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FACIAL EMOTION RECOGNITION ABILITIES IN INDIVIDUALS WITH TRAITS  
OF BORDERLINE AND NARCISSISTIC PERSONALITY DISORDERS

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## ABSTRACT

Borderline personality disorder (BPD) is a chronic and debilitating disorder characterized by chaotic interpersonal relationships, poor impulse control, angry outbursts, and frequent self-injurious or suicidal behavior (Skodol et al., 2002). BPD has also been associated with social cognitive deficits (Levy et al., 2006a; Levy, 2005) that are thought to contribute to difficulties regulating emotions (Herpertz et al., 1997). Narcissistic personality disorder (NPD) is characterized by a grandiose sense of self-importance and entitlement, preoccupation with fantasies of an idealized self, exploitation of others for personal gain, a need for excessive admiration, and haughty or arrogant behavior (American Psychiatric Association, 2000). NPD has also been associated with social cognitive deficits (Levy, 2012; Meyer, Levy, & Scala, 2012), particularly with regard to emotional empathy (Ritter et al., 2011) and facial emotion recognition abilities (Marissen, Deen, & Franken, 2012). BPD is highly comorbid with NPD, with approximately 39% of BPD patients also meeting DSM-IV criteria for NPD (Grant et al., 2008). However, little is known about the combined effect of comorbid BPD and NPD on social cognition. Given that social cognitive deficits have been observed in both disorders, it is suspected that these deficits may be exacerbated when both BPD and NPD are present. The present study compared the mental state decoding abilities of individuals with traits of both BPD and pathological narcissism (high-BPD-NPD) versus those who only have traits of BPD (high-BPD) or NPD (high-NPD), using the revised Reading the Mind in the Eyes task (RME; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003), and the Pathological Narcissism Inventory (PNI; Pincus et al., 2009). Compared to participants in the high-BPD group, those in the high-BPD-NPD group had significantly lower accuracy on the RME task for neutral faces but not positive or negative faces. This finding suggests that deficits in mental state

decoding abilities may be particularly pronounced for individuals who have high levels of NPD and BPD traits when interpreting ambiguous/neutral social cues. Future research should be directed at examining these processes in clinical populations of individuals with BPD and NPD to confirm the generalizability of these findings.

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## **Chapter 1**

### **Introduction**

#### **Borderline Personality Disorder and Emotion Recognition**

Borderline personality disorder (BPD) is a severe and prevalent psychiatric condition characterized by affective instability, identity diffusion, poor impulse control, unstable/chaotic interpersonal relationships, angry outbursts, frequent non-suicidal and suicidal self-injury, and high suicidality. Epidemiological studies place BPD prevalence rates at around 6% for the general adult population (Grant et al., 2008), 10-15% for psychiatric outpatients (Levy et al., 2006a), and as high as 20% for psychiatric inpatients (Levy et al., 2006a). BPD is highly comorbid for a variety of other psychiatric disorders, especially substance use disorders, major depression, anxiety disorders, and other severe personality disorders (Grant et al., 2008). Individuals with BPD are frequently hospitalized due to self-injurious behavior and suicide attempts and heavily utilize both inpatient and outpatient psychiatric care. Individuals with borderline personality disorder experience significant impairments in general functioning. Unemployment rates among BPD patients are extremely high, and even those patients who do retain jobs are often underemployed with respect to their level education, training history, and socioeconomic status (Levy et al., 2006a).

Emotion dysregulation is one of the most prominent and enduring features of BPD, especially in the context of interpersonal interactions. Observations of the tendency for real or imagined events in interpersonal relationships to precede BPD patients' unregulated affective states have led clinicians and researchers to suggest that impaired social cognitive abilities are a core mechanism underlying the development and maintenance of BPD. A reduced ability to

accurately perceive the mental and emotional states of others through facial expressions is one example of social-cognitive dysfunction that researchers and clinicians believe may be present in BPD. The ability to accurately recognize emotional states based on human facial features allows individuals to better predict others' behaviors and intentions, have appropriate emotional reactions, and regulate their emotional states in social contexts. An inability to accurately recognize emotions in the faces of others, then, could likely trigger extreme emotional reactions in BPD patients, leading to interpersonal conflict and aggression, relationship difficulties, impulsive actions, and self-destructive behaviors (Scott, Levy, Adams Jr., & Stevenson, 2011). Several studies of facial emotion recognition abilities in BPD patients and BPD analogues have already been conducted, with largely conflicting results.

