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CHILDHOOD TRAUMA AS A MEDIATOR OF THE RELATIONSHIP BETWEEN
BORDERLINE PERSONALITY DISORDER AND EMOTION RECOGNITION

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ABSTRACT

Purpose: The purpose of this study is to examine emotion recognition capacities in patients with borderline personality disorder (BPD) as a function of traumatic experiences. **Method:** Sixty clinical participants reliability diagnosed with a structured interview for BPD called the International Personality Disorder Examination (IPDE) were assessed for traumatic experiences using the Childhood Trauma Questionnaire-Short Form (CTQ-SF) and for emotion recognition capacities using the Reading the Mind in the Eyes Task (RME). It was hypothesized that BPD severity in terms of number of symptoms would be associated with decreased emotion recognition ability and that trauma severity would mediate this relationship. **Results:** There was no significant difference between the BPD and control groups for overall RME, $F(1,53) = .76, p = .387, \eta^2 = .014$. BPD symptoms were associated with negatively valenced RME scores ($r_s = -.24, p = .019$). Negatively valenced RME accuracy was negatively associated with overall CTQ score ($r_s = -.28, p = .033$) and emotional neglect ($r_s = -.41, p = .0013$). The SPSS PRCOESS macro found there was no significant mediation of overall CTQ score on the association between dimensional BPD, $\beta = -.0009, SE = .0035, 95\% CI [-.0086, .0048]$, and negatively valenced RME scores, $\beta = -.0040, SE = .0029, 95\% CI [-.0097, .0016]$. Consistent with the hypothesis, BPD symptom severity was related to difficulty recognizing negative emotions and greater trauma severity in childhood. Contrary to hypothesis, trauma did not explain the relationship between BPD symptoms and deficits in recognizing emotions.

TABLE OF CONTENTS

LIST OF FIGURES	iii
LIST OF TABLES	iv
ACKNOWLEDGEMENTS	v
Introduction.....	1
Emotion Regulation	2
BPD & Emotion Recognition.....	2
BPD & Trauma	3
Trauma & Emotion Recognition.....	4
Methods.....	7
Participants.....	7
Procedures	8
Measures	9
Statistical Analysis	10
Results.....	12
Discussion.....	14
Appendix A Tables	20
Appendix B Figures	23
References.....	24

LIST OF FIGURES

Figure 1. <i>Mediation of BPD-Negative Emotion Recognition by Overall Trauma</i>	23
Figure 2. <i>Mediation of BPD-Negative Emotion Recognition by Emotional Neglect</i>	24

LIST OF TABLES

Table 1. <i>Participant Demographic Information</i>	20
Table 2. <i>One Way Analysis of Variance by Group (ANOVA)</i>	21
Table 3. <i>Dimensional BPD Association with Trauma Subtype</i>	22

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Introduction

Borderline personality disorder (BPD) is a serious and highly prevalent psychological disorder characterized by emotional lability, chaotic interpersonal relationships, impulsivity, fear of abandonment, chronic feelings of emptiness, unstable self-image, high levels of suicidality, and frequent irritability and anger outbursts (Levy, 2013; Skodol et al., 2002). One in ten individuals with BPD completes suicide, which is almost 50 times more frequently than the general population (Paris, 2014; American Psychiatric Association, 2001).

BPD's prevalence in the general population ranges between 1 and 6% (Lenzenweger, Lane, Loranger, & Kessler, 2007; Grant et al. 2008). These individuals are frequently utilizing community resources such as hospital and psychiatric services (Paris, 2002). BPD accounts for 10-22.6% of psychiatric outpatients (Korekwa, Dell, Links, Thabne, & Webb, 2008; Zimmerman, Rothschild, & Chelminski, 2005) and between 20% and 25% of psychiatric inpatients (Levy, 2013; Widiger & Frances, 1989) and is thus more prevalent than schizophrenia, bipolar disorder, and autism combined (Levy, 2013). BPD is also highly comorbid with a range of psychological disorders such as mood disorders (e.g. major depression and bipolar I and II) as well as anxiety disorders, post-traumatic stress disorder, substance abuse disorder, and eating disorders (Zanarini et al., 1998). When comorbid BPD affects the course and outcome for these disorders resulting in longer periods of suffering, more frequent and quicker relapse, lower rates of employment, higher rates of relationship discord, alcohol and drug use and increased suicidality. Most problematically, the presence of BPD lowers the efficacy of otherwise

efficacious treatments for these other disorders. Interestingly, the presence of these disorders tend not to influence the course and outcome of BPD (Levy, 2013).

