MECHANISMS OF BORDERLINE PERSONALITY DISORDER: THE ROLE OF

IDENTITY DIFFUSION

A Dissertation

by

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ABSTRACT

Borderline personality disorder (BPD) is a disabling psychiatric condition that causes pervasive and enduring impairments in social and occupational functioning. Previous literature has outlined the core components of the disorder to include disturbances in affect regulation, identity problems, disrupted interpersonal relationships, and impulsive behavior. While several theories have postulated the primacy of one component in driving the remaining components, the etiological and maintaining mechanisms of BPD are poorly understood. Therefore, the present study examined the primacy of one of these components, identity disturbance, in eliciting changes in the affective, interpersonal, and impulsive components of the disorder. The current study employed an experimental manipulation of identity coherence in 388 undergraduates who were screened for high or low levels of borderline personality features. All participants completed measures of affect prior to and immediately following the manipulation and then completed a GoStop task of impulsivity and an interpersonal trust task in a counterbalanced order. The results suggest individuals with high levels of borderline personality features generally report reduced self-concept clarity and are more susceptible to efforts to alter the coherence of their identity than those with lower levels of borderline personality features. Destabilization of identity coherence led to greater difficulties inhibiting behavior in those with high levels of borderline features, whereas it improved behavioral control in those with low levels of borderline features. These

results support theoretical articulations of BPD that indicate impulse control problems are a means of regulating one's internal self-state. Contrary to some characterizations of the disorder, there was no evidence to suggest that alterations of identity coherence led to an exaggerated emotional response or disturbed interpersonal behavior. This finding is consistent with a number of studies examining affective reactivity to emotion induction procedures, interpersonal stimuli, and now alterations in identity coherence indicating that BPD is better characterized by severe, trait negative affect valence compared to healthy controls rather than hyper-reactivity. Moreover, the failure of interpersonal behavior to vary as a function of borderline personality status or experimental task type indicates the importance of dynamic influences during interactions as potential sources for variability in behavior. Although further research is needed to clarify the mechanisms linking identity, affective dysregulation, and interpersonal behavior; psychosocial interventions aimed at maintaining and developing a stable sense of identity may be beneficial for reducing the impulsive behaviors in BPD, which are potentially most critical for establishing the patient's safety.

DEDICATION

To my mother; I am forever grateful for her unyielding support and encouragement to pursue my goals and dreams - I wish she were here to see me finish.

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INTRODUCTION

Borderline personality disorder (BPD; American Psychiatric Association, 2000)

is a disabling psychiatric condition that is characterized by a pervasive dysregulation in

the core areas of affect, interpersonal relationships, identity, and impulsive behaviors

(American Psychiatric Association, 2000). BPD has been found to be associated with

substantial and enduring functional impairments in employment and social domains

(Skodol, Gunderson, et al., 2002; Skodol, Pagano, et al., 2005). Moreover, this disorder

presents a formidable challenge to treatment efforts (Gabbard & Lazar, 1999) and is

associated with greater psychiatric and nonpsychiatric treatment utilization (Ansell,

Sanislow, McGlashan, & Grilo, 2007). It is estimated that approximately 2% of the

community population suffer from BPD (APA, 2000), whereas patients with this

diagnosis are estimated to comprise 19% of all psychiatric inpatients and 11% of

outpatients (Widiger and Trull, 1993).

While BPD significantly impairs many aspects of one's functioning, the

etiological and maintaining mechanisms underlying BPD's core components are poorly

understood. Theories have postulated potential mechanisms and corresponding

treatments have been developed in accordance with those theoretical bases. These

theories variously attribute one component as primary in driving the remaining

components and relevant BPD symptomatology. Primacy of a component can be

established in either the distal etiology of the disorder, or in more proximal mechanisms

maintaining the disorder. Although it is important to understand those factors that

contribute to the cause of BPD, these factors may be distal in that their origins may be far removed from the onset of the disorder and they likely exert indirect influences on the later development of the disorder. Thus these distal etiological factors are likely to be the focus of prevention efforts; however, they do not provide a target for intervention aimed at more proximal mechanisms. To this point, models suggesting the primacy of the affective instability, impulsivity, and interpersonal components—either in distal or more proximal causal roles--have received limited or inconsistent empirical support. However, until this point little research has examined the potential primary role of identity concerns, perhaps due to the inconsistent conceptualizations of identity in BPD as well as the absence of paradigms to study this construct in experimental research.

The overarching goal of this study is to examine the primacy of identity disturbance in relation to the other major components of BPD in an experimental paradigm. This proposal will first provide a description of the four core components of BPD. Subsequent sections will examine each component in detail, outlining the empirical evidence for the importance of the components, reviewing established paradigms for investigation of these components and supporting research, and finally discuss various models describing the potential primacy of each component and empirical examinations of the model's tenets. These examinations have made use of both naturalistic and experimental approaches to establish primacy of a particular component. Finally, the main goals and hypotheses of the current study will be presented.

Delineating the Core Components

The diagnosis of borderline personality disorder is characterized by significant heterogeneity of symptoms and behaviors (Skodol, Gunderson, Pfohl, Widiger, Livesley, Siever, et al., 2002). Numerous attempts have been made to identify the core elements of the disorder. These efforts to reduce the complex nature of the BPD diagnosis allow for a better understanding of the underlying mechanisms. Early efforts focused on providing detailed clinical observations of patients presumed to be on the border of psychosis (Gunderson & Singer, 1975), accounting for qualitative differences that distinguished BPD from other psychological disorders. However, these descriptions were subjective in nature, likely reflecting some degree of unreliability as well as the theoretical orientation of the observer. Nonetheless, they influenced the conceptualization of the diagnostic criteria for borderline personality disorder and laid the groundwork for empirical studies to isolate the core components.

Empirical investigations of the core elements have used factor analytic methods to determine the components underlying the diagnostic criteria, and to a lesser extent, on more broadly defined diagnostic behaviors, signs, and symptoms across a wide range of contexts, age ranges, and conceptualizations of the borderline personality disorder construct. Although there are inherent limitations to each of these approaches, they have yielded fairly consistent results.

Rosenberger & Miller (1989) conducted a factor analysis of the diagnostic criteria with a nonpatient, undergraduate sample. Their results suggested internal consistency of criteria based on mild to moderate positive intercorrelations of the BPD

criteria. They also conducted a principal components factor analysis with varimax

rotation using these criteria. A two-factor solution was found accounting for 56% of the

variance. The first factor was comprised of interpersonal and identity criteria while the

second factor was comprised of affective and behavioral dysregulation criteria. These

findings suggest that responses to the criteria comprising these factors discriminate

between groups of nonpatient undergraduates.

In another study, Clarkin, Hull, and Hurt (1993) examined the factor structure of

a revised set of the BPD diagnostic criteria in a sample of 75 hospitalized female patients

diagnosed with BPD. Diagnoses were made using a revised version of the SCID-II

(First, Spitzer, Gibbon, Williams, & Benjamin, 1995) which utilized dimensional ratings

of all criteria. Results of the factor analysis suggested a three factor solution. Similar to

Rosenberger & Miller's (1989) study, the first factor consisted of identity problems and

uncertainties in interpersonal relationships. However, there was a slight loading of

affective instability on this factor. The second factor was predominantly comprised of

the affective component of BPD. The third factor, which had previously not been

considered to be an essential element of the disorder (APA, 1987), was comprised of

criteria reflecting problems with impulsivity. The differences in factor structure may

reflect the source of the sample (undergraduates vs. inpatient females). For example,

those admitted to inpatient settings are typically experiencing greater distress that may

have been acted out in an impulsive or suicidal manner.

Sanislow, Grilo, & McGlashan (2000) completed a factor analysis of DSM-III-R

borderline personality criteria in young adult psychiatric inpatients revealing 3 factors,

or homogeneous elements of the disorder. The first component labeled disturbed

relatedness consisted of the unstable relationships, identity disturbance, and chronic

emptiness criteria of BPD. The second component labeled behavioral dysregulation was

comprised of the impulsivity and suicidal/self-mutilative behavior criteria; while the

third factor, affective dysregulation consisted of the affective instability, inappropriate

anger, and efforts to avoid abandonment criteria. These findings were replicated by

Sanislow et al. (2002) in a sample of 668 predominantly treatment-seeking patients

participating in the Collaborative Longitudinal Personality Disorder Study. This project

utilized confirmatory factor analysis to examine model fit of DIPD DSM-IV BPD

diagnoses for the three-factor solution derived from the Sanislow, Grilo, and McGlashan

(2000) study. Similarly, Blais, Hilsenroth, and Castlebury (1997) found three core

domains in a factor analysis of the DSM-IV BPD diagnosis in a sample of 91

outpatients. The factors again were comprised of 1) instability of identity and

interpersonal problems, 2) affective instability, and 3) impulsivity. Results confirmed the

fit of the three-factor model. These findings are consistent with the previously described

factor analytic studies and provide evidence for stability of the presence of core

components across different definitions of the disorder.

In contrast, Selby and Joiner (2008) examined the latent structure of DSM-IV

BPD criteria as measured by the International Personality Disorders Examination

(Loranger, Sartorius, Andreoli, Berger, Buchheim, Channabasavanna, et al., 1994)

across an ethnically diverse community sample. Their findings suggested the presence of

four factors across three ethnic groups. Although the factors were not extracted in the

same manner for each group, they were labeled cognitive disturbance (e.g. dissociation under stress), affective dysregulation (e.g. moodiness), disturbed relatedness (e.g. chaotic relationships), and behavioral dysregulation (e.g. suicide/self-injury).

Results of factor analyses examining broadly defined diagnostic behaviors, signs, and symptoms of borderline personality demonstrate consistency with many of the components derived from factor analyses of diagnostic criteria; however, the studies of broad band diagnostic behaviors provide evidence for further refinement of the components. Grinker, Werble, and Drye (1968) conducted the initial and most comprehensive examination of those core elements of borderline syndrome. In this study 51 hospitalized patients considered to conform to the borderline syndrome were observed during their hospitalization and rated on 93 features representative of ego-functions. These ego functions were clearly defined and designed to measure the following attributes of the ego: 1) outward behavior (e.g. adaptation to reality, people), 2) perception (e.g. reality testing), 3) messages (i.e. language capacity) and 4) affects and defenses (i.e. regulation and control of drives/defensive functions) (Grinker, et al., 1968, p. 46). All variables were then subjected to cluster and factor analysis which resulted in four factors all variants of the borderline syndrome shared: 1) anger as a primary affect, 2) defects in affectional relationships, 3) unstable self-identity; and 4) chronic depression and loneliness. Grinker, et al., (1968) deemed these four elements to be the core components of the borderline syndrome.

Although this initial investigation was completed prior to the development of diagnostic criteria, Morey (1988) additionally examined the core elements of BPD

utilizing a broader base of diagnostic criteria. Clinicians completed a checklist of features representing all DSM-III and DSM-III-R personality disorder criterion exhibited in a sample of patients diagnosed with any personality disorder. Those 32 features that correlated with the clinical diagnosis of BPD were then subjected to a factor analysis and five factors were obtained. The five factors were labeled 1) defects in self-other individuation, 2) interpersonal distrust, 3) self-destructiveness, 4) defects in the control of anger and other affects, and 5) inconsistency/impulsivity. These factors corresponded closely to those obtained by Grinker et al. (1968) as well as the findings of the previously described studies. Taken together, these studies suggest that inclusion of a multitude of personality disorder criteria and symptoms that relate to the BPD diagnosis assesses a broader range of content of the borderline personality disorder construct than the BPD criteria themselves (Blais, Hilsenroth, & Castlebury, 1997) and resulted in greater refinement of the core self-disturbances and interpersonal problems. Given the evidence from previous research suggesting identity and interpersonal problems to be highly related and represent one component; the current findings alternatively suggest that these constructs are separate elements– as has been suggested by APA's (1994) description of the disorder. Thus, if these components are in fact distinct elements, one can infer that they have differing underlying mechanisms.