Lynch and colleagues (2006) administered the Multimorph Facial Affect Recognition Task (MFAR; Blair, Colledge, Murray, & Mitchell, 2001) to 20 patients with BPD and 20 healthy control subjects matched for age and gender; the researchers found that the BPD patients demonstrated significantly lower intensity thresholds for identifying emotions in facial expressions across all basic emotion categories (anger, disgust, sadness, fear, surprise, and happiness), suggesting that individuals with BPD possess heightened sensitivity to emotional expressions. Similarly, Domes and et al. (2008) administered the MFAR to 25 BPD patients and 25 healthy control subjects (matched for gender, age, education history, and IQ), finding that the BPD patients demonstrated intensity thresholds for emotion detection that were comparable to those of the healthy control group; however, the BPD patients did show more errors in their actual choices of which emotion was being expressed, particularly for surprised expressions. In the same (2008) study, Domes and colleagues also administered a task that required the participants to identify emotions in several series of emotionally ambiguous expressions (achieved by mixing two different expressions together at varying intensities) and found that the

BPD patients were more likely to respond with “anger” for both anger-disgust combinations and anger-happiness combinations.

Dyck et al. (2009) administered two different facial emotion recognition tasks -- the Fear Anger Neutral Test (FAN; Gur et al., 2002; Schneider et al., 2006) and the Emotion Recognition Test (ER; Kohler et al., 2004) to a group of 19 BPD patients and a group of 19 healthy control subjects (matched for gender, age, and education history). They found that when required to discriminate negative and neutral facial expressions quickly (as in the FAN), BPD patients demonstrated deficits in emotion recognition abilities and -- consistent with Domes et al.'s (2008) findings -- a tendency to attribute negative emotions to neutral facial expressions; when given an unrestricted amount of time to process facial expressions (as in the ER), however, the BPD patients performed just as well as the healthy control group.

Fertuck et al. (2009) and Preißler et al. (2010) both used the Reading the Mind in the Eyes Task (RME; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) to test facial emotion recognition abilities in patients with borderline personality disorder, but with differing results. Fertuck and colleagues (2009) compared 30 BPD patients and 25 healthy control subjects (matched for race, age, and education history) and found that the BPD group performed significantly better than the healthy control group on the RME, for both neutral emotion valences and overall score. Interestingly, Preißler and colleagues (2010) used a similar set up and found no significant differences in RME performance between their 64 BPD patients and 38 healthy control subjects. However, they also administered the purportedly more sensitive Movie for the Assessment of Social Cognition (MASC; Dziobek et al., 2006) to their participants and found that, compared to the healthy controls, the BPD group demonstrated significantly impaired recognition of others' emotions, thoughts, and intentions.

Scott et al. (2011) also used the RME to assess facial emotion recognition abilities, but not with actually diagnosed BPD patients. Instead, Scott and colleagues screened 242

undergraduate university students with the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003) and formed a group of 38 BPD analogues and a group of 46 low-trait control participants based on scores. Compared to the control group, the BPD analogue group demonstrated enhanced accuracy for expressions of negative emotion but no differences for positive or neutral expressions; consistent with earlier studies, however, the BPD analogue group did demonstrate a tendency to choose negative emotions when presented with neutral expressions.

Clearly, individuals with BPD do exhibit some level of difficulty with facial emotion recognition. While findings across these studies differ with respect to demonstrated enhancements or impairments in emotion recognition abilities, common observations were the increased sensitivity to expressions of negative emotions and the tendency for BPD patients to attribute negative emotions to benign or neutral expressions.

