THE PENNSYLVANIA STATE UNIVERSITY
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DEPARTMENT OF PSYCHOLOGY

# SELF-CONCEPT AS A MODERATOR IN THE RELATIONSHIP BETWEEN BORDERLINE PERSONALITY DISORDER AND READING MENTAL STATES

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# ABSTRACT

**Purpose**: Borderline personality disorder (BPD) is a highly prevalent, chronic, and debilitating disorder. Epidemiological studies consistently reveal that about 2% of the general population and up to 20% of mental health outpatients suffer from the disorder. Unstable interpersonal relationships, emotion dysregulation, angry outbursts, and suicidality are symptoms central to BPD. Prominent theories of BPD suggest that the difficulties observed are related. The purpose of the current study was to examine the moderating effect of self-concept on the relationship between BPD and emotion recognition. **Method**: Participants were 50 adults, 31 reliably diagnosed with BPD and 19 healthy controls (HC). Ninety-two percent were female and seventy-eight percent were Caucasian. The mean age was 27.44 (SD=12.36). **Procedure**: Diagnosis was established using the International Personality Disorders Examination (IPDE). In a separate session, participants completed a computerized measure designed to assess participants' capacity to infer mental status (e.g., happy, sad, worried) from photographs of just the eye region of the face, called the Reading Mind in the Eyes Test (RMET), and completed a number of self-report measures, including the Self-Concept Clarity Scale (SCCS). **Hypotheses:** It was predicted that participants with BPD would exhibit poor self-concept clarity in relation to healthy control participants. It was hypothesized that the ability to decode mental status would be impaired in those with BPD as compared to healthy controls. It was also hypothesized that individuals with BPD would display longer reaction times than healthy controls, particularly when it comes to negative emotions. The final hypothesis was that self-concept clarity would moderate the relationship between BPD diagnosis and performance on the RMET such that people with BPD and better self-concept clarity would respond to facial stimuli more accurately and display a shorter reaction time as compared to people with BPD and poor self-concept

clarity. **Results:** Those with BPD performed worst on the SCCS than the healthy controls did, suggesting that they have poorer self-concept clarity. Contrary to our hypotheses, the BPD group did not perform significantly different from the HC group in overall or valence-specific RME accuracy. However, there were significant differences between the diagnostic groups in terms of overall and valence-specific RME reaction time. Upon controlling for age, the interaction between diagnosis and self-concept clarity score was not significant in RMET performance. **Conclusions:** Results revealed no significant moderating effects of self-concept clarity for both RMET accuracy and reaction time. These findings suggest that self-concept clarity may not in fact moderate the relationship between BPD and performance on the RMET, and that there may be another variable that better accounts for the observed variation.

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Chapter 1

# INTRODUCTION

## Borderline Personality Disorder

Borderline personality disorder (BPD) is a chronic and debilitating mental disorder that causes severe impairment to one's ability to perform in many, if not all, aspects of functioning. It is marked by a pervasive pattern of instability with regards to affect, sense of self, and in the perceptions of others (American Psychiatric Association, 2013). Clinical expressions of this instability include frantic efforts to avoid abandonment, chaotic interpersonal relationships, vacillations between idealization and devaluation of others, emotional dysregulation, impulsivity, angry outbursts, non-suicidal self-injury, and suicidality (American Psychiatric Association, 2013). The onset of these symptoms typically occurs in adolescence and early adulthood. Epidemiological studies reveal prevalence rates of approximately 1% to 6% in the general population (Grant et al., 2008; Lenzenweger, Lane, Loranger, & Kessler, 2007; Samuels et al., 2002; Torgersen, Kringlen, & Cramer, 2001; Trull, Jahng, Tomko, Wood, & Sher, 2010), while clinical studies suggest that 11% of outpatients and 19% of inpatients receive a BPD diagnosis (Levy, & Johnson, 2016; Widiger, & Frances, 1989; Zimmerman, Rothschild, & Chelminski, 2005).

**Emotion Recognition**

Impairment in the perception and interpretation of social, emotionally laden stimuli are a central component of the disorder (Linehan, 1993). Domes and colleagues (2007) found that people often use information from their external environments to navigate social situations. Accurate recognition of basic emotions from facial expressions allows one to better predict and explain others' behaviors, respond appropriately, and control one's own emotions. In the same respect, impaired mental state detection can lead to inaccurate interpretations of social situations, which in turn may elicit extreme and intense emotional arousal, and interpersonal chaos. Manifestations of affective instability in BPD may be in displays of aggression, and engagement in risky, impulsive, and self-destructive behaviors. These maladaptive expressions of emotion make it difficult for borderline patients to build or maintain relationships (Fonagy, 1991; Kernberg, 1985; Silk, 2000; Yeomans & Levy, 2002).

