recalled overall affective state following the amusing film clip.

Higher levels of anxious symptoms (measured at part 3) were only associated with less biased recall of sadness following the sad film clip.

Gender also appears to have been related to participants' affective predictions, recollections, and experiences. Female participants predicted, experienced, and recalled worse overall affect and sadness following the sad film clip than male participants, and recalled those affective states less accurately. Female participants also demonstrated greater bias in their predicted overall affect following the amusing film clip.

Higher levels of social desirability were associated with: worse predicted overall affect in response to the sad film clip; greater levels of recalled sadness in response to the sad film clip;

and greater recall bias regarding sadness in response to the sad film clip. Higher levels of social desirability were also associated with greater recall bias for both overall affect and levels of amusement following the amusing film clip.

Regression Analyses

The results of each of the hierarchical linear regression analyses are presented fully in tables 6.1 through 6.8. Results from the mixed model regressions confirm that of the linear regressions outlined below, but are not described in detail because they do not provide any additional information.

Forecasting Biases for the Sad Film Clip

Participants' bias in the prediction of their overall affective state following the sad film clip was predicted by their level of BPD symptoms throughout all models. Gender was also a significant predictor in all models. The model with the best fit contained only BPD symptoms and gender as predictor variables ($aR^2 = .08$, $F(2,172) = 8.38$, $p < .001$; $\beta_{PAI} = .25$, $t(174) = 3.42$, $p = .001$; $\beta_{Gender} = -.20$, $t(174) = -2.69$, $p < .01$). The model explained 8% of the total variance. For each unit increase in BPD symptoms (an increase of 1 point on the PAI-BOR) there was a 0.25-unit increase in participants' forecasting biases with regard to their predicted overall affect following the sad film clip. However, as can be seen in Figures 1.1 and 1.2, while the betas are positive, as BPD symptoms increased, participants' bias scores crossed over zero on the y-axis, and were actually more accurate in their forecasts. With regard to overall affect following the sad clip, as BPD symptoms increased, forecasting bias decreased. Female participants, compared to

male participants, demonstrated 0.2-units less bias in their predicted overall affect following the sad film clip.

Participants' bias in the predicted level of sadness following the sad film clip was predicted by their level of BPD symptoms ($aR^2 = .02$, $F(1,183) = 4.49$, $p < .05$; $\beta_{PAI} = -.16$, $t(184) = -2.12$, $p = .05$), however, all models with additional predictor variables failed to reach significance. The model explains 2% of the total variance indicating that for each unit increase in BPD symptoms there was a 0.16 decrease in participants' forecasting biases in their predicted level of sadness following the sad film clip. With regards to sadness following the sad clip, as BPD symptoms increased, forecasting bias decreased.

Forecasting Biases for the Amusing Film Clip

Participants' bias in the prediction of their overall affective state following the amusing film clip was not predicted by their level of BPD symptoms. However, gender and social desirability were significant predictors in the best fitting model, which contained all predictor variables ($aR^2 = .04$, $F(5,175) = 2.55$, $p < .05$; $\beta_{Gender} = -.21$, $t(175) = -2.74$, $p < .01$; $\beta_{SDS} = .17$, $t(175) = 2.20$, $p < .05$). The model explained 4% of the total variance; for each unit increase in social desirability there was a 0.17-unit increase in participants' forecasting bias in their predicted overall affect following the amusing film clip. Female participants demonstrated a 0.21-unit greater forecasting bias in their predicted overall affect following the amusing film clip, compared to male participants.

Participants' bias in the predicted levels of amusement following the amusing film clip was not predicted by their BPD symptoms or any of the other variables—no models reached significance.