### **Narcissistic Personality Disorder, Empathy, and Emotion Recognition**

Narcissistic personality disorder (NPD) is a severe psychiatric condition characterized by an exaggerated sense of self-importance, manipulation of others for personal gain or maintenance of inflated self-image, a need for excessive admiration or praise, and an inability to empathize with the feelings of others. NPD is one of several personality disorders that is highly comorbid with borderline personality disorder, with roughly 39% of BPD patients also meeting criteria for NPD (Grant et al., 2008). While individuals with NPD are often able to maintain high levels of functioning everyday life and may even possess characteristics that promote success in certain careers, their interpersonal relationships suffer greatly due to their difficulties with relating emotionally to others.

A lack of empathy in patients with NPD has been extensively discussed in both conceptual and clinical fashions, but little empirical investigation in this area has been conducted, with the few studies that have been conducted producing conflicting results. Although empathy is often measured using self-report questionnaires (Davis, 1983; Baron-Cohen & Wheelwright, 2004), clinicians and researchers have noted that self-report methods are very vulnerable to social desirability bias, which understandably could be a severe detriment when attempting to study empathy in patients with NPD (Ronningstam, 2009). As a result, facial emotion recognition tasks are a viable alternative, given the close relationship between emotion recognition abilities and empathy (Martin, Berry, Dobranski, Horne, & Dodgson, 1996; Gery, Miljkovitch, Berthoz, & Soussignan, 2009; Besel & Yuille, 2010).

Ritter et al. (2010) administered the Multifaceted Empathy Test (MET; Dziobek et al., 2008) and the MASC to 47 NPD patients, 53 healthy control subjects, and 27 BPD patients and found that the NPD patient group demonstrated significant impairments in emotional empathy, but not cognitive empathy, compared to the other two groups. Emotional empathy (Mehrabian & Epstein, 1972; Eisenberg & Miller, 1987) refers to an individual's emotional response to another person's emotional state, while cognitive empathy (Baron-Cohen and Wheelwright, 2004) refers to an individual's ability to take another person's perspective and mentally represent the mental and emotional states of others. Marissen, Deen, & Franken (2012) administered a self-report measure of empathy (the Interpersonal Reactivity Index [IRI]; Davis, 1983) and a facial emotion recognition task based on Eckman & Friesen's Pictures of Facial Affect to 20 patients with NPD, 20 patients with a Cluster C personality disorder, and 20 healthy control subjects. The NPD group showed no significant differences in their responses on the self-report measure but demonstrated severe impairment on the facial recognition task, particularly for fearful and disgusted facial expressions.

### **The Present Study**

While these are the only two studies that have actually examined empathy in patients with narcissistic personality disorder, they suggest that patients with NPD do lack certain empathic abilities and that these deficits may be related to impairments in facial emotion recognition. Given these findings, the emotion recognition difficulties demonstrated in BPD patients, and the high rates of co-occurrence between BPD and NPD, we believe it is important to study emotion recognition abilities in individuals with comorbid BPD and NPD diagnoses. No studies have addressed this question as of yet. Research in this area could highly benefit our understanding of these two personality disorders, how they interact when present in the same individual, and how we approach treatment.

The present study set out to compare facial emotion recognition abilities in individuals with comorbid characteristics of BPD and NPD to individuals with only characteristics of BPD and only characteristics of NPD. We hypothesized that individuals with both BPD and NPD traits would demonstrate impairments in facial emotion recognition abilities.

## **Chapter 2**

### **Methods**

#### **Participants**

For the purposes of the study, 258 undergraduate Penn State students aged 18-39 years ( $M=19.2$ ,  $SD=2.51$ ) were recruited from a pool of PSYCH 100 and PSYCH 105 sections in exchange for credit toward their research participation requirement. Participants were administered the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003) and the Pathological Narcissism Inventory (PNI; Pincus et al., 2009) during the experimental procedure and were sorted into three groups -- a high-NPD group ( $n=15$ ), a high-BPD group ( $n=34$ ), and a high-BPD-NPD group ( $n=24$ ) -- based on their scores on the MSI-BPD and the PNI, using a cut-off point of one standard deviation above the mean score for each measure.