However, the literature surrounding the connection between BPD and facial emotion recognition is mixed. There is some evidence that BPD participants preformed similarly to the healthy control group on an affect recognition task (Schilling et al., 2012) and displayed no specific difficulties in interpreting negative, neutral, and positive affect (Domes et al., 2008; Schilling et al., 2012). Results from another study suggested that the BPD group performed even better on the task than the healthy control group (Fertuck et al., 2009). One explanation for this could be that borderline individuals show an increased accuracy in and sensitivity to facial affect recognition, regardless of valence (Lynch et al., 2006). However, an additional portion of the literature suggests that borderline individuals demonstrate less capacity to decipher others' mental states (Bland, Williams, Scharer, & Manning, 2004; Levine, Marziali, & Hood, 1997), particularly when presented with mixed valence emotions (Scott, Levy, Adams, & Stevenson,

2011). Characteristic cognitions of people with BPD discussed by Pretzer and colleagues (1990) indicate that these individuals perceive the world and the people around them as malevolent, and themselves as vulnerable and unaccepted. These findings are also in line with Linehan's (1995) notion that people with BPD were hyper-vigilant of cues they identified as a potential social threat or rejection. Coinciding with Pretzer's (1990) and Linehan's (1995) theories, it was found that when presented with ambiguous facial expressions, BPD participants tended to become negatively biased towards the perception of fear (Domes et al., 2008) and possibility of evaluation from others (Arntz & Veen, 2001; Wagner & Linehan, 1999).

Difficulty in reflecting upon the emotional experience and mental states of self and other is thought to be a central component of BPD. First introduced by Fonagy (Fonagy, & Target, 1998), this concept is referred to as mentalization or reflective function – the ability to reflect upon and to understand one's own mental state and the mental states of others (Baron-Cohen, 1989; Langdon, Coltheart, Ward, & Catts, 2002). Levy and colleagues (Levy et al., 2006) found that BPD patients have reflective functioning scores in the 2.5 – 3 range, while studies of participants with depression and eating disorders, and healthy controls found scores of 5. Similarly, people also possess a capacity to understand that people's beliefs, desires, intentions, and perspectives are different from one's own, and to use these to predict and explain their behaviors (Fonagy, 1991). Premack and Woodruff (1978) referred to this concept as "theory of mind". The capacity to detect others' mental states from readily observable social cues such as facial expressions is thought to be a critical aspect of theory of mind (Sabbagh, 2004; Tager-Flusberg, 2001). Other theories exist in the literature that mark social-cognition deficits as an essential symptom of BPD (Blatt, Auerbach, & Levy, 1997; Gunderson, 1996; Kernberg, 1984; Levy & Blatt, 1999; Westen, 1991; Young, Klosko, & Weishaar, 2003). Irrespective of the

variations between these theories, there appears to be some common themes. They all propose that people with BPD experience difficulties in the identification and inference of their own emotions, and the emotions of other people in social situations.

**Identity Disturbance and Self-Concept**

As highlighted by Kernberg (2006), the understanding of oneself and one's own identity is essential to understanding other people. Identity disturbance and an unstable sense of self are prominent features of borderline personality disorder that could account for the difficulties individuals with BPD have in emotion recognition. Baumeister (1999) identified three components that formulate the "self:" self-concept, identity, and self-esteem. He broadly defined self-concept as "your ideas about yourself", identity as "who you are", and self-esteem are "how you evaluate yourself." More specifically, self-concept is comprised of mental templates that structure one's thoughts and feelings about oneself. Self-schemas control the interpretation of information pertaining to the self (Baumeister, 1999). Borderline individuals' self-perception often vacillates between two extremes of a spectrum. Their sense of themselves is unorganized, and who they perceive themselves to be tends to be disconnected from who they actually are. This identity disturbance results in an unintegrated individual who is out of tune with one's own emotions. The inability to identify, understand, and moderate one's own emotions prevents one from being able to do the same for other people's emotions.

**Hypotheses**

Though many studies have attempted to identify the contributor of complex mental state decoding abilities in people with BPD, no studies have considered SCC to be a possible moderator. The current study aimed to assess the moderating effect of SCC on the relationship between BPD diagnosis, and both accuracy and reaction time in emotion recognition. One hypothesis was that individuals with BPD would exhibit poor self-concept clarity in relation to healthy control participants. It was predicted that the ability to decode mental or emotional states would be impaired in those with BPD as compared to healthy controls. It was also hypothesized that individuals with BPD would display longer reactions times to the facial stimuli presented than healthy controls, particularly when it came to negative emotions. The final hypothesis was that self-concept clarity would moderate the relationship between BPD diagnosis and performance on the RMET such that people with BPD and better self-concept clarity would respond to facial stimuli more accurately and display a shorter reaction time as compared to people with BPD and poor self-concept clarity. .

Chapter 2

# METHOD

## Participants

Participants were 31 individuals reliably diagnosed with borderline personality disorder and 19 matched healthy controls. Of the 50 total participants, 92% were female and 78% were Caucasian. The mean age was 27.44 (SD=12.36). Demographic characteristics of each group are presented in Table 1.

## Measures

**McLean Screening Instrument for Borderline Personality Disorder.** Participants were administered a 21-item modified version of the McLean Screening Instrument for Borderline Personality Disorder (MSI BPD; Zanarini et al., 2003) over the telephone at the time of recruitment. The original MSI-BPD (Zanarini et al., 2003) is a 10-item questionnaire commonly used to assess for BPD features. Test-retest reliability, internal consistency, validity, and diagnostic efficiency in identifying of presence of *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition – Text Revision* (DSM-IV-TR) BPD in adult respondents was demonstrated. Items on the modified version were rewritten in the first-person to allow for self-administration and sub-items were added to assess particular symptom domains more precisely. For example, the original MSI-BPD item, "Have you often felt that you had no idea of who you are or that you have no identity?" was broken into two separate items: "I have often felt that I had no idea who I am" and "I have often felt that I have no identity." All items were rated on a 4-

point Likert scale (0 = “False, not at all true”; 3 = “Very true”) and were summed to calculate a continuous scale score, with internal consistency (coefficient alpha) of $\alpha$ = .93.