Further support for the notion of distinct interpersonal and identity disturbance components can be found in studies of adolescents with BPD. It is widely accepted that BPD has an onset prior to adulthood (e.g. Becker, Grilo, Edell, & McGlashan, 2002); however, all of the reviewed studies examine these core components in adults for whom

if the disorder is present, the underlying mechanisms have likely already become relatively fixed and may obscure the ability to clearly elucidate the core components of the disorder. One study has examined the factor structure of the DSM-III-R BPD criteria in a sample of adolescents (Becker, McGlashan, & Grilo, 2006). An important aspect of their findings was the fact that no single criteria represented a core feature of the disorder, as indicated by a significant relationship between one criterion and all other criteria – a typical occurrence in studies with adults. The factor analysis of dimensional DSM-III-R BPD criteria established a four-factor structure. The factors were characterized by 1) self-negating/depressive affects, 2) affective dysregulation/identity disturbance, 3) interpersonal dysregulation, and 4) impulsivity/identity disturbance. The loading of identity disturbance on several components suggests that the identity disturbance criteria likely permeates the BPD diagnosis and may represent another distinct core feature of the disorder in this sample. This finding is supported by another study from this group (Becker, Grilo, Edell, & McGlashan, 2002) who demonstrated the "identity disturbance" criteria as well as the criteria "affective instability" and "uncontrolled anger" to be the best overall predictors of a BPD diagnosis in this adolescent sample.

The DSM has described the essential features of BPD to include instability in affect, self-image, interpersonal behaviors, and impulsivity (APA, 2000, p. 706). Two components affect dysregulation and behavioral dysregulation (impulsivity); have been clearly defined across several studies to be central to the disorder. Disturbances in interpersonal relationships and identity are also central to the disorder, but evidence is

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mixed regarding their importance as individual components versus a single, highly correlated, component. Despite the mixed findings, the current study will follow suit with APA's definition and consider the identity and interpersonal components to be distinguishable entities that exert different influences on other components of the disorder. The theoretical literature articulates the interrelationships of the core components of the disorder and serves as a useful framework for understanding the underlying mechanisms of borderline personality.

Core Components and Their Primacy

Affective Dysregulation

The affective instability component is commonly regarded as a defining feature of borderline personality disorder linking it to other mood disorders such as major depression and bipolar disorder (e.g. Akiskal, Chen, Davis, Puzantian, Kashgarian, & Bolinger, 1985). Those with BPD are characterized as having a generally dysphoric mood, with a heightened reactivity and emotional vulnerability (typically negative), as well as dysfunctional emotional regulatory responses (APA, 2000). Consistent with those with mood and anxiety disorders, those with BPD generally report elevated negative affect (Conklin, Bradley, & Westen, 2006) such as dysphoric mood (Yen, Zlotnick, & Costello, 2002), hopelessness and anger (Freeman, Stone, Martin, & Reinecke, 2005), chronic feelings of anxiousness (Conklin & Westen, 2005), and aversive inner tension (Stiglmayr, Grathwol, Linehan, Ihorst, Fahrenberg, & Bohus, 2005). Moreover, these individuals consistently report lower levels of positive affect (Conklin, Bradley, & Westen, 2006) and a diminished capacity to coordinate mixed

valence emotions (Levine, Marziali, & Hood, 1997). Affect in BPD is not temporally stable and is more reactive than normal. Those with BPD moods tend to fluctuate more rapidly, more frequently, and tend to be of greater intensity. For instance, Trull, Solhan, Tragesser, Jahng, Wood, Piasecki, and Watson (2008) found that patients with BPD reported a greater degree of affective variability and instability, greater frequency of mood changes, and a greater magnitude of mood changes, as measured by the PANAS, over a 28-day period relative to patients with major depressive or dysthymic disorder. Other research examining affective instability in patients with BPD has demonstrated similar deficits in affective instability (e.g. Cowdry, Gardner, O'Leary, Leibenluft, & Rubinow, 1991; Ebner-Priemer, Kuo, Kleindienst, Welch, Reisch, Reinhard, et al., 2007) with negative emotional states persisting longer (e.g. Stiglmayr et al., 2005). The nature of affective instability specific to BPD has been found to be limited to the affects of anger, anxiety, and oscillations between depression and anxiety (Koenigsberg, Harvey, et al, 2002). The rapid fluctuation and variability in these mood states is thought to be attributable to hyper-responsiveness to stressors and other emotional stimuli in BPD (Linehan, 1993).

Extant research examining this proposed general emotional reactivity in BPD has received mixed support. There has failed to be consistent evidence for heightened physiological reactivity in BPD (Herpertz, Gretzer, Steinmeyer, Muehlbauer, Schuerkens, & Sass, 1997; Kuo & Linehan, 2009); however, studies examining emotional reactivity utilizing subjective ratings have demonstrated more consistent support for heightened reactivity in BPD. Individuals with BPD have been found to

demonstrate differential reactivity to anger and sadness in response to teasing (Tragesser, Lippman, Trull, & Barrett, 2008) and greater emotional lability in response to interpersonal stressors (Zeigler-Hill & Abraham, 2006). Moreover, despite this evidence for a heightened reactivity response, emotional reactivity in BPD appears to be less generalized (e.g. Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2010) and more likely to occur in response to more self relevant stressors. For example, Gratz, Rosenthal, Tull, et al., (2010) demonstrated that individuals with BPD reported greater emotional reactivity to a stressor that included a negative feedback evaluation of the individual, compared to a general stressor task. In sum, much of the research highlights the prominent negative affectivity and emotional hyperreactivity among those with BPD, suggesting that subjective ratings of emotional reactivity may be most altered by personally salient stressors.

Primacy of Affective Dysregulation. One model asserts affective dysregulation as the primary component that may be driving the remaining components of BPD (e.g. Linehan, 1993). Linehan (1993) proposes that individuals with BPD have a general vulnerability to experience negative affect and are thus affectively unstable. From this perspective, the other components of BPD serve as a means to regulate periods of intense affect or other outcomes of emotion dysregulation. For example, impulsive behaviors would be viewed as an ineffective and maladaptive coping strategy when one is overwhelmed with negative affect. Thus, an individual experiencing extreme distress may impulsively harm himself or herself by cutting their body in an effort to reduce feelings of distress. Additionally, threats of suicidal or other impulsive behaviors can

elicit support from one's environment, which in turn can help to regulate affect. Emotional stability is also postulated to be a prerequisite for the development of a stable sense of identity; therefore, individuals with unpredictable emotions have impeded the formation of a stable sense of self. This relationship is not necessarily a direct path, according to Linehan's theory (1993). Specifically, the theory suggests identity diffusion may occur as a result of impulsive or dysregulated behaviors, cognitive inconsistencies, or other efforts to inhibit an emotional response. Thus, it is possible there is a direct causal pathway between affect dysregulation and identity disturbance, or this relationship may be mediated by impulsive behaviors. The final component, unstable interpersonal relationships are theorized to be a product of both identity diffusion and an inability to appropriately regulate emotions. For example, individuals who experience extreme emotional reactivity and low thresholds for activation may readily express these emotions in relationships, sabotaging their ability to maintain a healthy relationship. Moreover, individuals who have constantly fluctuating views of themselves and their values or ideals may invite particular reactions from others.

The primary role of affect as a precipitating factor for other components of BPD is the central basis for Dialectical Behavior Therapy (DBT; Linehan, 1993), a treatment designed for individuals with this disorder. DBT is a comprehensive, multifaceted treatment program that has received experimental support suggesting its effectiveness in reducing disturbances in several of these core components (Bohus, Haaf, Simms, Limberger, Schmahl, Unckel, Lieb, & Linehan, 2004; Linehan, Armstrong, Suarez, Allmon, & Heard, 1991; van den Bosch, Koeter, Stijnen, Verheul, & van den Brink,

2005; Yen, Johnson, Costello, & Simpson, 2009). For example, Harley, Baity, Blais, & Jacobo (2007) examined the effectiveness of the DBT skills group in reducing the four BPD components, as measured by the PAI-BOR scale, in an outpatient sample. The DBT treatment in general and specifically the skills group, targets all four core components of the disorder simultaneously by emphasizing emotion regulation skills, interpersonal effectiveness skills, distress tolerance skills (impulsivity/suicidality), and mindfulness skills (identity disturbance). Patients in this skills group demonstrated significant improvement in the areas of affect dysregulation, impulsivity (self-harm), and interpersonal dysfunction; however, there was no improvement in identity disturbance. Additional research has examined the impact of DBT skills use on BPD features in the context of the larger DBT treatment program (Stepp, Epler, Jahng, & Trull, 2008). Borderline features, as measured by the PAI-BOR scale, were reassessed after each skills component module in a 12-month treatment program. Affective instability and negative relationships were significantly improved over the course of the treatment; however, when accounting for patients self-reported use of the DBT skills, those who used the skills more frequently demonstrated significant improvements in the affective instability, negative relationships, and identity disturbance features of the disorder (Stepp, et al., 2008). Overall, much of the research examining DBT treatment suggests it is effective in reducing disturbances in the core components. However, the treatment study findings do not directly address the primacy of the affective dysregulation component posited by Linehan's model. DBT treatment is designed to target each component individually rather than allowing the enactment of mechanisms underlying

the core components to unfold; thus, evidence supporting the effectiveness of the multifaceted treatment should not be considered strong support for this model.

There is a paucity of research examining the centrality of affect regulation directly and existing research findings are mixed. For example, Tragesser, Solhan, Schwartz-Mette, and Trull (2007) examined the longitudinal relationships between affective instability and BPD features of identity disturbance, self-harm/impulsivity, and negative interpersonal relationships, as measured by the Personality Assessment Inventory (PAI; Morey, 1991). The Personality Assessment Inventory Borderline Features scale (BOR; Morey, 1991) is comprised of four subscales designed to assess each of the core components of borderline personality functioning; affective instability (BOR-A), identity disturbance (BOR-I), negative relationships (BOR-N), and self-harm (BOR-S). In this study, participants were screened using the PAI-BOR scale at age 18. Those individuals were divided into two groups based on their scale scores. The above-threshold group was classified based on PAI-BOR scores two standard deviations above the mean score for community participants (≥ 38), whereas the below-threshold group, obtained scores less than this value (< 38). Individuals were then randomly selected from the larger groups for continuing participation in the study and attempts were made to sample an equal number of participants based on BOR threshold status and gender. These individuals were contacted again two years later (at age 20) and asked to complete the PAI-BOR scale (N = 361; 169 above-threshold; 192 below-threshold). The potential primacy of affective instability was examined using a series of path analyses to predict Wave 2 BOR subscale scores from Wave 1 affective instability scores. Their findings

were consistent with Linehan's theory (1993) suggesting that affective dysregulation problems best predicted subsequent impulsivity, interpersonal dysfunction, and identity disturbance issues. Tragesser, Solhan, Brown, Tomko, Bagge, and Trull (2010) attempted to replicate this finding (using the same sample) with another measure of BPD, the Revised Diagnostic Interview for Borderlines (DIB-R; Zanarini, Gunderson, Frankenburg, & Chauncey, 1989) which also breaks the BPD diagnosis into four main components – affect, cognition, impulse action patterns, and interpersonal relationships. The results were consistent such that negative affect predicted the cognitive and interpersonal features of BPD; however, impulsivity scores were not able to be accounted for in this model. In another study, Jacob, Gutz, Bader, Lieb, Tuscher, and Stahl (2010) tested the influence of state and trait emotions on behavioral impulsivity, as measured by performance on a Stop Signal task, a measure of behavioral disinhibition, in a sample of patients diagnosed with BPD and healthy controls. These authors found no differences between groups in the number of reactions during the Stop trials (indicator of behavioral disinhibition). Using state and trait measures of anxiety and anger, they tested for the influence of these emotions on behavioral impulsivity and found that only state anger was significantly associated with behavioral disinhibition in the BPD group, whereas neither affect was associated with impulsivity scores in the healthy control group (Jacob, Gutz, Bader, Lieb, Tuscher, & Stahl, 2010). It should be noted that trait levels of affect were not controlled for in these analyses, indicating a possible source of explanation for the observed relationships. Evidence from these studies suggests the role of affective instability as a primary component in BPD;

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however, the observed inconsistencies in findings across studies and the exertion of effects only when a specific affect is present illuminate the possibility of an alternative explanation.