In the finalized sample of 73 participants, there were 23 males and 50 females, aged 18-32 years ( $M=19.27$ ,  $SD=2.43$ ). Approximately 63% identified as Caucasian, while 37% identified as non-Caucasian (African-American, Asian/Pacific Islander, Hispanic/Latino, etc.). A one-way analysis of variance revealed no significant differences in average age among the three participant groups, and chi-square analyses showed no significant differences in gender ratio or racial/ethnic distribution. Table 1 displays demographic and clinical characteristics for all three groups.

## Measures

To measure mental state decoding abilities, we used a computerized version of the revised Reading the Mind in the Eyes Task (RME; Baron-Cohen et al., 2001). In the RME, the participant is shown a series of 36 images of the eye regions of the faces of different actors and actresses; each image is presented along with four word choices (one correct answer and three foils), and the participant must select which word he or she thinks best describes what the person in the image is thinking or feeling. Because the RME was developed based on consensus ratings instead of coding systems and is significantly more challenging than other facial emotion recognition tasks, it is highly sensitive to subtle differences in mental state decoding abilities without being at risk for floor or ceiling effects (Scott et al., 2011).

In our version of the task, the 36 images were shown in a randomized order and were divided into three valence categories—positive (9), negative (10), and neutral (17)—based on pilot data from a previous study (Scott et al., 2011). Each image was sized 15cm × 6 cm, with the four word choices positioned at the four numbered corners of the image. Participants entered their responses by pressing the number key (1, 2, 3, or 4) corresponding to each selection. Responses and response times in milliseconds were recorded automatically by the computer.

To measure participants' levels of BPD traits (i.e. BPD symptom severity), we used the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003). The original version of the screener is a 10-item, self-report, yes/no questionnaire designed to test for features of DSM-IV BPD and has demonstrated strong predictive validity, diagnostic efficiency, and reliability (Zanarini et al., 2003). For the purposes of our study, we made modifications to the original screener. Items were rewritten as declarative statements in the first person, and certain items from the original screener were broken up into multiple items for more precise measurement; for example, the original item “Have you felt very angry a lot of the time?”

How about often acted in an angry or sarcastic manner?” became “I have felt very angry a lot of the time” and “I have often acted in an angry or sarcastic manner”. Instead of choosing “Yes” or “No” for each item, participants used a 0-3 response scale, with 0 labeled as “False, not at all true” and 3 labeled as “Very true”.

To measure participants’ levels of pathological narcissism or NPD traits, we used the Pathological Narcissism Inventory (PNI; Pincus et al., 2009). The PNI is a 52-item self-report measure comprised of seven subscales: contingent self-esteem (CSE), exploitativeness (EXP), self-sacrificing self-enhancement (SSSE), hiding the self (HS), grandiose fantasy (GF), devaluing (DEV), and entitlement rage (ER). Participants respond using a seven-point Likert-type scale, with 0 labeled as “Not At All Like Me” and 6 labeled as “Very Much Like Me”; items are written as declarative statements in the first person. The EXP, SSSE, and GF subscales determine the participant’s narcissistic grandiosity (GRAND) score, while the CSE, HS, DEV, and ER subscales determine the narcissistic vulnerability (VULN) score.

### **Procedure**

Participants arrived in the lab space in groups of two to five and were seated by a proctor (typically one of the lab’s undergraduate research assistants) at separate private computer stations, administered Informed Consent forms, and given verbal instructions for the experiment. The participants then completed a series of self-report questionnaires (Demographics, the STAI, and the PANAS), followed by the MSI-BPD, the PNI, and the RME task. Following completion of the procedure, the participants were thanked and debriefed by the proctor. The procedure and consent forms were approved by the university’s Office of Research Protections.

## Chapter 3

### Results

We set out to compare facial emotion recognition abilities in individuals with characteristics of both borderline personality disorder and narcissistic personality disorder to those with only BPD traits and only NPD traits. We used the McLean Screening Instrument for Borderline Personality Disorder and the Pathological Narcissism Inventory to determine participant levels of BPD and NPD traits, respectively, and the revised version of the Reading the Mind in the Eyes test to measure facial emotion recognition. We separated participants into three different groups based on mean MSI-BPD and PNI scores: a high-NPD group ( $n=15$ ), a high-BPD group ( $n=34$ ), and a high-BPD-NPD group ( $n=24$ ).