**International Personality Disorder Examination.** The International Personality Disorder Examination (IPDE; Loranger, 1999) is a 99-item semi-structured clinical interview designed to assess for personality pathology as defined by the *Diagnostic and Statistical Manual of Mental Disorders – Fourth* (DSM – IV) *and Fifth Editions* (DSM-5). Its strong psychometric properties and cross-national validation make the IPDE an ideal tool for diagnosing DSM-IV Axis II pathology (Loranger et al., 1994). Doctoral-level graduate students and trained undergraduate research assistants were trained to reliability to administer the IPDE under the supervision of a licensed psychology. Interviewers coded participant responses to provide a score for each BPD criterion. BPD dimensional scores were computed based on the sum of BPD criteria scores. Final diagnoses were determined using the LEAD (Longitudinal, Expert, All Data) standard (Spitzer, 1983). This method of evaluation uses the results of the diagnostic instrument and any additional available clinical data to come to a “best estimate diagnosis.” Research consistently finds that diagnoses based on the LEAD standard or “best estimate diagnosis” method are more valid than those generated from the interviews themselves (Levy et al., 1999; Mattanah, Becker, Levy, Edell, & McGlashan, 1995; Pilkonis, Heape, Rubby, & Serrao, 1991). The use of the LEAD standard results in few diagnoses, less comorbidity, and better predictions to clinical, course, and outcome variables (Pilkonis et al., 1991).

**Self-Concept Clarity Scale.** The Self-Concept Clarity Scale (SCCS; Campbell et al., 1996) is a 12-item, self-report instrument that measures clarity and consistency in identity and one’s perception of self. Each item is rated on a 5-point Likert scale (1=*Strongly disagree*; 5 = *Strongly agree*). Example items include “Sometimes I feel that I am not really the person I

appear to be" and "If I were to describe my personality, my description might end up being different from one day to another day." Of the twelve, two items were reverse scored: "I seldom experience conflict between the different aspects of my personality" and "In general, I have a clear sense of who I am and what I am". Responses were summed to calculate a total scale score such that high scores reflected poor self-concept and low scores reflected good self-concept. Satisfactory psychometric properties were described for this questionnaire with high average internal consistency reliability among three samples (.86), and test-retest reliability (.79 at 4 months and .70 at 5 months) (see, Campbell et al., 1996).

**Reading the Mind in the Eyes Test.** The Reading the Mind in the Eyes Test (RMET; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) is a computer program designed to measure one's ability to decode the mental or emotional states of others. During this test, participants are presented with 36 black-and-white photographs (15 cm x 6 cm) of the eye region of the human face, from the area just below the eyebrow line and above the bridge of the nose). The instructions are as follows:

> *You will see a series of photographs of faces. Your task is to decide what each person is thinking or feeling. For each face, enter the number on the keyboard that corresponds with the number of the word that best describes what the person in the photograph is thinking or feeling. You may feel that more than one word is applicable, but please just choose one word, which you consider to be the most suitable. Before making your choice, make sure that you have read all 4 words.*

Immediately before each trial, a fixation cross on a white background is displayed on the screen. Each photograph is then presented in the center of the computer. Four adjectives are presented at each of the four corners of the cropped picture (see *Figure 1*,e.g., "Dominant",

"Friendly", "Guilty", and "Horrified"). The adjectives vary for each photo. There is only one correct response; the other three serve as distractors. Participants are asked to select the mental state that best describes what the person in the picture was thinking or feeling. Participants enter their responses by pressing one of four keys (1, 2, 3, 4) corresponding to the four terms. The trials are indiscriminate. Responses and response times (in milliseconds) are electronically recorded in the E-Prime 2.0 software. The 36 RMET stimuli are classified into three categories: positive, negative, and neutral. A previous study developed criteria to assess the emotional valence of the photographs and adjectives. The results classified 10 stimuli as negative, 17 stimuli as neutral, 9 stimuli as positive (Scott et al., 2011). Accuracy on the RMET was determined using the percentage of correct responses a participant had in a particular valence category as well as overall accuracy across the 36 trials. Reaction time was calculated as the amount of time (in milliseconds) the subject spent responding to a stimulus from the moment it was presented on the screen.

**Procedure**

Clinical participants were recruited from the Pennsylvania State University Psychological Clinic, a large community mental health center (CMHC) serving Central Pennsylvania. Some clinical individuals were recruited upon intake and others after having participated in other studies in the lab and provided consent for us to contact them in the future for other studies by telephone and/or email.

Healthy control participants were identified through a mass screening of the psychology participant pool for an introductory psychology course. In exchange for their participation,

students received credit towards their research participation requirement for the course. Students completed a number of screening measures for a variety of psychology department studies. Included among these measures was the MSI-BPD to screen for possible borderline personality disorder. Those scoring at least one standard deviation below the mean on the MSI-BPD were classified as exhibiting low levels of BPD, and were selected and re-administered the questionnaire over the phone a second time at the time of recruitment.