Recall Biases for the Sad Film Clip

Participants' bias in the recollection of their overall affective state following the sad film clip was predicted by their level of BPD symptoms throughout all models. Gender was also a significant predictor in all models. The model with the best fit contained only BPD symptoms and gender as predictor variables ($aR^2 = .05$, $F(2,176) = 5.47$, $p < .01$; $\beta_{PAI} = .21$, $t(178) = 2.51$, $p < .01$; $\beta_{Gender} = -.16$, $t(178) = -2.00$, $p < .05$). The model explained 5% of the total variance. For each unit increase in BPD symptoms there was a 0.21-unit increase in participants' recall bias regarding overall affective state following the sad film clip (but again crossing over zero on the x-axis). With regard to overall affect following the sad clip, as BPD symptoms increased, recall bias decreased. Female participants demonstrated a 0.16-unit greater bias in their recall bias regarding overall affective state following the sad film clip, compared to male participants.

Participants' bias in their recalled level of sadness following the sad film clip was significantly predicted by their level of BPD symptoms throughout all models. Additionally, participants' level of depressive symptoms at Part 3 was also a significant predictor in all models containing it. The model with the best fit contained all predictor variables ($aR^2 = .13$, $F(5,178) = 6.46$, $p < .001$; $\beta_{PAI} = -.23$, $t(183) = -2.85$, $p < .01$; $\beta_{MASQ-AD} = -.20$, $t(183) = -2.87$, $p < .05$). The model explained 13% of the total variance. For each unit increase in BPD symptoms, there was a 0.23-unit decrease in participants' recall bias regarding their recalled level of sadness following the sad film clip. For each unit increase in depressive symptoms, there was a 0.20-unit decrease in participants' recall bias regarding their recalled level of sadness following the sad film clip. With regards to sadness following the sad clip, as BPD symptoms increased, recall bias decreased.

Recall Biases for the Amusing Film Clip

Neither participants' bias in their recollection of their overall affective state nor their bias in their recalled level of amusement following the amusing film clip was predicted by their BPD symptoms or any of the other variables—no models reached significance.

IV. Discussion

Affective instability is considered to be among the defining features of BPD, playing a central role in the development and maintenance of the disorder (Linehan, 1993; Links et al., 2007; Skodol et al., 2002; Stepp et al., 2013). Despite its importance, there is still much to be understood regarding the factors contributing to and maintaining affective instability in BPD. Disorder specific biases in affective forecasting/recollection are one such domain, with limited research and the potential to elucidate potential sources of affective instability specific to BPD.

This study represents the first attempt to investigate the relation between affective forecasting/recall biases and BPD symptoms. We calculated participants' biases by comparing their forecasts/recollections to their actual reports following two emotionally evocative film clips. We then examined the relationship between said biases and their level of BPD symptoms to determine if and how individuals with BPD may experience a specific pattern of affective biases.

As a whole, participants exhibited statistically significant biases in their affective forecasts and recollections for both film clips. Participants predicted that they would experience more sadness, less amusement, and worse [less pleasant] overall affect than they actually experienced following both the sad and amusing film clips. Participants also recalled worse overall affect and less amusement than they actually experienced following the amusing film clip. Participants recalled worse overall affect than they actually experienced following the sad film clip. However, participants recalled less sadness than they actually experienced following the sad film clip. While statistically significant, the differences between participants' forecasted/recalled and experienced affect was relatively small (discrepancies were <1.4 out of a possible 8 points). The degree of discrepancies/biases in our study were similar to those of some

previous studies on affective forecasting in samples of non-clinical undergraduate populations (Hoerger, 2012; Kwong, Wong, & Tang, 2013) but smaller than others (Dunn, Brackett, Ashton-James, Schneiderman, & Salovey, 2007), which have reported biases of up to 3.08 points. To date, no research has investigated the influence the magnitude of forecasting biases has on outcomes of interest (i.e., decisions and behaviors). Without such research, the real world implications of affective biases remain unclear.

Counter to our hypotheses regarding BPD symptoms and affective biases relating to the sad film clip, individuals with higher levels of BPD symptoms were *more* accurate in their predicted and recalled levels of sadness and overall affect. Participants with more BPD symptoms were also more affected by the sad film clip—reporting worse overall affect and more sadness following the sad film clip. It is possible that individuals with more BPD symptoms pay more attention to their negative affective experiences because they have different (more intense) experiences than those of their peers. And an increased amount of attention paid to these experiences could contribute to an increased accuracy in their prediction and recall of them.