Emotion Regulation

Negative emotions are reported by BPD patients with greater intensity and frequency than non-clinical controls (Dixon-Gordon, 2011; Levine, Marziali, & Hood, 1997). Evidence also shows that their emotions fluctuate more rapidly compared to a sample of healthy controls (Ebner-Priemer et al., 2007). This has great importance when considering that one of the most characteristically identifying symptoms associated with BPD is the marked deficits in emotion regulation as they engage in more maladaptive emotion regulation strategies (Glenn & Klonsky, 2009). Specifically, one study found an association between BPD and both emotional avoidance and distress intolerance (Gratz, Rosenthal, Tull, & Lejuez, 2006). Individuals with BPD were less willing to tolerate emotional distress even if it was needed to participate in goal-oriented actions. They were also less willing to engage in situations that had the potential to be distressing compared to individuals who did not have a personality disorder diagnosis.

BPD & Emotion Recognition

One of the major components of emotion regulation is the skill of emotion recognition (Linehan, 1993). Some studies have found that individuals with BPD have marked deficits in emotion recognition abilities. A recent meta-analysis found that when compared to healthy controls, individuals with BPD had more difficulty properly recognizing negative facial expressions in general with the greatest deficits for the emotions of anger and disgust (Daros,

Zakanis, & Ruocco, 2012). However, they scored the worst when asked to identify neutral emotional displays. Their greatest difficulty was misattributing negative emotions to faces without any emotional display (Domes et al., 2009; Dyck et al., 2009). Although there have been many findings of deficits in emotion recognition, the research in this area has not been conclusive. There have been a few studies that show individuals with BPD score better than healthy controls on emotion recognition tasks (Fertuck et al., 2009; Frick et al., 2012; Scott, Levy, Adams, & Stevenson, 2011).

BPD is a heterogeneous disorder. Individuals who receive the same diagnosis of BPD may present in different ways due to a different combination of equally weighted criteria earning them the diagnosis. Given the nine core symptoms of BPD and a requirement of presenting a minimum of five, according to diagnostic requirements outlined by the Diagnostic and Statistical Manual of Mental Disorders-5th Edition (DSM-5; APA, 2013), there are a possible 256 combinations of symptoms comprising a borderline diagnosis (Cooper, Balsis, & Zimmerman, 2010; Johansen, Karterud, Pedersen, Gude, & Falkum, 2004). It is possible that this heterogeneity in BPD profiles could explain the mixed findings in the field. The factors underlying associations between BPD and emotion recognition then may not be the diagnosis itself but relatively disparate underlying components that comprise the disorder.

BPD & Trauma

Numerous studies have found that those with BPD report experiencing frequent and severe trauma experiences during childhood (Fernando et al., 2014; Helgeland & Torgersen, 2004). Given the high prevalence of trauma in the BPD population, it is likely that traumatic

experiences influence the manifestation and experience of BPD symptoms and outcomes in the individual. There have been a number of studies over the past few decades that have found BPD patients report experiencing abuse and neglect during childhood more frequently than clinical comparison groups including those with other personality disorders and major depressive disorder. (Fernando et al., 2014; Lobbestael, Arntz, & Bernstein, 2010; Weston, Ludolph, Misle, Ruffins & Block, 1990; Zanarini & Frankenburg, 2007; Zanarini et al., 1997). Specifically, there has been evidence that frequency of emotional abuse in childhood is indicative of BPD symptom severity in a non-clinical sample (Kuo, Khoury, Metcalfe, Fitzpatrick, & Goodwill, 2015). However, these findings of a greater prevalence of trauma in those with BPD have been disputed in the field. A recent study compared individuals with BPD to their sisters on levels of pathology and childhood trauma experienced (Laporte, Paris, Guttman, & Russell, 2011). Those with BPD and their sisters both reported high prevalence of childhood trauma. However, the sisters were found to have very little evidence of any pathology demonstrating that trauma is not indicative of BPD development. Those with BPD did reported more emotional abuse and sexual abuse than their sisters, however, the sisters reported highly comparable trauma experiences. This contradictory evidence is further supported in the field regarding other pathologies as findings have shown that BPD does not indicate higher prevalence of trauma even when compared to other personality disorders (Golier et al., 2003).