For both clinical and healthy controls, the presence or absence of BPD was confirmed by interview with the IPDE. Participants had to be at least 18 years old to participate. Exclusion criteria for the study included diagnosis of a psychotic disorder or an intellectual disability. All participants were administered the IPDE, except for three individuals who were screened but did not return for their clinical assessment appointments. These three participants did not endorse a significant amount of BPD symptoms on the MSI-BPD and so were placed in the HC group.

Participants met with a research assistant who provided them with a complete description of the study. They were given the option to terminate their participation at any point throughout the experiment; if they chose to move forward, participants provided written informed consent. Next, they completed the computerized RMET described above. The RMET was performed under a "cognitive load condition" during which participants were presented with a sequence of numbers, letters, and symbols prior the presentation of each facial stimuli and were then required to recall the sequence after. Then, participants completed a series of online questionnaires, which included a demographics questionnaire and the SCCS. They were then debriefed, thanked for their participation, and dismissed. The debriefing form provided them with the primary investigator's contact information to direct any further questions or concerns. All documents used in this study were approved by the university's Institutional Review Board (IRB).

Chapter 3

# RESULTS

## Sample Characteristic Analyses

Data analyses were conducted using Statistical Package for the Social Sciences, version 24 (SPSS Inc., Chicago, IL). Table 1 presents a comparison of demographic characteristics by diagnostic group. The two groups did not differ in distributions of men and women, race/ethnicity, or marital status. However, there were significant differences between the two diagnostic groups in regards to age. The BPD group ($M$ = 31.97, $SD$ = 13.46) was significantly older than the HC group ($M$ = 19.26, $SD$ = 2.21), $t(48) = 4.07$, $p < .001$. Therefore, age was entered as a covariate in the data analyses for accuracy and reaction time, and the results are reported controlling for age.

## Preliminary Data Analyses

To assess diagnostic group differences in SCCS scores, we used an independent samples t-test. As shown in Table 2, the BPD group ($M$ = 38.42, $SD$ = 8.57) scored significantly higher on the SCCS than did the healthy controls ($M$ = 27.05, $SD$ = 5.74), $t(48) = -5.11$, $p < .001$. Pearson correlations were used to examine the relationship between age, overall accuracy, overall reaction time, and self-concept clarity. As displayed in Table 3, participant age was positively correlated with overall RMET reaction in the overall sample [$r = .46$, $n = 50$, $p < .001$] and BPD group [$r = .41$, $n = 50$, $p = .02$]. Overall accuracy was not correlated with overall reaction time or SCCS score. SCCS score was also not correlated with overall reaction time.

## Experimental Task Analyses

**RMET Accuracy.** To assess overall and valence differences in RMET accuracy, we used an independent samples t-test. Accuracy was examined in four ways: overall accuracy (which included composite negative, neutral, and positive valence scores), negative accuracy, neutral accuracy, and positive accuracy. The results displayed in Table 2 indicated that there was no significant relationship between diagnostic groups in terms of overall and valence-specific items. Overall accuracy was almost identical between those with BPD (M = .73, SD = .11) and the healthy controls ($M$ = .73, $SD$ = .12), $t(48) = -.05$, $p = .96$. The BPD group ($M$ = .82, $SD$ = .14) also got a comparable percent of negative valence stimulus responses correct to the HC group ($M$ = .78, $SD$ = .14), $t(48) = -.77$, $p = .44$. In terms of neutral valence photos, individuals with BPD ($M$ = .70, $SD$ = .13) performed very similarly to the healthy controls ($M$ = .70, $SD$ = .14), $t(48) = .08$, $p = .94$. Accuracy for positive valence images between individuals with BPD ($M$ = .71, $SD$ = .16) and the HC group ($M$ = .76, $SD$ = .14), $t(48) = -1.04$, $p = .31$ also lacked significance.

**RMET Reaction Time.** To assess overall and valence differences in RMET reaction time, we used an independent samples t-test. Four types of variables were examined to measure reaction: overall reaction time (which included composite negative, neutral, and positive valence scores), negative reaction time, neutral reaction time, and positive reaction time. Findings illustrated group differences in regards to overall and valence-specific reaction time (Table 2). The BPD group ($M$ = 8049.55, $SD$ = 3073.05) took longer to respond to the facial stimuli presented overall than the HC group did ($M$ = 6020.49, $SD$ = 2146.12), $t(48) = 2.74$, $p < .001$. In addition, participants with BPD ($M$ = 7319.83, $SD$ = 2694.84) displayed a longer reaction time for negative valence photographs than the healthy controls ($M$ = 5505.02, $SD$ = 1825.07), $t(48) = 2.59$, $p < .001$. Similarly, the HC group ($M$ = 6256.80, $SD$ = 2307.82) experienced a shorter

reaction time to neutral facial stimuli than did the BPD group ($M$ = 8080.40, $SD$ = 3057.05), $t(48) = 2.24$, $p = .03$. Those with BPD ($M$ = 8802.09, $SD$ = 4066.58) also took longer to respond to positive-valence images than the healthy controls ($M$ = 6170.90, $SD$ = 2505.58), $t(48) = 2.83$, $p < .001$.

**Moderation Analysis.** To examine self-concept clarity as a moderator in the relation between BPD diagnosis, and RMET performance, we ran a linear regression with diagnostic group, self-concept clarity score, and their interaction predictors controlling for age.