Our hypotheses regarding affective biases in relation to positive emotions were not supported either; BPD symptoms were not related to forecasting or recall biases for the amusing film clip. This could be because BPD symptoms are unrelated to differences in positive affective experiences—a domain in which there is limited research. If it is the differences from peers in their affective experiences that lead them to greater attention and therefore more accurate forecasts/recollections, then the comparable affective biases related to positive affect would also make sense since their experiences were similar to that of their peers.

While contrary to our hypotheses, the results of the present study are not counter to other major theories regarding affective experiences and BPD symptoms; the biosocial theory of BPD

(Linehan, 1993) states that individuals with BPD have more frequent, more intense, and longer lasting emotional experiences. Additionally, if individuals with BPD are more accurately aware that they will experience more intense negative affect in response to aversive stimuli, they may be more likely to avoid situations that evoke negative emotions—thereby contributing to their increased propensity towards experiential avoidance. If this pattern of affective biases can be replicated in clinical populations, then this would indicate that the affective problems in BPD are not an issue of accuracy, but rather an issue of experience. If that is the case, then treatments for BPD may benefit from shifting targets—focusing more on increasing emotion regulation and distress tolerance skills rather than modifying cognitions.

Limitations and Future Directions

While the results from this study provide some important information about affective biases in the context of BPD, there are several limitations that restrict the conclusions that can be drawn. First, we used a non-clinical undergraduate sample, so results will need to be replicated in a full BPD sample before any conclusions can be extended to the clinical population.

Additionally, further research will be required to determine if the limited variability and magnitude of the affective biases seen in the sample reflect genuine general accuracy in affective forecasts and recollections or are a function of measurement issues. If it is the latter, the restricted range of individual differences in affective biases may have masked the actual relationships among variables. Future studies with improved affective measures may reveal a different pattern of biases in relation to psychopathology variables.

The lack of any behavioral components of the study's paradigm, coupled with the restricted magnitude of participants' affective biases, make it difficult to determine the impact

affective biases would have on individuals' day-to-day lives. A number of design modifications could improve the external validity of future studies on affective biases. One issue with the present study's design may have been the chosen emotional elicitation, film clips. The emotions elicited by the clips may have been obvious to participants, thereby improving forecasting and recall accuracies by reducing the opportunity for sources of biases (misconstrual, immune neglect, focalism, etc.). Individuals are able more accurately predict and recall their emotions when the affective states were less complex (Wilson and Gilbert, 2003). Future studies would benefit from the use of less obvious, more complex, and/or more naturalistic emotional elicitations—particularly ones that prompt emotions that are particularly difficult for individuals with BPD. For example, an EMA design similar to that of Wenze and colleagues (2013), in which participants make predict/report the events and emotions actually experienced in their real lives. Alternately, future studies could use more behavioral paradigms to elicit naturalistic, complex, and BPD specific emotions (e.g. shame or anger). Tasks involving exclusion (e.g. cyberball; Williams & Jarvis, 2006), aggression, and/or invalidation (Herr, Jones, Cohn, & Webber, 2015) could be ideal for this purpose.

Conclusions

This study sought to advance our understanding of the phenomenology of BPD, examining specific patterns of affective forecasting and recall biases related to BPD symptoms. It represents the first laboratory-based study to examine affective forecasting/recall biases in the context of psychopathology. Furthermore, it is the first study to examine affective biases related to BPD symptoms. In the present sample, participants' BPD symptoms were positively associated with more accurate (less biased) affective forecasts and recollections regarding