Trauma & Emotion Recognition

A study conducted by Shenk, Putnam, and Noll (2013) found that maltreated children were overall significantly less accurate than the non-maltreated control group when recognizing

emotional displays. The maltreated children showed the greatest significant deficit in properly recognizing the facial display of fear. Further, the study did not show any differences between maltreatment subtypes such as physical abuse, sexual abuse or neglect in predicting emotion recognition deficits. However, other studies in the field have found that the trauma subtype does indeed influence emotion recognition abilities. One of these studies (Pollak, Cicchetti, Hornung, & Reed, 2000) found that children who experienced physical neglect performed worse at recognizing emotions overall compared to children who experienced physical abuse and the controls. This physically neglected group was more biased toward selecting sad emotional displays. Children that had been physically abused showed deficits recognizing sadness and disgust and were more biased toward selecting an angry emotional display. The non-maltreated control groups did not show any selection bias when determining the displayed emotion (Pollak, Cicchetti, Hornung, & Reed, 2000).

One study has attempted to understand the role trauma may play in emotion regulation, but not emotion recognition specifically, in BPD. Fernando et al. (2014) found that BPD patients with high levels of childhood trauma reported significant difficulty with emotion regulation. They also found that the type of trauma experienced influenced the individual's difficulty with specific emotion regulation strategy deficits. Those with high levels of emotional neglect in childhood were found to use adaptive emotion regulation strategies less often. Those with high levels of emotional abuse were found to use maladaptive emotion regulation strategies more often. However, it is still unclear through what components of emotion regulation trauma affects to create this deficit. Given the research associating trauma and emotion recognition deficits, it is possible this component is the undermining factor in poor emotion regulation abilities.

The present study aims to resolve mixed findings in the field regarding the relationship between BPD and emotion recognition abilities by examining the specific role trauma type and severity play in emotion recognition deficits. The first hypothesis is that the number of BPD symptoms will be associated with decreases in emotion recognition ability and increased trauma severity. The second hypothesis is that presence and severity of trauma will mediate the relationship between BPD and emotion recognition.

Methods

Participants

Data were collected for sixty women who completed the measures reported in this study as part of three other previous studies (Beeney, Franklin, Levy, & Adams, 2011; Scott, Levy, Adams, & Stevenson, 2011; Scott, Levy, & Granger, 2013). Twenty-two of the participants had a clinical diagnosis of BPD, 6 were subthreshold for BPD having met 4 or fewer symptoms, 11 participants were part of a temperamentally matched (TM) control group (e.g., matched to BPD patients based on levels of impulsivity and negative affect but not meeting more than two criteria for BPD) and 21 participants were non-temperamentally matched (NTM) controls (also not meeting criteria for more than two symptoms of BPD). The 22 clinically diagnosed and 6 subthreshold participants were recruited from the outpatient department of a large rural northeastern university-based community mental health center. The TM and NTM groups were recruited from the same university's introductory psychology participant pool through an online screening to assess impulsivity, negative affect, and BPD symptoms using the Angry Hostility, Anxiety, Depression, and Impulsivity subscales from the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992). The TM group was determined through the participant's *T* scores being within 1 *SD* of the BPD sample on each subscale. The NTM group was determined through their *T* scores being within 1 *SD* of the normal population. All participants were screened for BPD symptom criteria using the International Personality Disorder Examination (IPDE; Loranger, 1999). Demographic information for these participants are reported in Table 1.

Exclusion criteria for all participants were heart disease, pregnancy within the last 6 months, current lactation, and endocrinological diseases other than diabetes and thyroid disorders. These criteria were included based on the requirements of the previous study for which these participants were originally recruited (Scott et al., 2013). The exclusion criteria for the clinical and subthreshold samples included diagnosis of psychotic disorders, Bipolar I, delirium, dementia, and intellectual disabilities. The exclusion criteria for the TM and NTM groups include a current clinical DSM-IV Axis I or Axis II diagnoses, suicidal or self-harm behaviors, and meeting more than two of the criteria for BPD as defined by the DSM-IV (Scott et al., 2013). See Table 1 for demographic information.