The overall model including diagnostic group, self-concept clarity score, age, and their interaction did not significantly predict overall RMET accuracy, $F(4, 45) = .83$, $p = .51$, and there was no significant moderating effect of self-concept clarity, $t(44) = -.97$, $p = .34$ (Figure 1). The overall model including diagnostic group, self-concept clarity score, age, and their interaction did not significantly predict RMET accuracy for negative valence faces, $F(4, 45) = 1.10$, $p = .37$, and there was no significant moderating effect of self-concept clarity, $t(44) = -.33$, $p = .74$. The overall model including diagnostic group, self-concept clarity score, age, and their interaction did not significantly predict RMET accuracy for neutral valence faces, $F(4, 45) = 1.58$, $p = .20$, and there was no significant moderating effect of self-concept clarity, $t(44) = -.78$, $p = .44$. The overall model including diagnostic group, self-concept clarity score, age, and their interaction did not significantly predict RMET accuracy for positive valence faces, $F(4, 45) = 1.03$, $p = .40$, and there was no significant moderating effect of self-concept clarity, $t(44) = -1.25$, $p = .22$.

The overall model including diagnostic group, self-concept clarity score, age, and their interaction did significantly predict overall RMET reaction time, $F(4, 45) = 3.36$, $p = .02$. However, these results seem to be driven by age differences between the controls and those with

BPD, $b = 89.88$, $t(44) = 2.37$, $p = .02$, as the interaction between diagnosis and self-concept clarity score was not significant, $t(44) = -.42$, $p = .68$ (Figure 2). The overall model including diagnostic group, self-concept clarity score, age, and their interaction did significantly predict RMET reaction time for negative valence faces, $F(4, 45) = 3.76$, $p = .01$. However, these results seem to be driven by age differences between the controls and those with BPD, $b = 90.30$, $t(44) = 2.35$, $p = .02$, as the interaction between diagnosis and self-concept clarity score was not significant, $t(44) = -.51$, $p = .61$. The overall model including diagnostic group, self-concept clarity score, age, and their interaction did significantly predict RMET reaction time for neutral valence faces, $F(4, 45) = 3.06$, $p = .03$. However, these results seem to be driven by age differences between the controls and those with BPD, $b = 74.40$, $t(44) = 2.27$, $p = .03$, as the interaction between diagnosis and self-concept clarity score was not significant, $t(44) = -.85$, $p = .40$. The overall model including diagnostic group, self-concept clarity score, age, and their interaction did significantly predict RMET reaction time for positive valence faces, $F(4, 45) = 2.82$, $p = .04$. However, these results seem to be driven by age differences between the controls and those with BPD, $b = 106.29$, $t(44) = 2.13$, $p = .04$, as the interaction between diagnosis and self-concept clarity score was not significant, $t(44) = .08$, $p = .94$.

Chapter 4

# DISCUSSION

The purpose of the current study was to examine the moderating effect of self-concept clarity on the relationship between BPD diagnosis and emotion recognition. People with borderline personality disorder are characterized by disturbances in their identity, which is comprised of who they are as an individual and their ideas about themselves. Their self-perception often vacillates between various unintegrated perceptions of themselves. One minute they can feel capable and the next like a failure. Sometimes these evaluations are extreme. It is not unusual for a person with BPD to feel "evil." Similarly, one minute the person with BPD may identify with a group, ideas, or beliefs and then the next minute, day, or week they identify with the a contradictory group, idea, or belief. Finally, this lack of identity relates to how they see others, which often oscillates between the two extremes of idealization and devaluation. This identity disturbance leads to an inability to consolidate one's sense of self and impairment in the capacity to accurately process and respond to one's emotions. Due to the importance of self-understanding in other-understanding, we believed that deficits in self-concept in individuals with BPD might result in difficulty identifying and understand the emotions of other people.

Based on the literature, we predicted that borderline individuals would exhibit poor self-concept clarity in relation to the healthy controls. A second hypothesis was that BPD participants would display impaired accuracy and a longer reaction time to the facial stimuli presented, particularly negative valence photographs. A final prediction was that self-concept clarity would moderate the relationship between BPD diagnosis and self-concept clarity. Only one hypothesis was supported by our results; the BPD group scored significantly higher on the SCCS, indicating

that they possess poorer self-concept clarity as compared to the HC group. There was also a significant relationship between BPD diagnosis and RMET reaction time, although this finding became nonsignificant when controlling for age. Overall, individuals with BPD and healthy controls performed similarly on the RMET and overall accuracy did not difference between groups. Though the results from previous studies are mixed, our results are consistent with Schilling et al. (2012), who found that BPD participants performed similarly to healthy control participants on an affect recognition task and displayed no particular impairment in decoding negative, neutral, and positive affect, which Domes et al. (2008) also discovered. Contrary to our hypotheses, the results suggest that self-concept clarity may not in fact moderate the relationship between BPD and performance on the RMET, and that there may be another variable that better accounts for the observed variation.

Based on our results, there is evidence that borderline individuals may possess the capacity to accurately decipher the emotions of other people. Since their sense of self changes often and is vastly inconsistent, perhaps this capability is influenced by participants' emotional or mental state at the time of participation. Negative emotions in borderline individuals are caused by a distorted perception of events in social interactions. It may be that it is only when people with BPD experience negative emotions that they are feel vulnerable and so are more susceptible to interpreting social stimuli as a personal attack on them. Perhaps their ability to accurately interpret social situations is influenced is better predicted by their current affective state and the level of personal relevance certain stimuli may have. It's possible that the objectiveness of the facial stimuli on RMET is what resulted in a similar performance between diagnostic groups.