Additionally, inconsistencies have been demonstrated in the limited experimental examinations of affective instability as a predictor of other BPD core components. For instance, Chapman, Leung, and Lynch (2008) demonstrated that individuals with high BPD features self-report greater difficulty inhibiting impulses when they are emotionally distressed. However, behaviorally, negative emotional states did not increase the likelihood of impulsive behaviors in a passive-avoidance learning task compared to low BPD individuals. In contrast to the self-report findings, negative emotional states in high BPD individuals instead facilitated their performance on the behavioral task. Moreover, Miller, Gaughan, Pryor, & Kamen (2009) examined the effects of a depressive affect induction on performance on an impulsivity task and social behavior in individuals with Cluster B personality disorders. Their results suggested depressive affect was not associated with poorer delay of gratification (impulsivity measure) or more aggressive social behavior in individuals with greater BPD features.

Furthermore, Chapman, Dixon-Gordon, Layden, and Walters (2010) experimentally examined BPD features as a potential moderator of the relationship between fear (a negative emotional state) and impulsivity in an undergraduate sample. Their findings suggested that those individuals with high levels of borderline personality features who viewed a fear inducing film clip exhibited greater impulsivity on a passive-avoidance learning task, a measure of impulsivity, in comparison to those with high

levels of BP features who completed a neutral mood induction (viewing colors on a screen) task. In contrast, those with low levels of borderline personality features exhibited greater impulsivity in the neutral mood induction condition, compared to those with high levels of BP features; however, those with low borderline features did not exhibit greater impulsivity compared to the neutral condition or those with high borderline features.

Other researchers have underscored the importance of the interaction between emotional and inhibitory systems through the use of an emotional linguistic Go/No Go task. For example, Silbersweig et al. (2007) demonstrated a significant deficit in behavioral inhibition for BPD patients during no-go trials utilizing BPD-specific negative emotion words, compared to neutral and positive valence words. Sprague and Verona (2010) further examined impairments in behavioral responding as a function of the emotional context using a similar emotional-linguistic go/no go paradigm which included a diagnostically-specific negative word condition; however, their sample included individuals with high levels of both borderline and antisocial features. Their findings suggested that individuals with high levels of borderline-antisocial features exhibited greater impairments in behavioral responding in both the negative word condition and the diagnostically relevant negative word condition. The duration of the behavioral impairment in the high borderline-antisocial group was greatly affected by the word category such that impairments were only seen in the initial block for the negative word condition, but the impairments seen in the diagnostically relevant negative word condition were evident for a prolonged period of time.

In sum, there is a significant amount of literature suggesting the primary role of affective dysregulation as a primary component driving the other components of the disorder. However, the extant empirical research findings provide a number of inconsistencies with those hypothesized relationships. These inconsistencies may be due to differential effects of distinct negative emotional states, the study methodology, or more importantly, they may suggest the possibility of the primacy of some alternative component of borderline personality disorder.

Impulsivity

Impulsivity is a core component of BPD that has been implicated in the development (Zanarini, 1993) and trajectory (Links, Heslegrave, & van Reekum, 1999) of the disorder. Impulsivity has been broadly defined as a personality construct that is comprised of a number of domains including dysfunctional impulsivity, sensation seeking, risk-taking, boredom susceptibility, inability to delay gratification, impulsive aggression, and disinhibition (e.g., Depue & Collins, 1999; Perry & Carroll, 2008; Whiteside & Lynam, 2001). The impulsivity criterion of BPD, according to DSM-IV, most closely resembles a propensity for risk-taking behaviors and nonspecific impulsive behaviors. For example, individuals with BPD typically engage in behaviors such as reckless driving, substance abuse, or sexual promiscuity that lack forethought. Such behaviors endanger the individual with BPD and place others at risk (APA, 2000). Moreover, deliberate acts of self-harm such as suicidal and parasuicidal behaviors are also considered risk-taking behaviors. The inherent broadband nature of impulsive BPD behaviors reflects more of a symptomatic presentation of the disorder, rather than the

underlying construct of impulsivity responsible for the production of these behaviors. Research efforts have attempted to further elucidate the impulsivity component of the disorder through examination of specific domains of the construct as outlined above.

Individuals with BPD have been characterized as having difficulty with delaying gratification, or they are perceived to be more likely to seek the immediate benefits and fail to consider long-term consequences. Several studies have examined this phenomenon in BPD individuals and found mixed evidence. For example, Berlin, Rolls, and Iversen (2005) examined time perception in BPD individuals, others with orbitofrontal cortex lesions (an area associated with disinhibition and impulsivity), and healthy controls. Time perception is inherent in the delay of gratification/delay discounting tasks as overestimating elapsed time is likely to contribute to one's inability to delay gratification. Individuals who overestimate elapsed time are thus likely to be anticipating the reward at a much earlier time point, relative to those who underestimate the amount of elapsed time. Results were consistent with this notion such that individuals with BPD had a faster perception of time than comparison groups (Berlin, Rolls, & Iversen, 2005). However, in actual delay discounting tasks when rewards were made available, individuals with BPD did not respond differently than non-BPD individuals (Coffey, Schumacher, Baschnagel, Hawk, & Holloman, 2011; Dougherty, Bjork, Huckabee, Moeller, & Swann, 1999).

Inconsistent evidence has also been found with regard to the impulsivity domain of impulsive aggression. Despite having clear interpersonal implications, aggression is primarily studied as an indicator of impulsivity. Impulsive aggression has been defined

as "a hair-trigger aggressive response to provocation with loss of behavioral control" (Bornovalova, Lejuez, Daughters, Rosenthal, & Lynch, 2005; p. 793), which can be directed towards the self (e.g., self-harming behaviors) or others. For example, individuals with BPD report greater impulsive aggression than healthy controls and these responses also correlate with actual aggressive behaviors (Dougherty et al., 1999). Furthermore, individuals with BPD reported greater physical aggression, verbal aggression, anger, and hostility compared to individuals with other personality disorders and matched controls (McCloskey, New, Siever, Goodman, Koenigsberg, Flory, & Coccaro, 2009). Impulsive aggression has also distinguished between various diagnostic groups and BPD. The most frequently used task of impulsive aggression is the Point Subtraction Aggression Paradigm (PSAP; Cherek, Spiga, & Egli, 1992) that measures aggressive responses to periodic losses of "money", which are attributed to responding of a fictitious other person. Two studies have examined this task in individuals with BPD. Dougherty et al., (1999) compared BPD patients' aggressive responses, as indicated by pressing a button to subtract "money" from the other person, on this task to the performance of healthy controls. Their findings suggested that individuals with BPD responded with a significantly greater number of aggressive responses compared to healthy controls. McCloskey et al., (2009) also utilized the PSAP paradigm to examine impulsive aggression in BPD, other personality disorders, and healthy controls. Their findings suggest BPD individuals exhibited significantly more aggressive behaviors compared to healthy controls; however, they did not differ from individuals with other personality disorder diagnoses. This finding is limited as it suggests that impulsive

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aggression is not sufficiently unique to BPD and is actually a symptom of other personality disorders as well.

The most consistent evidence for the core impulsivity impairment in BPD is the domain of behavioral disinhibition. Response inhibition reflects the notion that individuals with impulsivity concerns have deficits in their abilities to inhibit a prepotent response (Bornovalova, Lejuez, Daughters, Rosenthal, & Lynch, 2005). Individuals with BPD are theorized to differ in their ability to learn to inhibit a previously exhibited response, or demonstrate passive avoidance. Impulsivity in this domain is believed to contribute to repeated acts of deliberate self-harm as well as other impulsive behaviors exhibited by individuals with BPD (Chapman, Gratz, & Brown, 2006). The Go/No Go paradigm is frequently used to assess behavioral disinhibition. In this task, participants are required to execute a behavioral response (Go) or suppress this response (No Go) depending on the stimulus that is presented. Behavioral disinhibition is measured by the number of errors of commission or the number of instances in which a participant presses "Go" when they should not. There have been a number of studies examining behavioral disinhibition of individuals with BPD utilizing the Go/No Go paradigm. For instance, Leyton, et al. (2001) found significant differences in the number of commission errors committed between a group of healthy controls and those diagnosed with BPD who were medication free. The magnitude of this relationship was similar across gender with a large effect size difference (Cohen's d; Cohen, 1988) estimated to be 1.39 for males and 1.37 for females; suggesting that those with BPD, demonstrated a greater propensity to make commission errors. Similar results with regard to errors of

commission were obtained in samples of BPD patients seeking outpatient treatment (Mortensen, Rasmussen, & Haberg, 2010) and inpatient samples (Rentrop, Backenstrass, Jaentsch, Kaiser, Roth, Unger, Weisbrod, & Renneberg, 2008). These deficits in impulse control of individuals with BPD have been specific to the domain of errors of commission and did not manifest in other aspects of this task (e.g. reaction time, errors of omission).

Similar paradigms examining behavioral response inhibition have generally found consistent results. For example, Coffey, Schumacher, Baschnagel, Hawk, & Holloman (2011) examined differences in response inhibition in a sample of individuals diagnosed with BPD and a comorbid substance use disorder (BPD-SUD), those with BPD alone, and a sample of matched controls. Given the overlap of impulsivity concerns in both substance use disorders and BPD, the study sought to discern the specificity of certain impulse control domains to BPD. Using a GoStop task, they found that individuals with BPD and BPD-SUD groups failed to inhibit their responses significantly more than those in the control group (BPD vs. control $d = 1.26$; BPD-SUD vs. control $d = .90$); however, there was no significant difference between the BPD groups and the effect size difference was small ($d = .30$; Coffey, et al., 2011). The lack of a significant difference between the two groups suggests that behavioral response disinhibition is not likely due the presence of a substance use disorder, but rather reflects core impairment in BPD. Moreover, significant deficits in behavioral disinhibition have also been found utilizing a passive avoidance task with incarcerated females diagnosed with BPD (Hochhausen, Lorenz, & Newman, 2002). Houchhausen et al. (2002) found

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incarcerated females with BPD committed significantly more passive avoidance errors (commission errors) than a female offender sample who did not meet criteria for BPD. These authors also conducted analyses controlling for the presence of comorbid anxiety, depression, and antisocial personality disorder diagnoses – all believed to potentially impact impulsivity in an incarcerated sample – and found the group differences in these errors remained significant. This study again supports the notion that behavioral disinhibition is a core feature of impulsivity specific to BPD.

In sum, the research consistently highlights impulsivity as a core deficit in BPD. Those with BPD report broad deficits in impulsivity; however, this finding does not translate to all domains of impulsivity. Evidence for increased impulsivity in experimental paradigms has been mixed, though it appears that the most consistent and largest effects are demonstrated in the behavioral disinhibition domain.

Primacy of Impulsivity. Some authors have suggested that impulsivity may serve as the primary feature of BPD (e.g. Zanarini, 1993) by accounting for the relationships amongst other components of the disorder. Although Zanarini (1993) initially conceptualized BPD as an impulse-spectrum disorder, the mechanisms of the disorder were not clearly articulated and much of the support for these claims was based solely on family history and diagnostic phenomenological studies. Others (e.g. Coccaro, & Kavoussi, 1991; Cocarro, Siever, & Klar, 1989; Tyrer & Bateman, 2004) have argued the impulsivity and impulsive aggression seen in BPD reflect underlying biological abnormalities, which, in conjunction with environmental influences, can produce other core aspects of the disorder.

A psychosocial treatment has not been developed in accordance with this model. However, several studies have examined the use of psychopharmacological treatments targeting impulsivity and impulsive aggression in BPD. Although interpersonal dysfunction and identity disturbances are not the primary targets of pharmacological interventions others have suggested (e.g. Coccaro & Kavoussi, 1991; Cocarro, Siever, & Klar, 1989) that these components may remit when the severity of the impulsivity and impulsive aggression diminish. In contrast, affective disturbances in BPD have frequently been examined as the primary target for pharmacological interventions and these medications are typically in a similar class (e.g. another selective serotonin reuptake inhibitor, SSRI), or the same, as those used to treat impulsivity. Several studies examining the effectiveness of pharmacological treatments targeting the impulsivity and impulsive aggression features of BPD have demonstrated significant decreases in the targeted symptoms as well as diminished affective disturbances with selective serotonin reuptake inhibitors (SSRIs; fluoxetine; e.g. Zanarini, Frankenburg, & Parachini, 2004) and selective serotonin and norepinephrine reuptake inhibitors (duloxetine; Bellino, Paradiso, Bozzatello, & Bogetto, 2010). In contrast, other studies have noted improvements only in impulsivity/impulsive aggression with the SSRI fluoxetine (New, Buchsbaum, Hazlett, Goodman, Koenigsberg, Lo, Iskander, Newmark, Brand, Flynn, & Siever, 2004) and other pharmacological treatment studies using SSRI's have failed to demonstrate any significant improvements (Rinne, van den Brink, Wouters, & van Dyck, 2002). Despite these seemingly promising findings for treatment according to this model, it cannot be concluded that the reduced impulsivity and impulsive aggression led

to the changes in affective dysregulation. Affective disturbances generally, and those seen in BPD, have similar neurobiological underpinnings and systems involved as impulsivity and impulsive aggression, thus the direction of the operating mechanisms is unclear. Furthermore, there is no evidence that psychopharmacological treatments for impulsivity lead to improvement in the interpersonal and identity components of the disorder. These findings therefore only provide week support for establishing primacy of the impulsivity component.