Procedures

All measures used in this study were approved by the institutional review board. Individuals with a diagnosis of BPD were recruited from a university-based community mental health center through a phone screener as a part of a previous study (Scott et al., 2013). Once recruited, the participants were brought into the clinic and interviewed by advanced clinical psychology graduate students trained in diagnostic interviewing. The control groups of TM and NTM were recruited from the same university's subject pool which conducted a mass online screening for the same previously conducted study and were selected to participate based on NEO-PI-R results (Scott et al., 2013). The participants in the subthreshold group were originally excluded from the previous study for not meeting the number of BPD symptom criteria or temperament for either group (Scott et al., 2013). Participants were brought into a lab where they completed a battery of measures including the CTQ-SF at the time of their participation. At a

later date, these individuals were called back into the lab by recruiters to participate in the RME task (Scott et al., 2011).

Measures

NEO-PI-R. The Angry Hostility, Anxiety, Depression, and Impulsivity subscales of the NEO-PI-R (Costa & McCrae, 1992) were utilized to assess level of NA/IMP traits of each participant to divide them into the appropriate TM, NTM, and BPD groups. Responses were gathered using a five point Likert scale response format (0 = strongly disagree; 4 = strongly agree). These subscales demonstrated high reliability ($\alpha = .84$ to $.92$).

IPDE. BPD symptom number and severity were determined for each participant using the International Personality Disorder Examination (IPDE; Loranger, 1999). This is a clinician rater diagnostic semi-structured interview used to diagnose all DSM-IV personality disorders. Only the 9 item BPD subscale responses were utilized to capture dimensionality of symptoms for the purpose of this study. Interrater reliability for the diagnosis of BPD from the IPDE was high ($\kappa = .88$) (Scott et al., 2013).

RME. Emotion recognition abilities were evaluated using the Reading the Mind in the Eyes task (RME; Baron-Cohen et al., 2001). This task contains 36 black and white photographs (15 cm X 6 cm) of the eye region of the face, each expressing a different emotion. Participants are asked to identify the emotion that is being displayed by choosing from four given options (one target and three distractors) which were displayed at each of the four corners of the photographs. The 36 different photographs were randomized for each participant. Participant's responses and response times in milliseconds were digitally recorded. The 36 emotional valences

were divided into sub-categories of 9 positive, 10 negative and 17 neutral stimuli in order to examine the responses and reaction times for each. These valence categories were determined using classification ratings from a previous study in which each valence was categorized with greater frequency than expected by chance (Scott, Levy, Adams, & Stevenson, 2011). The RME has been found to have acceptable internal consistency ($\alpha = .71$) (Preißler, Dziobek, Ritter, Heekeren, Roepke, 2010).

CTQ-SF. The Childhood Trauma Questionnaire short form (CTQ-SF; Bernstein et al., 2003) is a 28 item self-report measure (25 clinical items and 3 validity/denial items) used to determine an individual's type and severity of traumatic experiences during their childhood. The CTQ-SF contains five subscales each subjectively assessing for a different classification of childhood trauma. The five types are sexual abuse, physical abuse, emotional abuse, emotional neglect, and physical neglect and each is presented in five questions. Participants are asked to answer each item using a five point Likert scale ranging from 1 for "never true" to 5 for "very often true". Each dimension of trauma is classified into four categories (none/minimal, low to moderate, moderate to severe, severe to extreme) depending on the participant's response rating. The CTQ has been found to have good internal consistency overall ($\alpha = .91$) (Scher, Stein, Asmundson, McCreary, & Forde, 2001).

Statistical Analysis

Descriptive analyses identified means, standard deviations, and frequencies of demographic data across groups. Next, one way analysis of variance (ANOVA) was used to examine the differences between groups across RME and CTQ outcome scores. Spearman rank

order correlation was used to establish significant associations between BPD symptoms, CTQ scores, and RME scores. For the purpose of this study, a mediation analysis (Preacher & Hayes, 2004) was conducted to assess if trauma severity explains the relationship between BPD symptoms and RME scores. The SPSS PROCESSES macro (Hayes, 2012) with 5,000 bootstrapped samples was conducted to assess the effect of BPD symptoms on CTQ scores (“a path”); the effect of CTQ scores on RME scores, controlling for BPD symptoms (“b path”); the direct effect of BPD symptoms on RME scores (“c’ path”); the indirect effect of BPD on RME through CTQ. This indirect effect if significant would denote a mediation.