negatively valenced emotions (the sad film clip). However, BPD symptoms were unrelated to biases regarding positively valenced emotions (the amusing film clip). Results from the study support theories that BPD symptoms are related to greater reactivity to negative stimuli (Linehan, 1993). While BPD symptoms were also related to affective forecasting/recall biases, individuals with more BPD symptoms demonstrated less bias in their forecasted and recalled affective states following the sad film clip—counter to our hypothesized results. While conclusions are tentative given the limitations of the study, they seem to indicate that BPD symptoms are uniquely related to affective biases and warrant further research. Furthermore, this study indicates that symptom-specific patterns of forecasting/recall bias can be studied with a laboratory-based paradigm, though they may be smaller in magnitude than those observed in more naturalistic paradigms—potentially requiring larger and/or more varied samples. If the observed patterns of biases are replicated in subsequent research, they may indicate that since BPD symptoms are related to more intense negative affective experiences and a more accurate prediction of them, clinicians treating individuals with BPD, or elevated BPD symptoms, might want to focus less on cognitive modification and more on teaching effective emotion regulation and stress tolerance skills.

Section V: Acknowledgment of Previous Publications

Carson-Wong, A., Hughes, C.D., Rizvi, S.L. (2016). The Effect of Therapist Use of Validation Strategies on Change in Client Emotion in Individual DBT Treatment Sessions.

Manuscript submitted for publication.

Hughes, C.D., Gunthert, K., Wenzel, S., & German, R. (2015). The Affective Control Scale Specificity: Subscale Distinction and Ecological Validity of Feared Emotions. *Motivation and Emotion*, 39(6), 984-992.

Rizvi, S.L., Hughes, C.D., Oliveira, P., & Hittman, A. (2016). Can DBT Be Successfully Implemented in a Psychology Training Clinic? Results from the DBT Clinic at Rutgers University. Manuscript submitted for submission.

Rizvi, S.L., Hughes, C.D., Thomas, M.C. (2016). The DBT Coach Mobile Application as an Adjunct to Treatment for Suicidal and Self-Injuring Individuals with Borderline Personality Disorder: A Preliminary Evaluation and Challenges to Client Utilization. *Psychological Services*, 13(4), 380.

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Table 1.0

Pathology Measures Descriptive Statistics (n=185)

| Measure | Range | Mean | SD | α |
|--|-------|-------|-------|----------|
| PAI-BOR Total | 5-59 | 27.82 | 11.86 | .89 |
| MASQ-Anxiety (Part 1) | 10-44 | 16.79 | 6.90 | .86 |
| MASQ- Depression (Part 1) | 8-38 | 21.52 | 6.39 | .85 |
| MASQ-Anxiety (Part 3) | 10-36 | 14.90 | 5.63 | .85 |
| MASQ-Depression (Part 3) | 8-38 | 22.76 | 6.15 | .83 |
| SDS | 11-26 | 19.46 | 2.95 | .96 |
| PAI-BOR=Personality Assessment Inventory-Borderline Personality Disorder Subscale; MASQ=Mini-Mood and Anxiety Symptoms Questionnaire; SDS=Social Desirability Scale | | | | |

Table 6.1

Regression Analyses for Sad Clip Overall Affect Forecasting Bias

| | Model 1 | | | Model 2 | | | | Model 3 | | | | Model 4 | | | | Model 5 | | | |
|---------|---------|--------|-----------------|---------|---------|-----------------|--------------------------|---------|---------|-----------------|--------------------------|---------|---------|-----------------|--------------------------|---------|---------|-----------------|--------------------------|
| | β | t | aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² |
| PAI-BOR | .23 | 3.03** | .05** | .25 | 3.42** | | | .26 | 3.38** | | | .3 | 3.45** | | | .30 | 3.39** | | |
| Gender | | | | -.20 | -2.69** | .08** | .04 | -.20 | -2.67** | | | -.21 | -2.77** | | | .20 | -2.70** | | |
| MASQ-AD | | | | | | | | -.03 | -0.40 | .07** | <.01 | -.03 | -0.39 | | | -.03 | -0.41 | | |
| MASQ-AA | | | | | | | | | | | | -.08 | -0.98 | .07** | <.01 | -.08 | -1.00 | | |
| SDS | | | | | | | | | | | | | | | | -.04 | -0.49 | .07** | <.01 |

*= $p < 0.05$; **= $p < 0.01$; PAI-BOR=Personality Assessment Inventory-Borderline Personality Disorder Subscale; MASQ=Mini-Mood and Anxiety Symptoms Questionnaire; SDS=Social