Evidence for the directional pathways between components has been documented with respect to studies examining the longitudinal course of BPD. Specifically, Links, Mitton, and Steiner (1990) found that with respect to the four subsections of the Diagnostic Interview for Borderlines (DIB), higher levels of impulsivity in previously hospitalized patients with BPD was the only significant predictor of the presence of BPD psychopathology at two years follow-up. In another study, Links, Heslegrave, and van Reekum (1999) examined the course of BPD over a 7-year period using the DIB at three time intervals (baseline, 2 years, and 7 years). Their findings suggest that the impulsivity, social adaptation, and psychosis (cognitive) subscales of the DIB were highly stable over the course of the study; however, only initial scores on the impulsivity subscale differentiated between patients whose diagnosis remitted (those with low scores) versus persisted (those with high scores). In addition, the impulsivity subscale was predictive of the affective and cognitive components at the 7-year follow up. Most notably, their findings suggest that impulsivity was a better predictor of affective and cognitive features of the disorder at follow-up than the initial levels of these components

(Links, Heslegrave, & van Reekum, 1999). These results suggest that impulsivity may further dysregulate emotional and cognitive features of the disorders, consistent with theoretical predictions. This finding may occur because after individuals engage in impulsive behaviors (e.g. cutting), they may find that they still feel empty inside and experience greater negative affect in response. However, impulsivity failed to predict disruptions in interpersonal functioning. In contrast to these findings, Tragesser, Solhan, Schwartz-Mette, and Trull (2007) failed to find support for a model implicating impulsivity as the driving component of BPD in a naturalistic longitudinal study. As was reported earlier, their findings indicated that affective dysregulation was the best predictor of the remaining components of the disorder. Tragesser, Solhan, Brown, Tomko, Bagge, and Trull (2010) also failed to find support for this model of impulsivity as the driving component, utilizing the DIB – R, another measure of BPD. These naturalistic studies have thus demonstrated inconsistent evidence for the inter-relationships of the core components of BPD. Additionally, there have been no experimental studies attempting to establish primacy of impulsivity.

Interpersonal Dysfunction

The interpersonal dysfunction component of BPD refers to the unstable and intense external relationships that are characteristic of individuals with BPD as well as interpersonal misperceptions. Extant empirical research suggests that interpersonal dysfunction is readily evident in individuals with BPD across a variety of social domains. Generally, those with BPD are described as more submissive, quarrelsome, and less dominant compared to healthy controls (Russell, Moskowitz, Zuroff, Sookman, &

Paris, 2007). Stepp, Pilkonis, Yaggi, Morse, & Feske (2009) used a social interaction diary (SID) paradigm to examine the quantity of social interactions and the interpersonal and emotional experiences during these interactions for individuals with BPD, another personality disorder, and no personality disorder. Their findings suggested that those with BPD interact with significantly fewer individuals compared to those without a PD diagnosis. Furthermore, they characterized the quality of these interactions as more disagreeable, expressing greater ambivalence and experiencing more negative emotions during interpersonal situations than those with other personality disorders and no PD. For example, Trull (1995) and Trull, Useda, Conforti, and Doan (1997) found that individuals with greater borderline personality features, as measured by the Personality Assessment Inventory (PAI; Morey, 1991), reported greater interpersonal distress at baseline and 2 years later relative to those with low levels of borderline features. Clifton, Pilkonis, & McCarty (2007) examined the composition and quality of social networks of individuals with BPD and those without a personality disorder diagnosis. Social networks were determined by asking participants to indicate 30 people who had been most important in their lives during the past year. Their findings suggested that compared to individuals without personality disorder diagnoses, those with BPD had stopped speaking with approximately 31% (as compared to 9%) of the members of their network, reported greater overall conflict, reported lower levels of trust for close members of their social network, and their social network included more former romantic partners.

The interpersonal domain of romantic relationships has also been extensively examined in individuals with BPD and provides a unique context to examine the core DSM-IV-TR (APA, 2000) interpersonal criteria of frantic efforts to avoid abandonment (both real and imagined) and unstable and intense interpersonal relationships. For instance, Hill, et al. (2008) found BPD to be associated with greater social dysfunction, specifically, more severe romantic dysfunction than individuals with antisocial personality disorder or Axis I disorders. Selby, Braithwaite, Joiner, and Fincham (2008) also found BPD symptomatology to predict current relationship dysfunction, even after controlling for a major depressive disorder diagnosis. The nature of the relational dysfunction in this study closely corresponds to the diagnostic criteria as this variable was comprised of measures assessing the level of closeness to partner, level of stress and conflict exhibited in the relationship, and the occurrence of disturbances in the relationship including breakups, betrayals, and arguments (Selby, et al., 2008). Moreover, at the subclinical level, borderline personality features have also been found to be positively associated with the number of relationships one is involved with, incidences of chronic and episodic stress, as well as lower romantic partner satisfaction over the course of a prospective 4-year study (Daley, Burge, & Hammen, 2000). Given the lack of specificity of relational disturbances to individuals in the social network or specific social domains, it is plausible the dysfunction is a manifestation of difficulties in the intrapersonal domain (e.g., Stanley & Siever, 2010).

A significant amount of research has examined the association between interpersonal misperception and borderline personality. Borderline personality disorder

has been associated with impaired and maladaptive representations of self and others, which contain erroneous expectations regarding social situations (Agrawal, Gunderson, Holmes, & Lyons-Ruth, 2004; Bender & Skodol, 2007; Fonagy, 1991; Scott, Levy, & Pincus, 2009). Generally, individuals with BPD tend to view others as having more malevolent intentions (Layden et al., 1993) in more extreme terms (Veen & Arntz, 2000), and as predominantly negative (Arntz & Veen, 2001), than those without the disorder. Previous research suggests that borderline personality features impact the perceptual accuracy of one's own and others' interpersonal behaviors. For instance, Hopwood (2008) demonstrated that individuals with borderline personality features described their own interpersonal behavior as more affiliative than others who knew them well. In addition, those with borderline personality features were hyper-perceptive to others' attempts to control; however, their ratings were more accurate, or consistent with their interaction partner's, than those without BP features. Moreover, Sadikaj, Russell, Moskowitz, and Paris (2010) found individuals with BPD to perceive others' behaviors as less communal and less agreeable which lead to negative affective reactions. The perceptions therefore are not based on the objective behavior of the social interaction partner (or the self), but rather on the basis of their own previous interpersonal experiences in the attachment system. Thus, perceptions of attempts to control or coldness from an interaction partner pose a threat to their sense of security and may suggest that the other person is not trustworthy leading to further disruptions in the interpersonal process.

One interesting paradigm used to study interpersonal dysfunction in BPD involves an experimental, economic social-exchange paradigm called the "Trust Game". This paradigm engages ones' capacity to appropriately sense and respond to others social signals, by examining the pattern of exchange of monetary units between partners. Recent research has utilized this methodology to examine the interpersonal behavior of individuals with BPD during social interactions. King-Casas, Sharp, Lomax-Bream, Lohrenz, Fonagy, & Montague (2008) examined the social exchange norms of the rupture and repair of cooperation in participants with BPD utilizing a multi-round variant of this game involving an investor and trustee. Cooperation in the game is signaled by behavior that mutually benefits both players, whereas a rupture, or break in cooperation is signaled by failure to contribute back to the initial investor. Their findings suggested that across rounds of the game, those dyads with a BPD trustee invested significantly less compared to dyads without a member with BPD, indicating a breakdown in cooperation. As many interpersonal exchanges experience a break in cooperation, King-Casas, et al. (2008) were also interested in possible actions to prove trustworthiness or repair the broken cooperation. Attempts to prove trustworthiness, termed "coaxing" behaviors, were defined as the trustee repaying a large fraction of the investment to the investor (after receiving a minimal investment). They found healthy players were more likely to perform coaxing behaviors than those with BPD (King-Casas, et al., 2008). These findings suggest a significant impairment in trust behaviors of those with BPD, such that those with this disorder exhibit difficulty in social exchanges as well as in repairing interpersonal relationships when there are disruptions.

Unoka, Seres, Aspan, Bodi, and Keri (2009) further examined interpersonal trust behaviors in BPD individuals, compared to those with major depressive disorder and healthy controls. Specifically, participants were asked either to invest money where the payoff depended on either another person (trust) or impersonal luck (random lottery); however, they were not informed of how much money was transferred back. Patients with BPD invested significantly less than controls and patients with major depressive disorder in the trust game. However, the groups did not differ in their investments during the luck game. Moreover, those with BPD predicted a less favorable outcome in the trust game as compared to the other groups.

Together these findings suggest that individuals with BPD experience significant impairments in their interpersonal functioning that may in part originate from difficulties in person perception. Misperceptions of their own behavior, as well as others' behaviors and intentions, results in mistrust and failures in their own relationships in addition to impairments in their ability to recognize and repair disruptions during interpersonal transactions.

Primacy of Interpersonal Dysfunction. A number of theoretical accounts propose unstable interpersonal relationships as a primary aspect of BPD that may be driving the remaining components of the disorder (e.g. Benjamin, 1996; Horowitz, 2004; Pincus, 2005; Wiggins, 1991). Individuals with BPD have abnormal attachment relations that may be the result of constitutional vulnerability (Bateman & Fonagy, 2006), previous interpersonal experiences, or a combination of the two (Bateman & Fonagy, 2006; Pincus, 2005). According to interpersonal theorists, all individuals' early interpersonal

experiences have a particular structure to which they develop a preferred style of responding. The structure of these experiences is then re-enacted in one's adult interpersonal relationships (Benjamin, 1996). It is argued that the source of personality disorders is the development of early maladaptive interpersonal patterns. For instance, individuals with BPD frequently report exposure to chaos in their early home environment. This chaos may take the form of dramatic interpersonal exchanges or constantly shifting statuses in relationships (e.g. adoring a child for their behavior, and then retracting one's love). Children internalize these exchanges and then later enact them in their adult relationships. For example, a child who experiences love from their parents and then immediately has that revoked to only be returned again unpredictably, may engage in a similar giving/retracting of love relationship with their romantic partner. Benjamin (1996) asserts that these maladaptive interpersonal patterns result in constantly shifting affective states, interpersonal relationships, self-image, and behavior. Moreover, the repetition of these patterns as an adult contributes to more proximal changes in each of these domains. Thus, although early interpersonal relationships establish these maladaptive patterns, more proximal enactments of the patterns may contribute to the disturbances seen in the other domains of BPD.

The premises of interpersonal theories of BPD have been examined through psychosocial treatments developed according to the theory. Interpersonal psychotherapy (IPT; Klerman, Weissman, Rounsaville, & Chevron, 1984) is a structured treatment that was developed based on the premise that early and current interpersonal relationships influence psychopathology and one's psychopathology always occurs in an interpersonal

context. Treatment focuses on four interpersonal themes that contribute to and/or follow the onset of a psychological disorder, including: complicated grief, role disputes, role transitions, and interpersonal deficits (Weissman, Markowitz, & Klerman, 2000). IPT was originally found effective in the treatment of major depressive disorder, but has since been applied and found efficacious for the treatment of a number of Axis I disorders (e.g. dysthymic disorder, bulimia nervosa, bipolar disorder; Weissman, Markowitz, & Klerman, 2000). Recently Markowitz, Bleiberg, Pessin, & Skodol (2007), adapted IPT for the treatment of individuals with BPD (IPT-BPD). Revisions to the treatment included addressing the chronicity of BPD, difficulties with treatment alliance, suicidality, and added a fifth area of focus, self-image (identity) concerns that are specific to this population. Preliminary findings have suggested the efficacy of 8 months of treatment in reducing affective disturbances as well as a significant reduction in the number of diagnostic criteria met as measured by the DIPD (Markowitz, Bleiberg, Pessin, & Skodol, 2007). Bellino, Rinaldi, and Bogetto (2010) further examined the IPT-BPD treatment when provided in conjunction with antidepressant (fluoxetine) medication as compared to antidepressant treatment alone. Their findings suggested that individuals who received the combined treatment demonstrated superior improvement in the domains of affective instability, interpersonal relationships, and impulsivity as measured by the BPD-Severity Index, an interview assessing the severity and frequency of BPD symptoms (Bellino, Rinaldi, & Bogetto, 2010). Thus, it appears that IPT modified for use in borderline patients contributes to a reduction in symptoms across several components of the disorder. However, the modification of IPT to address self-

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image (identity) concerns makes the treatment more BPD relevant, but also confounds the interpretation of the intervention as purely interpersonal in nature. Nonetheless, despite such modifications, no significant changes were seen in the identity domain.