A one-way analysis of variance revealed a marginally significant effect of group on RME performance, but only for neutral emotional expressions,  $F(2,69)=2.90$ ,  $p=.062$ . The high-BPD-NPD group showed a trend (in the predicted direction) toward impaired performance for neutral valences ( $M=.63$ ,  $SD=.14$ ) compared to the high-NPD group ( $M=.67$ ,  $SD=.14$ ) and the high-BPD group ( $M=.72$ ,  $SD=.13$ ). The results of this test are displayed in Table 2.

Because our sample size was relatively small and the use of an ANOVA with three groups creates strains on power, we conducted two independent-samples t-tests to compare the high-BPD-NPD group to the high-NPD and high-BPD groups separately. The independent samples t-test comparing the high-BPD-NPD group to the high-BPD group showed a significant effect of group on RME accuracy, but only for neutral valences,  $t(56)=2.42$ ,  $p<.05$ . The high-BPD-NPD group performed worse ( $M=.63$ ,  $SD=.14$ ) than the high-BPD group ( $M=.72$ ,  $SD=.13$ ). The independent samples t-test comparing the high-BPD-NPD group to the high-NPD group

revealed no significant effect of group on overall RME accuracy or any of the individual valence accuracies. The results of both t-tests are displayed in Tables 3 and 4, respectively.

A final one-way analysis of variance revealed no significant effect of group on response times during the RME task. For group mean response times (including overall response time and individual valence response times), standard deviations, and F-test details, please refer to Table 5.

## Chapter 4

### Discussion

The goal of our study was to examine the facial emotion recognition abilities of individuals with comorbid traits of borderline personality disorder and pathological narcissism as compared to those of individuals with traits of only borderline personality disorder or narcissistic personality disorder. Based on several recent studies of BPD patients, BPD trait analogues, and NPD patients, we hypothesized that individuals with traits of both personality disorders would demonstrate deficits in facial emotion recognition abilities when compared to individuals with traits of either personality disorder. To that end, we recruited a large sample of primarily first- and second-year undergraduate students from a large rural university and instructed them to complete the McLean Screening Instrument for Borderline Personality Disorder and the Pathological Narcissism Inventory, as well as the Reading the Mind in the Eyes Task.

We separated the pool of 258 participants into three different groups (high-BPD, high-NPD, and high-BPD-NPD) based on their scores on the MSI-BPD and PNI. For both measures, we used one standard deviation above the mean as the threshold for a “high” score. After the groups had been formed, we compared the high-BPD-NPD group ( $n=24$ ) to the high-BPD group ( $n=34$ ) and the high-NPD group ( $n=15$ ) on RME test accuracy for each of the three valence categories (positive, negative, and neutral expressions) and for the overall task score. The results partially supported our hypothesis. A one-way ANOVA revealed a nonsignificant trend ( $p=.062$ ) in the predicted direction indicating lower RME accuracy for the high-BPD-NPD ( $M=.63$ ,  $SD=.14$ ) group compared to the high-NPD ( $M=.67$ ,  $SD=.14$ ) and high-BPD ( $M=.72$ ,  $SD=.13$ ) groups, but only for neutral valence accuracy. These analyses were further explored using

independent samples t-tests individually comparing the high-BPD-NPD group to the high-BPD and high-NPD groups. The first t-test demonstrated that the high-BPD-NPD group performed significantly worse ( $M=.63$ ) than the high-BPD group ( $M=.72$ ) for neutral faces, but the second t-test comparing the high-BPD-NPD group to the high-NPD group showed no significant differences in any of the RME accuracy variables.

These findings suggest that facial emotion recognition abilities may be particularly impaired for individuals with traits of both BPD and NPD compared to individuals with traits of only BPD or NPD. However, the deficits were not broadly present and thus the combination of borderline and narcissistic features, at least as measured by the MSI and PNI in non-clinical college students, does not seem to accord any decrements in emotion regulation with the possible exception of ambiguous emotional states as represented by the neutral faces.