Desirability Scale

Table 6.2

Regression Analyses for Sad Clip Sadness Forecasting Bias

| | Model 1 | | | Model 2 | | | | Model 3 | | | | Model 4 | | | | Model 5 | | | |
|---------|---------|--------|-----------------|---------|---|-----------------|--------------------------|---------|---|-----------------|--------------------------|---------|---|-----------------|--------------------------|---------|---|-----------------|--------------------------|
| | β | t | aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² |
| PAI-BOR | -.16 | -2.12* | .02* | | | | | | | | | | | | | | | | |
| Gender | | | | | | .01 | <.01 | | | | | | | | | | | | |
| MASQ-AD | | | | | | | | | | .01 | <.01 | | | | | | | | |
| MASQ-AA | | | | | | | | | | | | | | .01 | <.01 | | | | |
| SDS | | | | | | | | | | | | | | | | | | <.01 | <.01 |

*=p<0.05; **=p<0.01; PAI-BOR=Personality Assessment Inventory-Borderline Personality Disorder Subscale; MASQ=Mini-Mood and Anxiety Symptoms Questionnaire; SDS=Social Desirability Scale

Table 6.3

Regression Analyses for Amusing Clip Overall Affect Forecasting Bias

| | Model 1 | | | Model 2 | | | | Model 3 | | | | Model 4 | | | | Model 5 | | | |
|---------|---------|---|-----------------|---------|--------|-----------------|--------------------------|---------|---|-----------------|--------------------------|---------|---|-----------------|--------------------------|---------|---------|-----------------|--------------------------|
| | β | t | aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² |
| PAI-BOR | | | -.01 | .10 | 1.28 | | | | | | | | | | | .14 | 1.53 | | |
| Gender | | | | -.19 | -2.55* | .03* | .04 | | | | | | | | | -.21 | -2.74** | | |
| MASQ-AD | | | | | | | | | | .03 | <.01 | | | | | -.04 | -0.53 | | |
| MASQ-AA | | | | | | | | | | | | | | .02 | <.01 | -.01 | -0.12 | | |
| SDS | | | | | | | | | | | | | | | | .17 | 2.20* | .04* | .03 |

*=p<0.05; **=p<0.01; PAI-BOR=Personality Assessment Inventory-Borderline Personality Disorder Subscale; MASQ=Mini-Mood and Anxiety Symptoms Questionnaire; SDS=Social Desirability Scale

Table 6.5

Regression Analyses for Sad Clip Overall Affect Recall Bias

| | Model 1 | | | Model 2 | | | | Model 3 | | | | Model 4 | | | | Model 5 | | | |
|---------|---------|-------|-----------------|---------|--------|-----------------|--------------------------|---------|--------|-----------------|--------------------------|---------|-------|-----------------|--------------------------|---------|--------|-----------------|--------------------------|
| | β | t | aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² |
| PAI-BOR | .19 | 2.54* | .03* | .21 | 2.82** | | | .19 | 2.51* | | | .21 | 2.48* | | | .22 | 2.52* | | |
| Gender | | | | -.16 | -2.09* | .05** | .02 | -.15 | -2.00* | | | -.15 | -1.96 | | | -.15 | -2.02* | | |
| MASQ-AD | | | | | | | | .07 | 0.98 | .05** | <.01 | .07 | 0.93 | | | .07 | 0.92 | | |
| MASQ-AA | | | | | | | | | | | | -.04 | -0.51 | 0.04* | <.01 | -.04 | -0.46 | | |
| SDS | | | | | | | | | | | | | | | | 0.05 | 0.67 | .04* | <.01 |

*= $p < 0.05$; **= $p < 0.01$; PAI-BOR=Personality Assessment Inventory-Borderline Personality Disorder Subscale; MASQ=Mini-Mood and Anxiety Symptoms Questionnaire; SDS=Social