Further supporting evidence for interpersonal primacy stems from empirical studies. For instance, Links et al. (2007), using an experience sampling methodology, had individuals with BPD rate their current mood states and record specific details about their current interpersonal situation, including whether their current mood state was influenced by current or recent events (from the previous days). Participants indicated that they considered 30% of their mood states during the study period to be triggered by characteristics of the current interpersonal situation. Despite these promising findings, Links et al. (2007) methodology randomly selected when participants completed mood measures throughout the day and then asked whether or not they believed this mood state was due to their current interpersonal situation. This methodology is limited as it relies on participants' attributions to determine the link between interpersonal situations and the resulting mood states. Event-contingent recording methodology does not rely on such attributions as it addresses this question directly by having participants complete ratings of affect following every interpersonal interaction. Sadikaj, Russell, Moskowitz, and Paris (2010) utilized the event-contingent methodology to examine the direct link between interpersonal situations and affective reactivity in individuals with BPD. They found BPD participants' perceptions of their partner's interpersonal behavior elicited negative affective variability. Furthermore, Tragesser, Lippman, Trull, and Barrett (2008) examined individuals with BPD features' emotional and behavioral reactions to

imagined teasing scenarios. Their findings indicated that individuals with higher levels of borderline features were more likely to report they would feel angry and sad in response to the teasing scenario. Moreover, these individuals also indicated they would actually engage in hostile behaviors such as glaring, or responding with a mean comment.

In sum, the existing data supporting the role of interpersonal dysfunction as the core deficit and driving force of the BPD components are promising. Much of the extant research supports a direct link between interpersonal disturbances and affective responses; however, there is much less support for the link between interpersonal disturbances and the impulsivity component. Moreover, treatment targeting the primary interpersonal dysfunction evident in BPD has failed to demonstrate improvements in the identity component of the disorder suggesting the potential primacy of that component.

Identity Disturbance

The construct of identity has been defined a number of ways across a number of domains of psychology. Erikson (1964) initially coined the term identity to reflect a developmental process in which individuals develop a unified self-image that integrates the concept of ourselves in relation to others. The successful outcome of this process resulted in an individual with a consistent and cohesive sense of self and others, while failure to successfully navigate this process results in identity diffusion. This identity diffusion is an integral feature of Kernberg's (1984) influential model of borderline personality organization. Kernberg defines identity diffusion as "represented by a poorly integrated concept of the self and of significant others . . . reflected in the subjective

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experience of chronic emptiness, contradictory self-perceptions, contradictory behavior

that cannot be integrated in an emotionally meaningful way" (Kernberg, 1984, p 12).

This implies that identity is comprised of two fundamental aspects 1) the specific content

of the self and 2) the coherence about the self, others, and the self across time. The first

aspect, the content of one's self, typically can be thought of by answering the question,

"Who am I?" The second aspect, the coherence of the self and others, is best understood

by the degree in which the individual is able to integrate, process, and organize different

aspects of the self. An individual with BPD would have a rather impoverished and

fragmented self-description, providing very few details about their self (as well as their

relationships) that are not connected well or the connections are not easily understood.

The limited research available with regard to identity has focused on the content of BPD

individuals' identity, although it is typically confounded with the coherence aspect

(Jorgensen, 2009). For example, individuals with BPD provide self-descriptions that are

typically negative (de Bonis, De Boeck, Lida-Pulik, Hourtane, & Feline, 1998); they use

more opposing terms to describe themselves (de Bonis, De Boeck, Lida-Pulik, & Feline,

1995), and they report more maladaptive self-schemas (Nilsson, Jorgensen, Straarup, &

Licht, 2010). Recent research has begun to highlight and describe the coherence aspect

of identity as it manifests in borderline personality disorder. For instance, Wilkinson-

Ryan and Westen (2000) completed a factor analysis of therapist rated identity

functioning and disturbances most characteristic of patients with BPD compared to those

with other and no personality disorder diagnosis. Their findings suggested that those

with BPD tend to define themselves in terms of a single role that seems unusual or

stigmatizing (e.g. victim of sexual abuse, or a display of tattoos/piercings); have a subjective sense of a lack of coherence of their identity; demonstrate inconsistencies in thoughts, feelings, and behaviors; and they lack a commitment to aspects of their identity. The painful incoherence factor, comprised of items indicating a sense of "false self", a lack of continuity of self over time, and a sense of emptiness, best distinguished the patients with BPD. Additionally, Lovasz (2009) recently examined the relationship between identity coherence and borderline personality features using self-report methodology as well by coding narrative life-stories from McAdams' Narrative Life Story Interview (LSI; McAdams, 1995) paradigm. She found that individuals' scores on the PAI-Borderline features scale were significantly positively associated with measures of identity coherence, such that those with greater borderline personality features reported greater disturbances in their identity coherence. Participants also completed a LSI, which was then coded for narrative coherence, or the ability to integrate, organize, and tell a story about the self. The results suggested that borderline personality features were significantly negatively associated with narrative coherence, such that participants with greater borderline features were less able to integrate and organize stories about their self (Lovasz, 2009). Thus, individuals are able to report the sense of incoherence and others are able to identify and rate identity coherence in individuals, but attempts to successfully operationalize the coherence (consolidation) of identity have been limited. One method utilized by Hopwood and Morey (2007), operationalized inconsistencies in item responding on a self-report measure of affiliation and control as a manifestation of lack of coherence. They found that individuals with greater borderline personality

features demonstrated greater inconsistencies with respect to affiliation and control.

Other studies (e.g. Zeigler-Hill, & Abraham, 2006; Tolpin, Gunthert, Cohen, & O'Neill, 2004) have utilized experience-sampling methodologies to examine the consistency in self-esteem over time. Their findings indicated that individuals with high levels of borderline personality features exhibit both generally low levels of self-esteem as well as greater inconsistencies in their self-esteem over time. Despite these promising findings, the literature has yet to develop an experimental paradigm to manipulate identity coherence without confounding this with the content of one's identity.

Primacy of Identity Disturbance. As with the other components of BPD, various theoretical accounts posit identity disturbances as the primary component driving the remaining features of the disorder (Clarkin, Hull, & Hurt, 1993; Jorgensen, 2006; Kernberg & Caligor, 2005). As mentioned, borderlines lack a coherent sense of self and others including contradictory self-perceptions, feelings of emptiness, behaviors that are inconsistent with emotional experience and poorly defined object relations (Kernberg, 1975, p.12). The identity disturbance characteristic of borderline personality organization, as defined by Kernberg (1984) reflects a deficit in the normal identity integration process. Failure to develop an integrated sense of identity contributes to persistent negative affect states and poor modulation of those affects. Moreover, Kernberg argues that these identity disturbances lead to chronically distorted and disturbed interpersonal interactions (Kernberg & Caligor, 2005). Impulse control problems are also hypothesized to be a direct result of this diffuse sense of identity, such

that individuals without an integrated view of themselves may engage in such behaviors to regulate the distress associated with their current internal state.

Consistent with the primacy of identity disturbances, Bateman and Fonagy (2004) assert that individuals with BPD have developed disturbances in their internal mental representations of self and others (identity). Interpersonal interactions continuously influence the ongoing development and coherence of the self and identity. Specifically, mental representations of interpersonal experiences allow one to attribute beliefs, intentions, desires, and so forth to themselves and others. Moreover, the emotional instability and impulsive actions characteristic of the disorder flow from the maladaptive interpretations and understandings of interpersonal behaviors (Bateman & Fonagy, 2004). For example, individuals with BPD may have experienced significant rejection and criticism in their early interpersonal relationships and therefore internalized a representation of self as "bad" and others as controlling. In a new interaction, the individual with BPD may interpret another's friendly behavior as manipulative and respond with any of a range of negative affects as well as maladaptive interpersonal responses. Despite several differences between Fonagy and Bateman and Kernberg's models regarding the developmental processes leading to BPD, both models assert the primacy of identity concerns and similar interrelationships of the remaining core components.

Although the mechanisms of BPD according to this model have been articulated, there have not been any efforts to naturalistically or experimentally examine the tenets. Several naturalistic studies conducted with adolescents have provided support for the

pervasiveness of identity disturbances in borderline personality. For example, Pinto, Grapentine, Francis, and Picariello (1996) found impairments in self-concept (identity disturbance) to differentiate adolescents with BPD and comorbid major depressive disorder (MDD) from adolescents with MDD alone, suggesting the core identity deficit in BPD to not be an artifact of depressive severity. Additionally, Bradley, Conklin, and Westen (2005) examined those SWAP-200-A items that were common to the multiple subtypes their research established of BPD adolescents. Despite the significant heterogeneity of symptoms and behaviors of those who met DSM-IV BPD criteria, only two items that represented 1) a lack of stable self-image and 2) emotional lability represented core components of the disorder in this age range. The findings regarding identity disturbance as a core disturbance in adolescents with this disorder are consistent with Erikson's (1964) proposal that the coalescence of identity is a key process that occurs during adolescence and individuals vary greatly in the degree to which this occurs.

The primary support for this model is based on the associated psychotherapy treatments, Transference-Focused Psychotherapy (TFP), which focuses on promoting identity consolidation (Clarkin, Yeomans, & Kernberg, 1999) and Mentalization-based Therapy (MBT), which focuses on the capacity to understand one's own perceptions and understanding of the self and others (Fonagy, & Bateman, 2006). TFP has demonstrated significant effectiveness with respect to the domain of impulsivity as evidenced by significant reductions in suicide attempts, fewer hospitalizations, decreased severity of self-harming behaviors, decreased aggression, and improvement on self-report measures

of impulsivity (Clarkin, Levy, Lenzenweger, & Kernberg, 2007). TFP has also been effective in improving affect (depression and anxiety) as well as interpersonal relationships, as evidenced by improvements in attachment relationships and on social adjustment measures (Clarkin, Levy, Lenzenweger, & Kernberg, 2004; Levy, Meehan, Kelly, Reynoso, Weber, Clarkin, & Kernberg, 2006). Consistent with the object relations theoretical articulation of the disorder, those receiving TFP also demonstrated substantial gains in their reflective functioning abilities (integration of mental representations of self and others) and evidenced greater improvement in their personality organization, an indicator of identity consolidation (Doering, et al., 2010). The effectiveness of this treatment targeting identity consolidation to demonstrate improvements in all four components of BPD is promising for understanding the mechanisms underlying BPD. Furthermore, MBT was developed based on the premise that deficits in mentalization capacity are the core impairment of BPD and efforts to ameliorate this impairment will lead to changes in the other core components of the disorder. Bateman and Fonagy (1999) examined the efficacy of MBT for patients diagnosed with BPD in a partial hospitalization setting over the course of 18 months. Compared to patients receiving standard psychiatric care, those in the MBT treatment group demonstrated significant improvements with respect to impulsive behaviors such as suicidality and self-harming behaviors; affective improvements, including fewer anxiety and depression symptoms as well as decreased severity of distress symptoms; and interpersonal and social functioning. Treatment gains were continuously demonstrated at both 18-month and 8-year follow-up across all areas of functioning

(Bateman & Fonagy, 2001; 2008) as well as significant improvements on the four domains of BPD (affect, cognitive, impulsivity, and interpersonal) as assessed by the Zanarini Rating Scale for Borderline Personality Disorder. These findings were replicated over the course of an 18-month period when the MBT treatment was administered in an outpatient setting in comparison to a structured clinical management approach (Bateman & Fonagy, 2009).