However, these conclusions must be interpreted cautiously as the study has several limitations. First, our sample size for group comparisons was relatively small, and did not provide us with significant power to observe small effects. In addition, significant age differences between diagnostic groups made it difficult to assess the impact our predictor variable had on the relationship between BPD diagnosis and emotion recognition without the influence of potential confounds. An additional potential limitation to the interpretation of these results is that there was a significant difference in reaction time before controlling for age. It is unclear whether this difference was a function of age, as the BPD group was significantly older than the HC group, or if it was related to why participants performed similarly on the RMET. It may be that those with BPD performed well on the test because they took longer to respond to each facial stimuli. However, reaction time was not correlated with accuracy for either the BPD or control condition. Although we controlled for age as a covariate, another approach would be to examine age-matched groups.

Borderline personality disorder affects the lives of the individuals that suffer with the disorder as well as those around them. Extreme and intense emotional arousal and interpersonal chaos are central components of the disorder. This study is important because it continues to explore potential contributors to relationship between BPD traits and difficulties identifying and understanding the emotions of other people. Future research is necessary in order to determine the true nature of the relationship between this disorder and emotion recognition abilities. It is recommended that additional studies be conducted to empirically examine the current emotional states in borderline individuals and what influence these may have on their mental state decoding abilities.

## Appendix A: Figures


*Figure 1. An example of a (male) stimulus used in the Reading Mind in the Eyes Test (RMET). Friendly is the target response.*