Our study was the first empirical investigation of facial emotion recognition abilities in individuals with traits of both BPD and NPD. No other studies have examined these abilities in analogue samples, let alone full clinical populations. Much more investigation of this research question is necessary, but we are able to say that our findings are somewhat consistent with what one would expect given the findings of certain studies that have examined emotion recognition in BPD and NPD separately. Dyck et al. (2009) and Preißler et al. (2010) both found that patients with BPD demonstrated deficits in emotion recognition abilities compared to healthy controls, and Marissen, Deen, & Franken (2012) found that patients with NPD demonstrated similar impairments.

Despite the non-clinical nature of our sample, our findings add to the growing body of evidence that suggests patients with borderline and narcissistic personality disorders have difficulties with facial emotion recognition abilities. While several studies have found that BPD patients demonstrate impaired abilities to properly recognize neutral emotional expressions and others have found that they possess enhanced abilities to recognize negative emotional

expressions, one finding common to almost all of these studies is that these patients have a tendency to incorrectly judge neutral or benign stimuli as expressions of negative emotion (fear, anger, disgust, etc.). Clearly, patients with BPD struggle at least in some way with facial emotion recognition, and the close relationship between emotion recognition, emotion regulation, and successful interpersonal relations suggests that these struggles may be a piece of the system behind the core features of the disorder. More research in the area of emotion recognition in narcissistic personality disorder is necessary, but the few studies that have been conducted indicate that NPD patients also suffer from deficits in emotion recognition abilities that may contribute to difficulties in understanding the emotional/mental states from others and forming appropriate reactions.

The current literature, as well as the findings of our study, suggests that patients with comorbid BPD and NPD diagnoses could benefit significantly from treatment approaches that emphasize improvements in attention to non-verbal emotional cues such as inferring mental states from facial emotions. Many treatments for borderline and narcissistic individuals (e.g., Bateman & Fonagy, 2009; Levy et al., 2006a; Levy, 2012) address a concept related to this process called reflective functioning. Reflective functioning (also referred to as mentalization) generally refers to an individual's capacity to perceive and reflect on the emotional and mental experiences of others and self in a way that allows for comprehension of others' social behaviors, prediction of future behaviors, and the formation of one's own appropriate reactions (Bateman & Fonagy, 2004). Transference focused psychotherapy is a highly structured, psychodynamic treatment originally developed for BPD by Clarkin and Yeomans (Yeomans, Clarkin, & Kernberg, 2002), based on Kernberg's (1984) object relations model of the disorder. TFP focuses on the correction of disintegrated or "split" representations of the self and others through interpretation of distorted interpersonal perceptions and has been shown to increase reflective functioning in patients with BPD randomized controlled trials (Levy et al., 2006b).

Our study has several strengths and limitations that should be taken into consideration when examining the results of our analyses. First and most importantly, the RME task is highly sensitive to subtle individual variations in facial emotion recognition abilities. Second, our version of the task categorized the images used into positive, negative, and neutral valences for the purposes of analyzing recognition abilities for specific types of emotional expressions. We also measured participants' response times and analyzed them across both groups to ensure that any differences in task performance were independent of response time. Finally, the homogeneous nature of our sample and the similarities in mean age and gender distribution across the high-BPD, high-NPD, and high-BPD-NPD groups suggest that our results are not due to differences in demographic variables.

The first main limitation of the study lies in the sample we selected. All of our participants were recruited from undergraduate introductory psychology courses at a large, rural state university, with more than 90% of participants falling in the 18-20 age range. The homogeneous nature of the sample and the small sizes of the experimental groups we created for the purposes of the analysis severely limit the statistical significance and generalizability of our findings. The second major limitation of the project is the non-clinical nature of the sample. We recruited from the student body and used self-report measures to determine participants' levels of BPD and NPD traits, using a relatively low score on each questionnaire as the threshold for qualifying as "high-BPD" or "high-NPD". Replication of this study in a clinical sample of psychiatric inpatients or outpatients with confirmed borderline and narcissistic personality diagnoses would be necessary to fully establish the clinical and scientific utility of our findings. A third and final limitation of the study is that, unlike the original version of the RME created by Baron-Cohen and colleagues, our study did not provide an accompanying glossary of the emotional and mental state terms used as word choices during the task. We eliminated the

glossary in the interest of recording useful response time data, but this choice could have affected the performance of any participants who had a poor understanding of the words used.