Given the dearth of research examining this model and the promise of the associated treatments, the current study will experimentally examine the role of identity disturbance as a driving mechanism for the affective, impulsive, and interpersonal components of the disorder.

The Current Study

The goal of the current study was to test the hypothesis that alterations in identity coherence in borderline personality disorder serve as a triggering mechanism that leads to subsequent changes in the affective, interpersonal, and impulsive components of the disorder. If disturbances in identity are a primary mechanism in BPD, then manipulations that may either promote or challenge identity coherence may produce changes in the remaining components for those with BPD. Such changes might also be observed in non-personality disorder controls; however, these individuals would be expected to be less susceptible to these efforts. As most of the previous support for a primary component for BPD involves the affective component, and to further elucidate the processes underlying the disorder, affective reactivity was examined as a mediator of the relationship between identity and the interpersonal/impulsivity components.

In order to examine the effects of identity disturbances, it was necessary to develop an experimental paradigm that had the potential to manipulate the coherence of identity. To date, the clinical literature has not produced such a paradigm; however, the social cognition literature provides a paradigm that utilizes metacognitive experience as a means of altering one's perceived coherence of their true self knowledge (Schwarz, 1998; Schwarz, Bless, Strack, Klumpp, Rittenauer-Schatka, & Simons, 1991; Schwarz & Clore, 1996). This paradigm effectively separates the content associated with a particular topic and the fluency, or coherence, by relying upon judgments of subjective experiences while processing information about that topic (Schwarz, et al., 1991). Thus, it makes it a plausible mechanism to separate the content from the fluency, or coherence, of one's identity, which has previously been significantly confounded in the literature. Although this paradigm was originally developed for use in the cognitive domain, it has since been adapted to better understand and influence perceptions of coherence related to true self-knowledge (Schlegel, Hicks, King, & Arndt, 2009). For example, Schlegel, Hicks, Arndt, and King (2011) instructed participants to list either 5 or 18 words to describe their true self and rate the ease of this experience. A judgment based on the recalled content of their true self would result in individuals who recalled 18 words about their true self to rate this task as easier than those who were asked to list 5 words about their true self. In contrast, if the judgment relied upon the coherence, or perceived fluency of the task, individuals who were asked to list 5 words would rate this task as easier than those who listed 18 words. Their results demonstrated that participants who were asked to list 5 descriptors rated the task as easier than those who were asked to list 18

descriptors. Furthermore, those who listed the 5 descriptors, or those who perceived their true self more coherently, also reported higher meaning in life than those participants who were asked to list 18 descriptors. This task was chosen as a manipulation of identity coherence for the current study based on this paradigms ability to separate content and fluency (coherence) of true-self knowledge.

The primary aim of the current study was to experimentally investigate the hypothesis that efforts to manipulate identity coherence in BPD would demonstrate primacy in driving changes in the remaining components of BPD. Previous research examining the primacy of the affective, impulsivity, and interpersonal components has resulted in inconsistent findings. To date, there have not been any attempts to examine the primacy of the identity disturbance component, despite the promising evidence of the associated psychosocial treatments (Bateman & Fonagy, 2001; 2008; Clarkin, Levy, Lenzenweger, & Kernberg, 2007). The current study utilized a paradigm borrowed from the social cognition literature to manipulate the coherence of identity for individuals with and without BPD. Self-report measures of affective reactivity and behavioral tasks measuring interpersonal disruptions and impulsivity were completed as markers of change in the core components of BPD. This approach is novel in that it is one of the first experimental investigations of the primacy of identity coherence in BPD and findings can aid in the development and validation of treatments for BPD. Specifically, this study sought to address the following aims:

*Specific Aim 1:*To determine if identity in borderline personality disorder is more responsive to a manipulation of clarity (coherence) of self-concept compared to non-personality disordered controls.

Specific Aim 2: To determine if a manipulation of identity coherence leads to changes in behaviors reflecting other major components of borderline personality disorder including:

a) Affective reactivity

b) Impulsivity

c) Interpersonal behavior

*Specific Aim 3:*To determine if the relationship between identity and interpersonal problems/impulsivity are mediated by affective reactivity, such that symptomatic behaviors result from emotional reactions triggered by disequilibration of identity.

PILOT STUDY

Methods

A pilot study was conducted to examine whether the effectiveness of a manipulation of one's perceived coherence of identity is differentially affected by participant's level of borderline personality features. Participants were 123 college students (63, or 51.2% of whom were males) between the ages of 17 and 26 years (M = 19.03, SD = 1.47) who completed the experiment in exchange for course credit. Represented ethnicities included 77.2% Caucasian, 10.6% Hispanic, 4.9% were of more than one ethnicity, 3.3% Asian-American, 2.4% were African-American, and 1.6% was of other ethnicity.

Measures

Personality Assessment Inventory (PAI) Borderline Features scale (BOR; Morey, 1991). The 24-item PAI-BOR scale was constructed with four subscales (Affective Instability, Identity Disturbance, Negative Relationships, and Self-Harm) targeting the different theoretical elements of Kernberg's conceptualization of borderline personality organization as well as those identified by empirical research on BPD. Participants respond to a 4 point scale ranging from "False, or Not at all True" to "Very True". In the present study, the PAI-BOR demonstrated adequate score reliability (α = 0.84).

Self-Concept Clarity Scale (SCC; Campbell, Trapnell, Heine, Katz, Lavallee, & Lehman 1996). The 12-item SCC scale assesses "the extent to which the content of an

individuals' self-concept is clearly defined, internally consistent, and temporally stable"
(Campbell, et al., 1996, p. 141). The clarity of one's self-concept is considered to be
theoretically independent of the content. Items are rated on 5-point scale ranging from
"strongly disagree" to "strongly agree." In the present study, the SCC demonstrated
adequate internal consistency ($\alpha = 0.87$) and high test-retest reliability ($r = 0.86$).

Procedure

When participants arrived at the laboratory, they were escorted to private
computer stations and informed consent was obtained. Participants were instructed that
they were going to be asked to complete several tasks to "explore the ways that people
describe and think about different aspects of the self". All portions of the experiment
were administered in the computer program MediaLab and the protocol was adapted
from Schlegel, Hicks, King, and Arndt (2011). Participants were then randomly assigned
to one of two conditions, to manipulate the ease or difficulty of the self-description task.
The 61 participants (49.6%) assigned to the "easy" condition and asked to write down 5
self-descriptors. The "difficult" condition was comprised of 62 participants (50.4%) who
were asked to write down 18 self-descriptors. All participants first completed several
measures unrelated to the purpose of the study as well as the PAI –BOR scale and the
SCC scale. The following instructions then appeared on the screen:

> *A great deal of recent research has examined how the average college student*
> *describes different aspects of their selves (e.g. their true selves, their everyday*
> *selves). In this next task we would like you to think about how you would*
> *describe one specific part of your self. The part of the self that we would like you*

to think about is the TRUE SELF. Specifically, we would like you to think about the characteristics, roles, or attributes that define who you really are – even if those characteristics are different than how you sometimes act in your daily life or how you would like to be.

Participants assigned to the "easy" condition then received the following instructions:

Research suggests that most college students can easily think of 5 words that describe their true self. They often report that these words are very "vivid" and come to mind "easily".

We want you to think of the 5 words that best describe your true self and easily come to mind for you. Take a moment and think of these words. It may help to first close your eyes in order to make these words easily come to mind. You will be asked to list these words on the following screen.

Again, just write down the words that come to mind easiest. That is, just write down the 5 words that best describe your true self.

Remember, your true self is who you think you really are - even if those characteristics are different than how you sometimes act in your daily life or how you would like to be.

(On following screen) Please list the 5 best words that describe your true self in the space below. Remember, your true self is who you think you really are - even if those characteristics are different than how you sometimes act in your daily life or who you would like to be.

Participants assigned to the "difficult" condition received the following instructions:

> *Research suggests that most college students can easily think of 18 words that*
> *describe their true self. They often report that these words are very "vivid" and*
> *come to mind "easily".*
>
> *We want you to think of the 18 words that best describe your true self and easily*
> *come to mind for you. Take a moment and think of these words. It may help to*
> *first close your eyes in order to make these words easily come to mind. You will*
> *be asked to list these words on the following screen.*
>
> *Again, just write down the words that come to mind easiest. That is, just write*
> *down the 18 words that best describe your true self.*
>
> *Remember, your true self is who you think you really are - even if those*
> *characteristics are different than how you sometimes act in your daily life or how*
> *you would like to be.*
>
> *(On the following screen) Please list the 18 best words that describe your true*
> *self in the space below. Remember, your true self is who you think you really are*
> *- even if those characteristics are different than how you sometimes act in your*
> *daily life or who you would like to be.*

Upon completion of the task, all participants rated one item that assessed how easy it was to think of the words to describe themselves on an 11-point scale. They then completed the SCC scale and demographic questions. All participants were debriefed and received course credit for their time.

Results

Participants obtained PAI-BOR scores ranging from 36 to 85T, with a mean of 56.24 (*SD* = 10.26). A t-score of 65 was selected as the point to split the sample for the remaining analyses. Thus, scores 65t or above on the BOR scale were classified as "high borderline features" (*N* = 25) and scores below 65t were considered "low borderline features" (*N* = 98).

To assess the effectiveness of the manipulation an independent samples t-test was conducted. Results revealed a significant mean difference in perceived ease of the task (*t* = 3.42, *p* < .01). Consistent with the findings of Schlegel, et al. (2011), participants who were asked to list 5 self-descriptors rated the task as easier (*M* = 7.26, *SD* = 2.52) than participants who were asked to list 18 self-descriptors (*M* = 5.68, *SD* = 2.62) representing a medium effect size of *d* = 0.61.

A 2 (borderline status; high BOR/low BOR) by 2 (difficulty; 5 word/18 word) ANOVA, was conducted to examine whether the groups differed in their self-reported perceived ease of completing the task. The main effect of borderline status was significant (*F*[1,119] = 12.92, *p*< .001) as well as the main effect of difficulty (*F*[1,119] = 4.81, *p*< .05); however, the interaction between borderline status and difficulty was not significant (*F*[1,119]= 1.70, *p* > .05). Planned contrast analyses were then performed to compare the impact of borderline features status within both conditions. Within the easy condition, there was a large difference in the ratings of easiness of the task between participants with low borderline features (*N* = 48, *M* = 7.83, *SD* = 2.05) compared to participants with high borderline features (*N* = 13, *M* = 5.15, *SD* = 3.02) with an effect

size of $d = 1.04$. In the difficult condition, there was medium effect size difference in the ease ratings ($d = 0.46$) of the task between participants with low borderline features ($N = 50$, $M = 5.92$, $SD = 2.53$) and those with high borderline features ($N = 12$, $M = 4.67$, $SD = 2.84$). These findings suggest that individuals with high borderline features report greater difficulty generating words to describe themselves, a relatively easy task for individuals with low borderline features. Additionally, regardless of borderline status, participants reported greater difficulty generating 18 words to describe themselves; however, the largest difference between borderline and non-borderline groups occurred in the 5-word condition.

Finally, a 2 (borderline status; high BOR/low BOR) by 2 (difficulty; 5 word/18 word) repeated measures ANOVA was conducted to examine whether the difficulty of the task and borderline features differentially impacted changes in participants' self-concept clarity. The main effect of time, borderline status, and condition were not significant; nor was the three-way interaction. A planned comparison analysis of change in self-concept clarity for the borderline features groups within the 5-word condition was then conducted. Participants with high borderline features exhibited an increase in self-concept clarity, reflecting an effect size of $d = 0.41$. In contrast, participants with low borderline features did not exhibit change in self-concept clarity ($d = 0.03$).

In sum, these findings suggest that individuals with high borderline personality features self-report significant difficulty generating words to describe their true self and they also perceive their true-self knowledge to be less coherent than individuals with low borderline features. The greatest difference in self-reported ease between borderline and

non-borderline groups occurs in the 5-word ("easy") condition. Despite their perceived difficulty of this task, individuals with high levels of borderline features exhibit improvements in their self-concept clarity; whereas individuals with low borderline features do not. Regardless of borderline status, change in self-concept clarity was not observed in the 18-word ("difficult") condition. Taken together, these findings suggest that the greatest potential differential impact between high and low borderline individuals upon the coherence of identity and self-concept occurs in the 5-word condition. These preliminary findings suggest that this condition may represent a novel paradigm for exploring the manipulation of identity coherence in individuals with borderline personality features.