Results

Two participants in the NTM group did not have IPDE data and were therefore not included in any analysis of dimensional BPD symptoms. A one-way analysis of variance (ANOVA) was conducted, which revealed significant group differences in overall CTQ total scores, $F(1,53) = 66.97, p < .000, \eta^2 = .56$, and on each of the five subscales of the CTQ (Table 2). The subthreshold group was left out of the ANOVA because of the limited group size ($n = 6$). The TM and NTM groups were combined into one control group for the ANOVA due to similar means and standard deviations. There was no significant difference between the two groups for overall RME, $F(1,53) = .76, p = .387, \eta^2 = .014$. There was trend level difference between the groups on the negative, $F(1,53) = 3.81, p = .056, \eta^2 = .068$, no difference for neutral $F(1,53) = 2.31, p = .135, \eta^2 = .042$, and a trend level difference for positive $F(1,53) = 3.90, p = .054, \eta^2 = .070$, valance accuracy (Table 2).

Spearman rank order correlation was used to determine association between BPD symptoms and the CTQ due to a high level of positive skew in the data. Dimensional BPD was negatively associated with negatively valenced RME scores ($r_s = -.24, p = .019$). Dimensional BPD scores across groups were also positively associated with overall CTQ scores ($r_s = .74, p < .000$) as well as each subscale of the CTQ (Table 3). Negatively valenced RME accuracy was negatively associated with overall CTQ score ($r_s = -.28, p = .033$) and emotional neglect ($r_s = -.41, p = .0013$). Overall RME scores were associated with overall CTQ scores ($r_s = -.28, p = .034$) and emotional neglect ($r_s = -.35, p = .0067$). No associations were found between neutral valenced

RME and CTQ. Only a moderate association was found between positively valenced RME and overall CTQ scores ($r_s = -.25, p = .057$).

Since dimensional BPD was associated with overall CTQ and negatively valenced RME scores, the SPSS PROCOESS macro (Hayes, 2012) was conducted to determine a possible mediation of overall CTQ score on the association between dimensional BPD and negatively valenced RME scores. Results suggested that, $\beta = -.0009, SE = .0035, 95\% CI [-.0086, .0048]$ overall CTQ was not a significant mediator since the confidence interval included the possibility of 0 (Figure 1). Emotional neglect also did not mediate the relationship between dimensional BPD and negatively valenced RME scores, $\beta = -.0040, SE = .0029, 95\% CI [-.0097, .0016]$ which again reveals non-significance as the confidence interval includes the possibility of 0 (Figure 2).

Discussion

The present study aimed to determine the relationship between BPD and emotion recognition abilities as a function of traumatic experiences. The initial analysis supported the hypothesis that an increase in BPD symptomology when viewed dimensionally would negatively affect emotion recognition abilities. However, this relationship was only with respect to recognizing negative displays and not present in overall emotion recognition abilities. There were however, trend level differences between the clinically diagnosed BPD group and the combined TM and NTM control group for recognizing negative and positive emotions. Group differences emerged for overall traumatic experience and each of the five subscales. In line with the hypothesis, individuals across groups with greater BPD symptom severity had an overall higher level of trauma in general and in each of the five different subcategories. These greater overall experiences of childhood trauma, and more specifically emotional neglect, were related to less accuracy interpreting negative and overall emotional states. Contrary to the hypothesis, these experiences of emotional neglect and overall trauma did not explain the relationship between BPD symptoms and deficits in recognizing negative emotions.

Consistent with the current finding examining emotion recognition from the eye region of the face, previous research on recognizing emotions in using full facial expressions has found trauma to be predictive of decreased accuracy recognizing emotions (Shenk, Putnam, & Noll, 2013). However, Shenk et al. (2013) found trauma subtype to be an irrelevant factor in this process which is contradicted by the current findings. In the current study we found that emotional neglect could very well be the driving factor connecting overall trauma to this