Future studies should seek to replicate our findings in a clinical sample of patients with individual and comorbid BPD and NPD diagnoses and include self-report measures of empathy and emotion recognition abilities as well as multiple task measures of these abilities. Despite the analogue nature of our participants and our small sample size, our findings are somewhat consistent with those of previous studies and indicate that there may be deficits in emotion recognition abilities in both BPD and NPD patients and that these deficits are increased in patients who meet criteria for both disorders. Further investigation in this area is clearly necessary for our developing understanding of both borderline and narcissistic personality disorders, the interaction between the two in patients with comorbid diagnoses, and treatment approaches.

## Appendix A

### Tables

*Table 1: Group Demographics and Clinical Characteristics*

	High-NPD (n=15)		High-BPD (n=34)		High-BPD- NPD (n=24)		<i>F</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Age	19.27	1.49	19.32	2.43	19.21	2.93	.02
MSI-BPD Score	.66	.29	1.58	.21	1.77	.36	76.07***
PNI Score	4.45	.41	3.61	.43	4.66	.44	47.26***
Gender	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	$\chi^2$
Male	8	53	8	24	7	29	4.38
Female	7	47	26	76	17	71	
Race/ethnicity	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	$\chi^2$
Caucasian	9	60	24	71	13	54	1.70
Non- Caucasian	6	40	10	29	11	46	

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

*Table 2: One-way ANOVA Results for RME Accuracy*

	High-NPD (n=15)		High-BPD (n=34)		High-BPD-NPD (n=24)		<i>F</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Positive faces	.71	.09	.73	.15	.68	.19	.92
Negative faces	.77	.17	.80	.13	.81	.16	.28
Neutral faces	.67	.14	.72	.13	.63	.14	2.90*
Overall	.71	.10	.74	.09	.69	.11	2.02

\*  $p < .10$ .

*Table 3: T-test Results for RME Accuracy (High-BPD vs. High-BPD-NPD)*

	High-BPD (n=34)		High-BPD-NPD (n=24)		<i>t</i> (2-tailed)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Positive faces	.73	.15	.68	.19	1.26
Negative faces	.80	.13	.81	.16	-.30
Neutral faces	.72	.13	.63	.14	2.42*
Overall	.74	.09	.69	.11	1.95

\*  $p < .05$ .

*Table 4: T-test Results for RME Accuracy (High-NPD vs. High-BPD-NPD)*

	High-NPD (n=15)		High-BPD-NPD (n=24)		<i>t</i> (2-tailed)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Positive faces	.71	.09	.68	.19	.57
Negative faces	.77	.17	.81	.16	-.68
Neutral faces	.67	.14	.63	.14	.76
Overall	.71	.10	.69	.11	.39

\*  $p < .05$ .

*Table 5: One-way ANOVA Results for RME Response Time in Seconds*

	High-NPD (n=15)		High-BPD (n=34)		High-BPD-NPD (n=24)		<i>F</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Positive faces	5.87	2.56	5.89	1.99	6.05	1.50	.92
Negative faces	5.59	1.49	5.64	1.77	5.71	1.51	.28
Neutral faces	6.09	2.35	5.75	1.78	6.05	1.86	2.90
Overall	5.90	2.02	5.76	1.74	5.95	1.55	2.02

\*  $p < .05$ .

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# ACADEMIC VITA

## Kevin G. Medved

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### Education

Psychology, B.S. May 2014  
The Pennsylvania State University  
Schreyer Honors College

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### Academic Awards & Scholarships

Schreyer Honors College Academic Excellence Scholarship	Fall 2010 — Spring 2014
National Merit Pennsylvania State University Scholarship	Fall 2010 — Spring 2014
Donald A. Trumbo Psychology Department Student Research Fund	May 2013
Dean's List (College of the Liberal Arts)	Spring 2012 — Fall 2013
Dean's List (Eberly College of Science)	Fall 2010 — Fall 2011

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### Academic Presentations

**Medved, K. G.**, Meyer, N. A., Scala, J. W., & Levy, K. N. (2013, April). The effect of comorbid borderline personality traits and pathological narcissism on mental state decoding abilities. Poster presented at the Annual Conference of the North American Society for the Study of Personality Disorders, Boston, MA.