MAIN STUDY

Methods

Participants

Participants were undergraduate students (N = 398) who received course credit in exchange for their participation and were screened for borderline personality features as described below. The data for 10 participants were incomplete due to interruptions during the experiment (e.g. fire alarm) and problems with electronic recording of data, resulting in a final sample of 388 subjects. Participants were between the ages of 17 and 23 (M= 18.77, SD = 0.94) and 66.5% (N=258) were female. Overall, 285 (73.5%) participants were Caucasian, 68 (17.5%) were Latin-American, 21 (5.4%) were Asian-American, 6 (1.5%) were Black, 8 (2.1%) were of other ethnicity.

Measures

Demographics. Participants completed a self-report questionnaire that asked about age, ethnicity, education, recent substance use, and a list of any current medications (e.g. antidepressants).

Personality Assessment Inventory (PAI). The PAI (Morey, 1991) is a 344-item self-report inventory of broad used to assess non-borderline psychopathology potentially relevant to the current study. The Borderline Features (BOR) scale was constructed with the core elements of borderline personality in mind, with four subscales (Affective Instability, Identity Disturbance, Negative Relationships, and Self-Harm) targeting different theoretical elements. These elements correspond to the core components

outlined by the DSM-IV (APA, 2000) and in the introduction section. The BOR scale in

isolation has been found to distinguish borderline patients from unscreened controls with

an 80% hit rate, and successfully identified 91% of these subjects as part of a

discriminant function (Bell-Pringle et al., 1997). Classifications based upon the BOR

scale in college students have been validated in a variety of domains related to

borderline functioning, including depression, personality traits, coping, Axis I disorders,

and interpersonal problems (Trull, 1995; Trull, Useda, Conforti, & Doan, 1997).

Participants completed the PAI-BOR scale as part of the pre-screening phase and again

during the experimental portion of the study. Those whose BOR score was >70T were

placed in the High BOR group; whereas those participants whose BOR score was <60T

were classified as Low BOR. Test-retest reliability for BOR scale scores from pre-

screening to experimental session was 0.88.

Personality Diagnostic Questionnaire--4 Borderline Personality Disorder Scale

*(*PDQ-4 BPD; Hyler, 1994). The PDQ-4 is a true-false, self-report measure of DSM-IV

personality disorders, including borderline personality disorder. The PDQ-4 has

demonstrated adequate reliability and convergent validity with other self-report

measures (e.g. Trull, Widiger, Lynam, & Costa, 2003) and structured interviews of BPD

(Hyler, Skodol, Kellman, Oldham, & Rosnick, 1990).The PDQ-4 BPD scale was

administered during the experimental session to establish convergent validity of

borderline groupings as determined by the PAI-BOR scale. In the current study, the PDQ

Borderline Personality Disorder scale demonstrated good internal consistency ($\alpha = .72$).

Self-Concept Clarity Scale (SCC; Campbell, Trapnell, Heine, Katz, Lavallee, & Lehman 1996). The 12-item SCC scale assesses "the extent to which the content of an individuals' self-concept is clearly defined, internally consistent, and temporally stable" (Campbell, et al., 1996, p. 141). The clarity of one's self-concept is considered to be theoretically independent of the content and items are rated on 5-point scale ranging from "strongly disagree" to "strongly agree." The SCC has previously demonstrated sensitivity to interventions targeting the core components of borderline personality disorder (Roepke, Schroder-Abe, Schutz, Jacob, Dams, Vater, et al., 2011). In the present study, the SCC scale demonstrated high internal consistency ($\alpha = .93$).

Self Assessment Manikin (SAM). The SAM (Bradley & Lang, 1994) is a pictorial assessment comprised of 2 items that measures the pleasure (valence) and arousal of a person's affective reaction. Respondents are given a graphic depiction of various points along each dimension and are asked to indicate their response on a 9-point rating scale. The SAM has been used in a variety of studies to measure affective responses, including studies of individuals with borderline personality disorder (Marissen, Meuleman, & Franken, 2010).

Behavioral Tasks

Interpersonal Trust Task. The interpersonal trust task is a behavioral economic exchange game developed by Kosfeld, Heinrichs, Zak, Fischbacher, and Fehr (2005) and adapted for use with borderline patients by Unoka et al. (2009). For this task, all participants played the game with a computer program, but were led to believe they were playing with another participant in the same room or a nearby room (if only one

participant was signed up). All participants were assigned to the role of "investor" and informed their "partner" was assigned to be the "trustee". Participants were given standardized instructions on the computer screens at the beginning of the experiment. All participants were informed they were given an initial endowment of $20 and could send as much of this amount to the trustee (other player) using the numbers of the keyboard. All participants were informed the experimenter would triple the amount they sent, then the trustee would receive information regarding the transfer via the internet (this amount would appear on their screen; e.g. if the investor transfers $5, the trustee will be informed that they have received $15 from the investor for a total of $35). Participants (investors) were then told the trustee can send any amount between zero and the total amount of money they have available back to the investor. However, the participants would not be informed about the amount of the back transfer. Participants completed 5 consecutive transactions with the same "partner". Before each new transaction, the participant began with $20. To increase motivation and incentive for this task, participants were told they would be given one entry for 2, $100 Amazon gift card drawings for every dollar earned at the end of the study. Due to the deception used, all participants were given one entry for the drawing. The amount of money transferred during each transaction was recorded.

GoStop Impulsivity Task. The GoStop task (Dougherty, et al. 2005) is a behavioral measure of response inhibition that has been adapted for use with participants with borderline personality disorder (Coffey, et al., 2011). Participants were presented with 2 blocks of trials, comprised of 160 randomly generated 3-digit numbers.

Consistent with the methodology of Dougherty et al. (1999), 25% of the numbers in each block will be presented as identically matched pairs (e.g. 839 and 839), 25% of the numbers in each block will be designated as stop trials, while the remaining 50% will be unmatched trials (e.g. 839 and 419). Participants were instructed to respond to matched number pairs by clicking the computer mouse (i.e. go trial) and to withhold responding if numbers do not match (i.e. novel trial). Participants were also instructed to inhibit their response if the second set of digits in a matched pair changed color from black to red (i.e. stop trial). Digits in these trials remained black for varying time intervals (50, 150, 250, or 350ms) before turning red. The150ms time interval has been found to detect differences between individuals with BPD and controls, with an effect size of $d = 1.26$ (Coffey, et al., 2011); however, the remaining stop delay intervals were included to prevent habituation from occurring. The dependent variable of interest in this study is the number of responses, or failures to inhibit a response, the participant makes during the stop trial. This value was recorded as the percentage of stop trials (commission errors) when an individual appropriately inhibited their response.

Procedures

Eligibility for participation was determined by participants' responses on the PAI-BOR scale administered during the Psychology Department's Subject Pool pre-screening phase at the beginning of each academic semester. Participants also completed the Self Concept Clarity (SCC) measure. Those individuals who met criteria, as outlined above, were contacted by the research team via email and referred to the Psychology Department's online sign up system. All participants were informed the experimental

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session would last approximately 2 hours and they would receive 4 research credits in exchange for participation. Up to six individuals could participate in a single session, with each session having openings for both High and Low BOR status individuals. Participants were randomly assigned to the control or experimental conditions prior to arriving at the study to ensure the computer software program could be set up upon arrival.

Upon arrival at the laboratory, participants were seated at a private computer station and informed consent was obtained from all participants. All participants were given a brief introduction to the study indicating that most of the experiment would take place on the computer. They were also informed the study would involve completing several personality questionnaires and tasks including one related to cognitive abilities and a task in which they would interact with another participant. All instructions for the interpersonal and impulsivity tasks were first presented in the MediaLab software. Participants then completed the PDQ- Borderline Personality questionnaire and state affect measures. Following these questionnaires, participants completed either the True-self manipulation or the control task as determined by random assignment. Those assigned to the true-self condition, received the instructions provided earlier in the pilot study section. Those participants assigned to the control condition were asked to complete the following task adapted from the WIAT-II Word Fluency subtest (Wechsler, 2002):

> *In this box we want you to write some words. Don't avoid using words you might*
>
> *misspell. We would like you to list 5 things that you can think of that are*

ROUND. For example, pizza could go on your list because a pizza is round.

Please list these 5 words in the space below.

This task was selected because it is most comparable to the experimental condition in that the task is sufficiently abstract, depends on verbal abilities, yet is relatively easy to complete as approximately 95% of individuals between the ages of 17 and 19 in the WIAT-II standardization sample were able to list at least 5 things that are round in a 60 second time period. Upon completion of the task, all participants completed a manipulation check by rating how easy it was to think of the words and a state version of the SCC scale. State affect measures were then repeated. Following this, the interpersonal trust task and impulsivity task described above were presented in a counterbalanced order and MediaLab and the GoStop software recorded data, respectively. The last portion of the experiment involved, participants completing the Personality Assessment Inventory and a demographics questionnaire, which included questions regarding current medication and illicit drug use. Finally, all participants were debriefed regarding the purpose of the study, given an entry form to complete for the gift card drawing, and granted psychology course credit in exchange for their participation.

Sample Size and Power

The main hypotheses of the current study centered on the relationship between coherence of identity and interpersonal dysfunction/impulsivity within the high BOR group. Statistical methods for estimating the necessary sample size for detecting mean differences are a function of three factors: a) the power, b) effect size, and c) the alpha level (Cohen, 1992). Standard conventions suggest that power is set to .80 and alpha =

.05. The results of our pilot data suggested that the manipulation of identity coherence results in an effect size of $d = 0.41$ for self-concept clarity change. Thus, in order to compute the necessary sample size for the t-test, we used SAS PROC GLMPOWER, which allows entry of specific cell means (taken from pilot data) rather than effect size estimates. The results of this analysis suggested a sample size of 194 for the high BOR group. However, to detect between group differences, a total sample size of 388 participants was necessary or 97 participants in each cell.

RESULTS

Following the 2 (High BOR/Low BOR) by 2 (identity relevant/control) between subjects design, participants were distributed across conditions as noted in Table 1. Analyses of variance and chi-square tests assessed differences across participant subgroups on age, education, sex, race/ethnicity, borderline personality features, the importance of winning the gift card, and affect valence and arousal prior to the experimental manipulation. Analyses comparing participant subgroups across education, sex, affective arousal, and race/ethnicity were not statistically significant suggesting there were no differences in these distributions across groups (see Table 1). There was a significant difference in mean age of the subgroups such that those with Low BOR features who completed the True-Self task ($M = 19.00$, $SD= 1.06$) were slightly older than the High BOR group who completed the control task ($M= 18.53$, $SD= 0.75$) following Bonferroni correction.

As expected based on selection criteria, those participants in the High BOR groups (both control and identity conditions) exhibited greater borderline personality features (PAI-BOR) compared to those assigned to the Low BOR groups (see Table 1). Administration of a second measure of borderline personality features (PDQ- 4 Borderline Personality Disorder scale) during the study demonstrated convergent findings with the PAI-BOR measure. In accordance with theoretical conceptualizations of BPD, there were statistically significant differences on affect valence between those with High BOR features and Low BOR features prior to the manipulation. Specifically,

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those with greater borderline personality features exhibited less coherent self-concepts and were less happy. However, there were not significant differences between subgroups on a measure of affective arousal. Subsequent analyses controlled for group differences on affect by either including these variables as covariates or computing residualized change scores (Cronbach, 1970), depending on the type of analysis and hypothesis.

We were also interested in the potential influence of how important it was to a participant to win the Amazon gift card in the interpersonal task on their actual behavior. We believed that this motivation may influence how much or how little the participant sent to the other player during the trust task. Our findings suggest differences in importance across the subgroups. Specifically, those with Low BOR features (regardless of condition) rated winning the gift card as more important compared to those with High BOR features who completed the true-self task (see Table 1). Due to the differences in importance potential influence on participant behavior, we included this as a covariate in our analyses examining interpersonal trust in the interpersonal task.