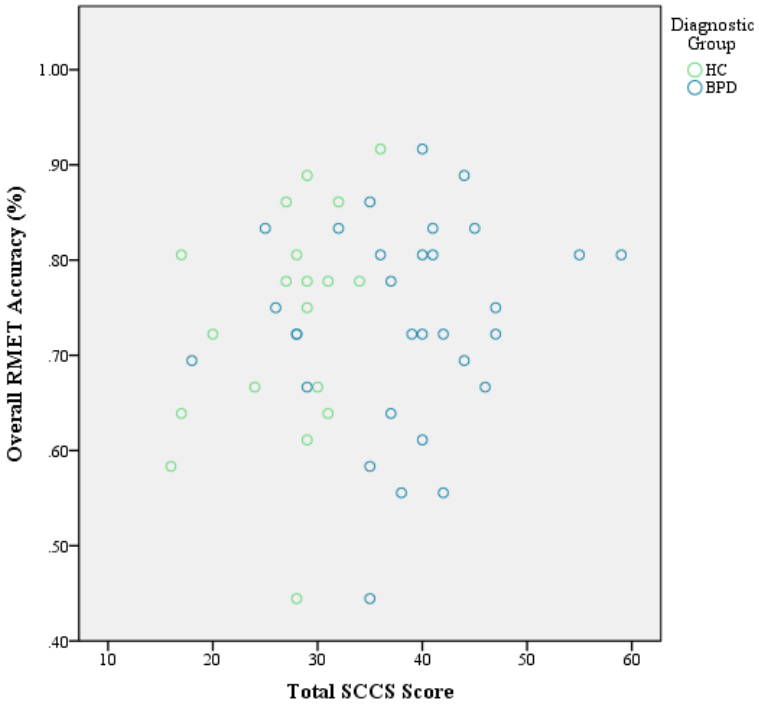


*Figure 2. Relationship between SCCS Score and RMET Accuracy.*

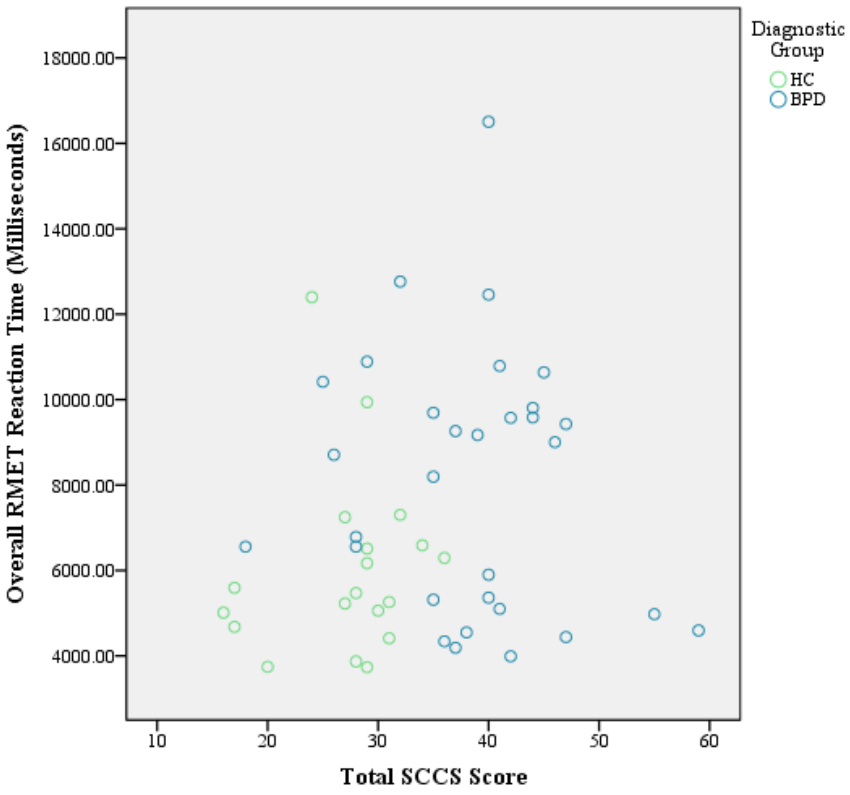


*Figure 3. Relationship between SCCS Score and Overall RMET Reaction Time.*

## Appendix B: Tables

*Table 1.*

*Demographic Characteristics as a Function of Diagnostic Group*

| | Total Sample (n = 50) | | BPD (n = 31) | | HC (n = 19) | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Gender | | | | | | |
| Male | 4 | 8 | 3 | 9.7 | 1 | 5.3 |
| Female | 46 | 92 | 28 | 90.3 | 18 | 94.7 |
| Race/Ethnicity | | | | | | |
| Hispanic/Latino | 3 | 6 | 0 | 0 | 3 | 15.8 |
| Asian/Pacific Islander | 3 | 6 | 2 | 6.5 | 1 | 5.3 |
| African American | 1 | 2 | 1 | 3.2 | 0 | 0 |
| African | 1 | 2 | 1 | 3.2 | 0 | 0 |
| Caucasian | 39 | 78 | 26 | 83.9 | 13 | 68.4 |
| Other | 3 | 6 | 1 | 3.2 | 2 | 10.5 |
| Marital Status | | | | | | |
| Single | 45 | 90 | 26 | 83.9 | 19 | 100 |
| Married | 3 | 6 | 3 | 9.7 | 0 | 0 |
| Divorced | 2 | 4 | 2 | 6.5 | 0 | 0 |
| Age, Mean (SD) | 27.14 (12.31) | | 31.97(13.46) | | 19.26 (2.21) | |

*Note*. This table compares demographic variables between participants in the Borderline Personality Disorder group (BPD; n = 31) and the Healthy Control group (HC; n = 19).

*Table 2.*

*Group Differences in Self-Concept and RMET Performance*

| | BPD (n = 31) M (SD) | HC (n = 19) M (SD) | *t* | *p* |
|---|---|---|---|---|
| SCCS Total Score | 38.32 (8.57) | 27.05 (5.74) | -5.11 | < .001 |
| RMET Overall Accuracy | .73 (.11) | .73 (.12) | -.05 | .96 |
| Accuracy for Negative Valence | .82 (.14) | .78 (.14) | -.77 | .44 |
| Accuracy for Neutral Valence | .70 (.13) | .70 (.14) | -.08 | .94 |
| Accuracy for Positive Valence | .71 (.16) | .76 (.14) | -1.04 | .31 |
| RMET Overall RT | 8049.55 (3073.05) | 6020.49 (2146.12) | -2.74 | < .001 |
| RT for Negative Valence | 7319.83 (2694.84) | 5505.02 (1825.07) | -2.59 | .01 |
| RT for Neutral Valence | 8080.40 (3057.05) | 6256.80 (2307.82) | -2.24 | .03 |
| RT for Positive Valence | 8802.09 (4066.58) | 6170.90 (2505.58) | -2.83 | .01 |

*Note*. This table outlines mean differences between the BPD (*n* = 31) and HC (*n* = 19) groups in SCCS, and RMET accuracy and reaction time. SCCS = Self-Concept Clarity Scale; RMET = Reading Mind in the Eyes Test; RT = Reaction Time.

*Table 3.*

*Matrix of Variable Intercorrelations.*

| | **1** | **2** | **3** | **4** |
|---|---|---|---|---|
| | **Overall Sample** | | | |
| **1.** Age | -- | | | |
| **2.** SCCS | .10 | -- | | |
| **3.** RMET Overall Accuracy | .02 | .16 | -- | |
| **4.** RMET Overall RT | .46** | .14 | .18 | -- |
| | **HC Group** | | | |
| **1.** Age | -- | | | |
| **2.** SCCS | -.001 | -- | | |
| **3.** RMET Overall Accuracy | .20 | .35 | -- | |
| **4.** RMET Overall RT | -.08 | .13 | .07 | -- |
| | **BPD Group** | | | |
| **1.** Age | -- | | | |
| **2.** SCCS | -.33 | -- | | |
| **3.** RMET Overall Accuracy | .02 | .14 | -- | |
| **4.** RMET Overall RT | .41* | -.15 | .26 | -- |

*Note*. *p< .05. **p < .001.

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personality disorders in psychiatric outpatients. American Journal of Psychiatry, 162, 1911–1918.

Academic Vitae

# Joanna Pantelides

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## Education

2013 - present **The Pennsylvania State University**, University Park, PA
Bachelor of Science in Psychology – Option in Life Sciences
Minor in Sociology:
Paterno Fellow and Schreyer Honors Student

January - April, 2016 **IES Abroad – Liberal Arts & Business Program**, Barcelona, Spain

## Research Experience

2015 - present **Laboratory Manager – RME Study Coordinator**
Laboratory for Personality, Psychopathology, and Psychotherapy Research **The Pennsylvania State University**, University Park, PA
Principal Investigator: Kenneth N. Levy, Ph.D.