Desirability Scale

Table 6.6

Regression Analyses for Sad Clip Sadness Recall Bias

| | Model 1 | | | Model 2 | | | | Model 3 | | | | Model 4 | | | | Model 5 | | | |
|---------|---------|---------|-----------------|---------|---------|-----------------|--------------------------|---------|---------|-----------------|--------------------------|---------|---------|-----------------|--------------------------|---------|---------|-----------------|--------------------------|
| | β | t | aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² | β | t | aR ² | Δ aR ² |
| PAI-BOR | -.31 | -4.40** | .09** | -.32 | -4.51** | | | -.28 | -3.83** | | | -.24 | -2.98** | | | -.23 | -2.85** | | |
| Gender | | | | .08 | 1.08 | .09** | <.01 | .06 | 0.86 | | | .06 | 0.91 | | | .05 | 0.76 | | |
| MASQ-AD | | | | | | | | -.20 | -2.75** | .12** | .04 | -.20 | -2.83** | | | -.20 | -2.87** | | |
| MASQ-AA | | | | | | | | | | | | -.08 | -1.01 | .12** | <.01 | -.07 | -0.91 | | |
| SDS | | | | | | | | | | | | | | | | .10 | 1.49 | .13** | .01 |

*=p<0.05; **=p<0.01; PAI-BOR=Personality Assessment Inventory-Borderline Personality Disorder Subscale; MASQ=Mini-Mood and Anxiety Symptoms Questionnaire; SDS=Social

Desirability Scale

Figure 1.1

Scatter Plot: Forecasting Biases Sad Clip Overall Affect

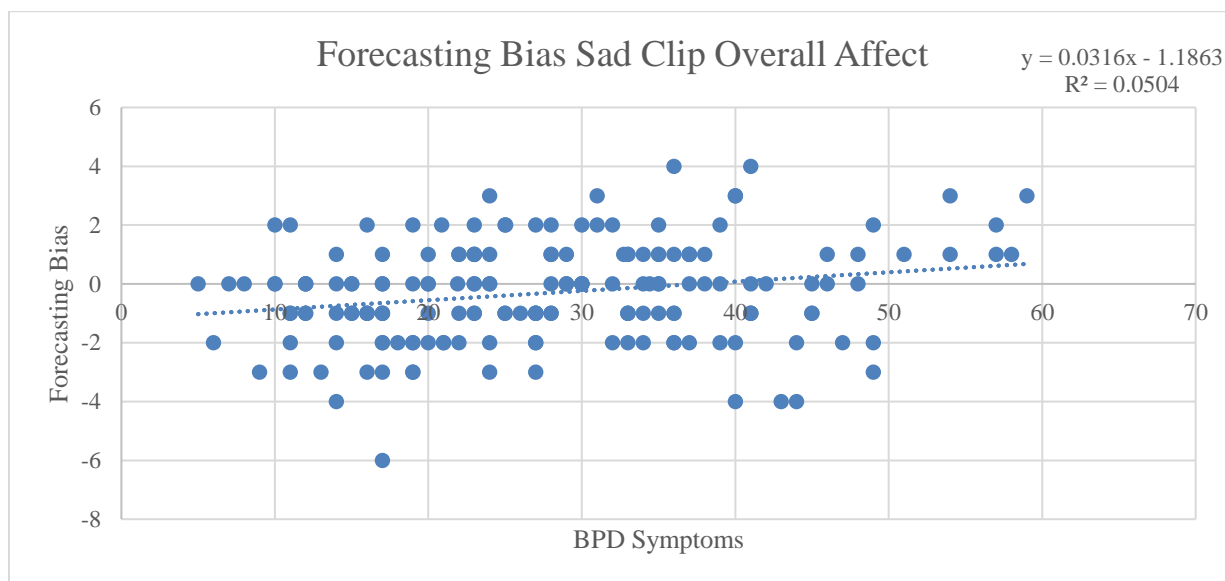
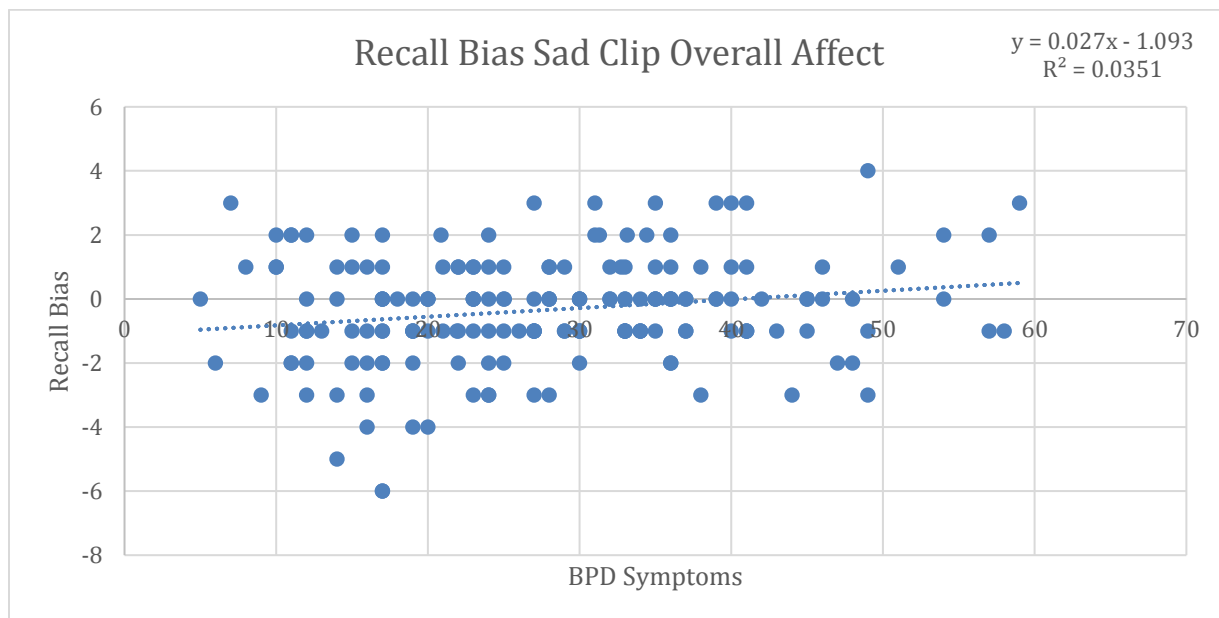