negative emotion recognition deficit since the other trauma subtypes were found to be unrelated. Emotional neglect constitutes an unsupportive and emotionally void environment during childhood. Consistent with the findings of this study, recent research claims those with emotional neglect have the greatest difficulty with emotional interpretations as a whole due to parental inconsistency in expressed emotions (Fishbein et al., 2009). This means that in childhood, there was not a consistent emotional role model from which these individuals could safely and stably internalize emotional interpretations. The specific deficit in recognizing negative emotional displays found in this study could be due to receiving positive emotional models in other contexts throughout their development (e.g. teachers in school, positive community role models, friendships, etc.). If those with emotional neglect had positive emotional models in other areas in their lives, the effect could be enough just overcome any significant deficit in recognition rooted in the neglectful home environment. However, the deficit for negative emotional interpretations would remain since there is generally no healthy exposure context to experience negative emotions. Their most common emotional exposure would be the home which in these neglectful environments, consists of indifference and unavailability. This would imply that this deficit may not just be due to a lack of negative emotional modeling from parents. It may reveal that these individuals have grown up interpreting their parents' absence of emotion as negative emotion and therefore did not only lack a model but have possibly gone further as to misattribute uncaring emotions as negative.

Understanding the relationship between emotional neglect and emotion recognition deficits should be considered in the therapeutic setting when working with patients to resolve trauma. Furthermore, another goal in therapy would be to develop a new accurate model of negative emotionality based on the findings of trauma's effect on daily functioning. If these

improvements in emotion recognition are able to be established, strained interpersonal relationships and social connectedness that may be related to these deficits will have the potential to improve. The improvements in emotion recognition skills may aid in the therapeutic process towards resolving the trauma. In an exclusively BPD sample, emotional neglect has been found to be associated with less frequent use of adaptive emotion regulation strategies (Fernando et al. 2014). In order to improve emotion regulation and increase the likelihood of these individuals utilizing adaptive emotional regulation strategies, it is imperative that therapists prioritize the resolution of trauma, possibly through offering accurate emotional models.

In BPD the relationship with incorrectly interpreting emotional states is less clear since these results have not been found consistently in the field. Our findings revealed that individuals with clinically diagnosed BPD showed a trend toward deficits interpreting negative and positive emotions correctly. However, a significant deficit was found for interpreting negative emotions when BPD is viewed dimensionally across groups. A recent meta-analysis found that overall, the greatest emotion recognition deficit for those with BPD is in identifying negative emotions, specifically disgust and anger (Daros, Zalanis, & Ruocco, 2012). These are important findings considering those with BPD characteristically experience uncontrollable angry outburst and emotional lability (Levy, 2013). It is possible that the deficits in emotion recognition constitute an insensitivity to negative emotionality in others and in themselves. In that way, they may not fully understand the reality of their own negative emotional experiences, especially in the context of interactions with others. Those with BPD may incorrectly interpret other individuals' negative emotional responses to their outbursts or behaviors. BPD is further characterized by chaotic interpersonal relationships which could be influenced by this deficit in inaccurately attributing

the negative emotional reactions of others which would in turn create a disconnect or miscommunication, possibly causing relationship strain.

The findings revealed that trauma does not explain the relationship between BPD symptom severity and negative emotion recognition problem but that trauma and BPD symptoms are each independent predictors. This may partially explain the mixed finding in the field. BPD symptom severity could be associated with misinterpreting certain particular negative emotions due to their own bias for negative emotionality. Meanwhile, trauma may be influencing the misinterpretation of other emotions due to an inconsistent emotional environment and lack of emotional modeling. For that reason, future research should look to break down emotion recognition abilities by specific emotion in order to assess a possible correlation for BPD and trauma separately for each emotion. In addition, future studies should consider the effect trauma has on emotion recognition when studying BPD, especially given the research that those with BPD often report high levels of trauma which is consistent with the findings of the present study (Fernando et al., 2014; Helgeland & Torgersen, 2004). These traumatic experiences, if left unaccounted for, may be influencing the data to reflect greater emotion recognition deficits than are actually associated with BPD creating a false correlation.

A limitation of the present study was a relatively small sample size for each group, especially the subclinical group. The study therefore had decreased power and a greater risk for type II error. The findings of this study are less generalizable due to the uniformity of the sample, that is, all of the participants were women and of which the majority were caucasian. Future studies should seek to increase generalizability by diversifying the ethnicities represented and including both men and women. The CTQ, being a self-report measure, adds the limitation

of subjective and inaccurate retrospective reporting. Individuals may interpret their own traumatic experiences as more or less severe than an objective rater. Further, the present study being a cross-sectional design, does not allow for the possibility that the subjective interpretation of the trauma experienced may change over time. Future studies should not only utilize an objective measure of trauma, but possibly include both objective and subjective measures to create a more nuanced picture of traumas influence on emotion recognition. Specifically, whether it is the objective trauma experienced or the individual perception of trauma is the influencing factor on emotion recognition abilities.