As a lab manager in Dr. Kenneth Levy's research laboratory, my responsibilities include managing and coordinating over two dozen undergraduate research assistants and working with Dr. Levy to ensure lab productivity. Other tasks include administering semi-structured clinical interviews, managing the IRB submissions and modifications, and recruiting research assistants. I am also currently the coordinator of a project that uses the Reading the Mind in the Eyes Test (Baron-Cohen et al., 2001) to assess how well various clinical populations can read the emotions of others and questionnaires to assess their thoughts, feelings, and behaviors. My responsibilities for this study include participant recruitment, data collection, management, and the training and coordination of undergraduate research assistants involved with the project.
May – August, 2016

**Research Assistant**
Saint Mary's Hospital for Children's Center for Pediatric Feeding Disorders, Bayside, NY
Supervisor: Laura Seiverling, Ph.D.

As a research assistant working with Dr. Seiverling, I entered data from numerous projects relating to pediatric feeding disorders. I was also present during team meetings and observed treatment sessions.

2014 - 2015 **Undergraduate Research Assistant – Smartphone Study Case Manager**
Laboratory for Personality, Psychopathology, and Psychotherapy Research
**The Pennsylvania State University**, University Park, PA
Principal Investigator: Kenneth N. Levy, Ph.D.

As a research assistant in Dr. Kenneth Levy's research laboratory, I was directly involved in a variety of research studies relating to personality, psychopathology, attachment, and psychotherapy. I have also been involved in an on-going study using smart phone technology to assess the stress, health, psychopathology, and adjustment of individuals with anxiety disorders and borderline personality disorders. I also received training in the transcription of the semi-structured Adult Attachment Interview (AAI).

## Publications

Levy, K. N., & **Pantelides, J.** (in press). Borderline personality disorder. In R. Riggio & J. S. Mio (Eds)., *The Wiley Encyclopedia of Personality and Individual Differences*.

Rosenstein, L. K, **Pantelides, J.**, Scala, J. W., & Levy, K. N. (2017, September). Does self-concept moderate the relationship between borderline personality disorder and emotion recognition? Abstract for poster submitted to the biannual meeting for the International Society for the Study of Personality Disorders (ISSPD).

Seiverling, L., **Pantelides, J.**, Hendy, H. & Towle, P. (accepted pending revisions). Prevalence of feeding problems in young children with and without autism spectrum disorder: A chart review study. *Journal of Early Intervention*.

## Research Support

**Source:** Liberal Arts Enrichment Funds
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## Academic Awards and Scholarships

2013 - present Dean's List, College of Liberal Arts
**The Pennsylvania State University**, University Park, PA

## Teaching Experience

2015 **Teaching Assistant** **The Pennsylvania State University**,
**Stacy. R. Silver, Ph.D.** University Park, PA
**Courses:**
SOC 30 – Sociology of the Family

## Certifications

2014 HIPAA Human Subjects IRB Certification
Social Science and Biomedical Modules

2014 NIH Certification
Protecting Human Research Participants

## Relevant Coursework

Introduction to Psychology, Techniques of Calculus I, Introduction to Human Development and Family Studies, Psychology as a Science and Profession, Introduction to Developmental Psychology, Introduction to Well-being and

Positive Psychology, Sociology of the Family, Child Psychopathology, Elementary Statistics, Basic Research Methods in Psychology, Introduction to Clinical Psychology, Personality Theory, Research Projects, Principles of Change in Psychotherapy

## Clinical Assessment Training

Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-IV)

Structured Clinical Interview for DSM-5 Axis I Disorders (SCID-5)

International Personality Disorder Examination (IPDE)

Adult Attachment Interview (AAI)

Suicide Attempt Self-Injury Interview (SASII)

## Community Involvement

2014 - 2015 **LifeLink PSU — Mentor**
**The Pennsylvania State University**, University Park, PA
Primary Supervisor: Marla Yukelson

## Other Work Experience

2010 - 2013 **Party Pro**
**Bounce U**, College Point, New York
Manager/Owner: Michael Barbosa

Bounce U has events that are open to the public, such as open bounces, and events that are private, such as birthday parties, field trips and Girl Scout celebrations. Timing truly is key during a busy weekend. With only two party pros assigned to each event and about seventeen events per day, it is a lot of responsibility to ensure that your event will begin on time, move through each bounce room on time without any injuries or other complications, continue to the party room on time (if it's a private event) with all the ordered food, drinks, and party decorations set up properly, and end on time. My responsibilities included setting up and decorating rooms for private parties, entertaining party guests (children and adults), and cleaning the bounce rooms and party rooms. My job demanded a great deal of responsibility and organizational skills in order to ensure that our guests had a fun and safe time at Bounce U.

2010 - 2013 **Dance Teaching Assistant**
**Mildrid Scilla School of Dance**, Flushing, New York
Manager/Owner: Sandra Gendell

I grew up dancing ballet, jazz, modern and lyrical at my local dance studio. As I began getting older and became a better dancer, my advanced modern dance teacher (who teaches all modern classes) asked me to spend my summers assisting her with all of her other classes, with girls of ages between eight and thirteen. My responsibilities included leading warm-up and helping the dancers with their technique and choreography. After two summers spent assisting, I was asked to assist the modern classes and ballet classes throughout the year. My responsibilities then included teaching my own choreography, as well.