McLaughlin, K. D., **Medved, K. G.**, Scala, J. W., & Levy, K. N. (2013, April). The predictive validity of the McLean Screening Instrument for Borderline Personality Disorder. Poster presented at the Annual Conference of the North American Society for the Study of Personality Disorders, Boston, MA.

**Medved, K. G.**, Meyer, N. A., Scala, J. W., & Levy, K. N. (2013, April). The effect of comorbid borderline personality traits and pathological narcissism on mental state decoding abilities. Poster presented at the Pennsylvania State University's Annual Undergraduate Research Exhibition, University Park, PA.

McLaughlin, K. D., **Medved, K. G.**, Scala, J. W., & Levy, K. N. (2013, April). The predictive validity of the McLean Screening Instrument for Borderline Personality Disorder. Poster presented at the Pennsylvania State University's Annual Undergraduate Research Exhibition, University Park, PA.

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## Research Experience

**Title:** Data Coordinator

**Location:** Laboratory for Personality, Psychopathology, & Psychotherapy Research  
The Pennsylvania State University — University Park, PA

**Supervisor:** Kenneth N. Levy, PhD

**Period:** August 2013 — Present

**Time:** 10.5 hours per week

**Description:** Responsibilities include managing the lab's Microsoft Access database of participant records and coordination of data entry and error-checking responsibilities, in addition to the many other tasks mentioned below.

**Title:** Research Assistant

**Location:** Laboratory for Personality, Psychopathology, & Psychotherapy Research  
The Pennsylvania State University — University Park, PA

**Supervisor:** Kenneth N. Levy, PhD

**Period:** October 2011 — August 2013

**Time:** 10.5 – 13 hours per week

**Description:** Responsibilities included transcribing Adult Attachment Interviews, adding and editing reference entries in EndNote/Mendeley, editing reference sections for Dr. Levy's manuscripts, uploading measures and other questionnaires to online survey managers, consenting participants for structured clinical interview appointments, directing participants in completing experiments on laboratory computers, entering data in IBM SPSS, merging datasets and checking them for errors, transcribing tapes of conference talks and therapy sessions for Dr. Levy, and recruiting and scheduling participants for various studies.

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## Employment History

**Title:** Student Employee

**Location:** The Mix Convenience Store at Pollock Dining Commons  
The Pennsylvania State University — University Park, PA

**Supervisor:** Matthew Wensel

**Period:** June 2012 — Present

**Time:** 15 – 25 hours per week  
**Description:** Responsibilities include preparing sandwiches, smoothies, and other food items, cleaning and stocking the convenience store, and operating the cash register.

**Title:** Summer Conference Assistant

**Location:** Conference Services

The Pennsylvania State University — University Park, PA

**Supervisors:** Nicholas Pazdziorko and Jared Hammond

**Period:** Summer 2012 and Summer 2013

**Time:** 12 – 48 hours per week

**Description:** Responsibilities included supervising underage guests staying in University residence halls during summer camps, welcoming guests and families to the University and assisting them with the check-in process, and providing amenities to guests.

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## Philanthropic Involvement

**Title:** Morale Committee Member

**Organization:** Penn State IFC/Panhellenic Dance Marathon

**Location:** The Pennsylvania State University — University Park, PA

**Supervisor:** Alex Bauer (2012 — 2013), Christopher McKeown (2013 — 2014)

**Period:** Fall 2012 — Spring 2013, Fall 2013 — Spring 2014

**Time:** 5 hours per week

**Description:** Responsibilities included raising funds for pediatric cancer treatment and awareness, attending weekly meetings throughout the year, providing emotional support to families with children afflicted with cancer, and monitoring the mental and physical health and safety of several registered dancers during a 46-hour, no-sitting, no-sleeping dance marathon.

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