There is also a possible threat to ecological validity for the RME design used in the present study due to the RME task being conducted in a laboratory setting. The participants were given as much time as the needed to view the emotional displays and select their answers. In reality, emotional displays may only appear for a short time and change rather quickly. There may also be other internal or external stressors on the individual at the time they must interpret the displays which was not recreated in this laboratory task. Future studies should attempt to increase their ecological validity by introducing stressors and limiting response time in order to obtain more representative data. Another potential limitation to the study was that participants were not provided with a glossary of terms when asked to select an emotional state. If a participant did not know the meaning of one of the four options, it may have influenced their accuracy in responding. However, looking up an unknown word could have increased reaction time, compromising that data.

The results of the present study show that BPD severity of symptomology is related to greater difficulty recognizing negative emotions. BPD symptom severity was related to overall

trauma and each of the five subcategories. Overall trauma and emotional neglect were also related to this decreased ability to recognize negative emotions. The results demonstrate the importance of accounting for trauma as well and BPD symptom severity separately when examining emotion recognition abilities which if further assessed in future research may help to alleviate some confusion in the field.

Appendix A

Tables

Table 1. *Participant Demographic Information*

<i>Characteristic</i>	BPD (n=22) <i>M (SD)</i>	TM (n=11) <i>M (SD)</i>	NTM (n=21) <i>M (SD)</i>	Subthreshold (n=6) <i>M (SD)</i>
Age	30.55 (7.7)	22.00 (5.5)	19 (1.7)	21.00 (8)
Ethnicity (%)				
Hispanic/Latina	0	18.2	14.3	0
Non-Hispanic/Latina	100	81.8	85.7	100
Race (%)				
American Indian/Alaska Native	4.5	0	0	0
Asian	4.5	9.1	4.8	0
Black/African American	0	0	14.3	50
White	86.4	72.7	80.9	50
Multiracial	4.5	9.1	4.8	0
Education Attained (%)				
GED	4.5	0	0	16.7
High School Graduate	18.2	36.4	61.9	16.7
Technical School	4.5	0	0	0
Partial 2-Year College	4.5	9.1	19	0
Associate Degree	0	0	0	16.7
Partial 4-Year College	31.8	36.4	14.3	33.3
Standard College	36.4	9.1	0	16.7
Masters Level	0	0	4.8	0
Doctoral Level	0	9.1	0	0
Marital Status (%)				
Single	54.5	90.9	100	50
Married	13.6	0	0	16.7
Separated	4.5	0	0	16.7
Divorced	27.3	9.1	0	16.7
Relationship Status (%)				
In a Relationship	63.6	72.7	52.4	50
Single	36.4	27.3	47.6	50

Note: BPD = borderline personality disorder; TM = temperamental match; NTM = non-temperamental match; M = mean; SD = standard deviation

Table 2. *One Way Analysis of Variance by Group (ANOVA)*

	BPD (n=22) M (SD)	Control (n=32) M (SD)	F	p
CTQ Total	60.32 (20.84)	29.22 (4.65)	66.97	.000
Emotional Abuse	16.73 (6.31)	6.34 (2.01)	76.01	.000
Physical Abuse	9.73 (4.52)	5.47 (.88)	27.18	.000
Sexual Abuse	10.18 (7.31)	5.22 (.94)	14.54	.000
Emotional Neglect	14.95 (5.26)	6.72 (2.33)	61.36	.000
Physical Neglect	8.73 (3.63)	5.47 (1.05)	23.20	.000
Overall RME Accuracy	.73 (.10)	.75 (.084)	.76	.387
Negative Accuracy	.73 (.14)	.81 (.13)	3.81	.056
Neutral Accuracy	.74 (.10)	.70 (.11)	2.31	.135
Positive Accuracy	.71 (.20)	.80 (.13)	3.90	.054