Figure 1.2

Scatter Plot: Recall Biases Sad Clip Overall Affect



Appendix 1: Pre Film Questionnaire

ID: _____

Date: _____

Timepoint _____

PRE FILM QUESTIONNAIREThe following questions refer to how you *feel right now*.

| | | | | | | | | |
|-------------------------|---|---|---|-------------------|---|---|---|----------------------------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Not at all/ somewhat | | | | Somewhat/ some | | | | Extremely/ a great deal |

Using the scale above, please indicate the greatest amount of EACH emotion you are currently experiencing.

____ amusement
 ____ anger
 ____ anxiety
 ____ disgust

____ fear
 ____ guilt
 ____ happiness
 ____ boredom

____ sadness
 ____ shame
 ____ surprise
 ____ interest

Do you feel any other emotions at this moment? O No O Yes

If so, what was the emotion? _____

How much of this emotion did you feel? _____

Please use the following pleasantness scale to rate the feelings you currently have. Circle your answer:

| | | | | | | | | |
|------------|---|---|---|---------|---|---|---|----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| unpleasant | | | | neutral | | | | pleasant |

Timepoint_____

The following questions refer to how you *felt while watching the film.*

Using the scale above, please indicate the greatest amount of EACH emotion you experienced while watching the film.

___ sadness
___ shame
___ surprise
interest

How much of this emotion did you feel? _____

| | | | | | | | | |
|------------|---|---|---|---------|---|---|---|----------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| unpleasant | | | | neutral | | | | pleasant |

How seriously did you take the video watching task?

| | | | | | | | | |
|------------|---|---|---|---|---|---|---|----------------|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Not at all | | | | | | | | Very seriously |