Note: CTQ = Childhood Trauma Questionnaire; RME = Reading the Mind in the Eyes; RT = response time; BPD = borderline personality disorder; Control = combined temperamental match and non-temperamental match group; M = mean; SD = standard deviation

Table 3. *Dimensional BPD Association with Trauma Subtype*

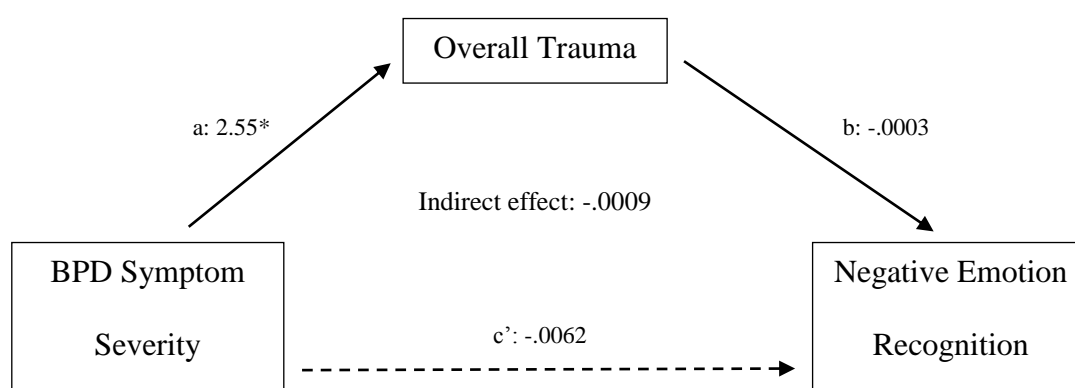
	Dimensional BPD (N=60)		
	M (SD)	<i>p</i>	r_s
Emotional Abuse	10.98 (6.72)	.000	.704
Physical Abuse	7.53 (3.96)	.000	.63
Sexual Abuse	7.72 (5.70)	.000	.46
Emotional Neglect	10.57 (5.70)	.000	.72
Physical neglect	7.32 (3.42)	.000	.54

Note: M = mean; SD = standard deviation

Appendix B

Figures

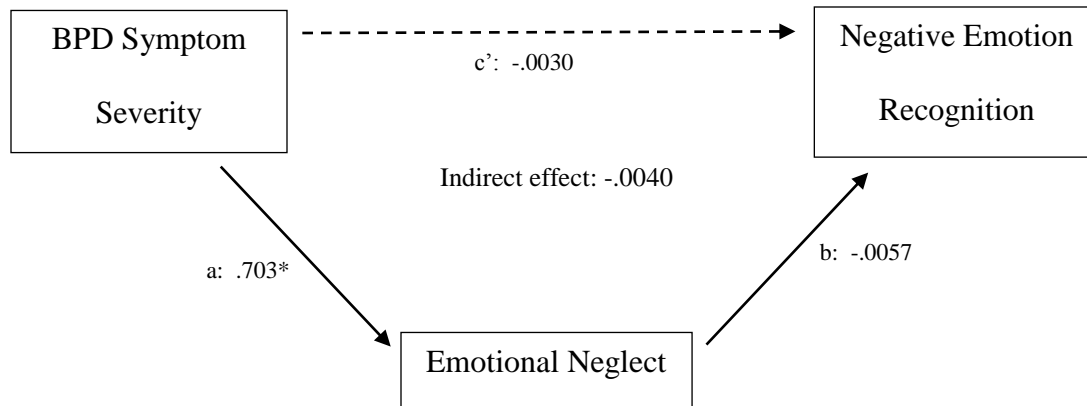
Figure 1. *Mediation of BPD-Negative Emotion Recognition by Overall Trauma*



Note: Data shown are parameter estimates from a mediation analysis following the recommendations of Preacher and Hayes (2004) and utilizing the SPSS PROCESS macro for indirect effects testing with 5,000 bootstrapped samples (Hayes, 2012).

* $p < .05$

Figure 2. *Mediation of BPD-Negative Emotion Recognition by Emotional Neglect*



Note: Data shown are parameter estimates from a mediation analysis following the recommendations of Preacher and Hayes (2004) and utilizing the SPSS PROCESS macro for indirect effects testing with 5,000 bootstrapped samples (Hayes, 2012).

* $p < .05$

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RESEARCH EXPERIENCE:

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