Borderline Personality and Identity Coherence

A 2 (borderline status; High BOR/Low BOR) by 2 (task; Control/True-Self) ANOVA, was conducted to examine whether the groups differed in their self-reported perceived difficulty of completing the task. The main effect of borderline status was significant, $F(1,384) = 17.71$, $p < .001$; as well as the main effect of task type, $F(1,384) = 5.81$, $p < .05$; however, the interaction between borderline status and difficulty was not significant, $F(1,384) = 0.04$, $p > .05$. Planned contrast analyses were then performed to compare the impact of borderline features status within both conditions. Within the

control condition, there was a medium effect size difference in the ratings of difficulty of the task between participants with low borderline features ($N = 116$, $M = 2.65$, $SD = 1.96$) compared to participants with high borderline features ($N = 83$, $M = 3.70$, $SD = 2.57$) with an effect size of $d = -0.47$ (see Figure 1). In the true-self condition, there was moderate effect size difference in the difficulty ratings ($d = -0.41$) of the task between participants with low borderline features ($N = 119$, $M = 3.27$, $SD = 2.13$) and those with high borderline features ($N = 70$, $M = 4.23$, $SD = 2.70$; see Figure 1). These findings suggest that individuals with high borderline features report greater difficulty generating words, a relatively easy task for individuals with low borderline features. Regardless of borderline status, participants reported greater difficulty generating words to describe their true selves; however, individuals with High BPD features in the true-self condition reported greatest difficulty generating words.
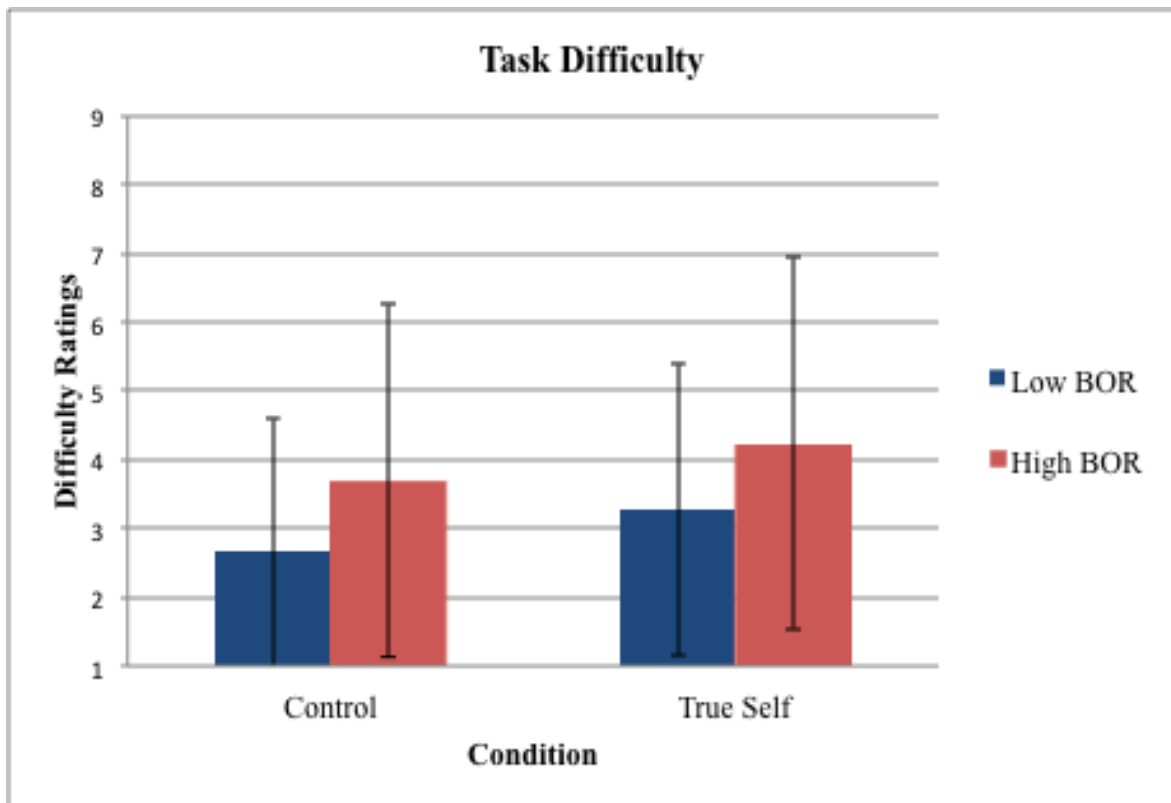
Figure 1. Ratings of task difficulty by borderline status and condition. This figure represents the self-reported difficulty ratings associated with completing the verbal fluency tasks as a function of borderline status and condition completed. Higher scores reflect greater difficulty completing the task.

Identity Coherence and Affect

A 2 (High BOR/Low BOR) x 2 (Control/True-Self) ANCOVA with affective arousal post-manipulation as the dependent variable and affective arousal pre-manipulation as the covariate was conducted to determine whether affective arousal was differentially impacted based on borderline status and the self-relevance of the manipulation. The results suggested that baseline affective arousal significantly

predicted post-manipulation arousal, $F(1, 383) = 547.34$, $p<.001$, $\eta_p^2 = .588$. The main

effect of borderline status approached significance, $F(1,383) = 3.33$, $p<.07$, $\eta_p^2 = .009$;

however, the main effect of condition failed to reach statistical significance, $F(1,383) =$

.19, $p>.05$. Further examination of group means indicated a trend for High BOR

participants to report greater arousal compared to Low BOR participants; however, this

effect was confounded by baseline differences across groups. The interaction of

borderline status and condition failed to reach statistical significance suggesting that

there was not a differential relationship between borderline features and whether or not

an individual completed the control or true-self manipulation ($F[1,383] = .13$, $p>.05$).

A second 2 (High BOR/Low BOR) x 2 (Control/True-Self) ANCOVA with

affective valence post-manipulation as the dependent variable and affective valence pre-

manipulation as a covariate was conducted to determine whether affective valence was

differentially impacted based on borderline status and the self-relevance of the

manipulation. Results indicated that pre-manipulation affective valence significantly

predicted post-manipulation affective valence, $F(1,383) = 405.77$, $p< .001$, $\eta_p^2 =.514$.

Additionally, there was a main effect of Borderline status, $F(1,383)= 9.86$, $p< .01$, $\eta_p^2 =$

.025. Examination of group means revealed that High BOR participants were generally

less happy ($M = 4.81$, $SD = 1.55$) than Low BOR participants ($M = 3.59$, $SD = 1.53$).

The main effect of condition ($F[1,383] = .12$, $p> .05$) and the interaction between BOR

status and condition ($F[1,383] = .82$, $p> .05$) both failed to reach statistical significance.

Together, these findings suggest that those with high levels of borderline personality

features generally report lower levels of happiness and a trend for greater affective

arousal compared to those with low levels of borderline personality features; however, they did not exhibit different affective reactions to this experimental task.

Identity Coherence and Impulsivity

A 2 (High BOR/Low BOR) x 2 (Control/True-self) x 2 (Order: Impulsivity/Interpersonal) ANOVA investigating the differential effects of Borderline status and identity relevant task completion on impulsive behavior indicated a significant three-way interaction, $F(1, 377) = 4.43$, $p < .05$. Further examination of the group means indicated that the relationship between borderline features and type of task completed depended on the order in which the impulsivity task followed the task. Specifically, when the impulsivity task immediately followed the control/true-self task, the degree to which participants appropriately inhibited their responses varied depending on participant's borderline status and the type of task they completed (see Figure 2). Results indicated that completing the True-Self manipulation had a differential effect for Low BOR and High BOR individuals. Low BOR individuals who completed the control task were generally more impulsive ($M = 60.28$, $SD = 20.86$) than Low BOR individuals who completed the true-self manipulation ($M = 68.16$, $SD = 21.08$), reflecting an effect size of $d = 0.37$. Among the individuals who completed the impulsivity task first, High BOR participants who completed the control task were less impulsive ($M = 59.44$, $SD = 23.34$) than High BOR participants who completed the True-Self task ($M = 52.24$, $SD = 24.40$). The main effect of Borderline status was significant, such that individuals who were High BOR were more impulsive than Low BOR individuals, $F(1, 377) = 4.38$, $p < .05$. The main effects of task type and order as well as the remaining interaction terms

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(BOR x Task type, BOR x Order, Task x Order) failed to reach statistical significance.

The means and standard deviations for both conditions and orders of presentation are

provided in Table 2.
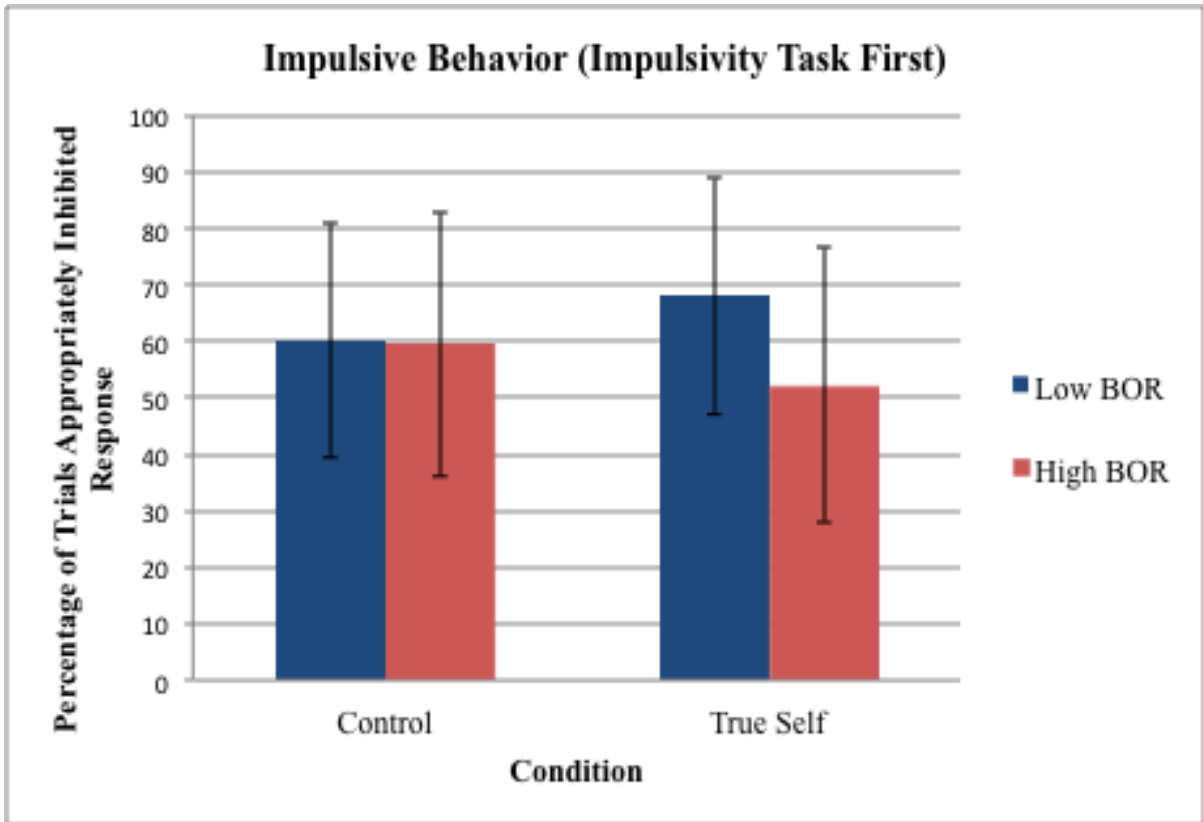
Figure 2. Performance on a behavioral disinhibition task as a product of borderline

status and condition. This figure reflects the percentage of trials that individuals

appropriately inhibited their response on the Go.Stop task. Higher numbers reflect better

impulse control (fewer commission errors). This figure only includes those participants

who completed the impulsivity task immediately following the manipulation.

Identity Coherence and Interpersonal Behavior

A 2 (High BOR/Low BOR) by 2 (Control/True-self task) by 2 (Order of tasks; Interpersonal/Impulsivity) factorial ANCOVA with importance of winning the gift card money as the covariate was conducted to examine whether interpersonal behavior was differentially affected by participants' borderline status, the fluency task they completed and the order in which the tasks were completed following the manipulation. We were specifically interested in the interpersonal behavior of those who completed the trust task immediately following the manipulation, as there was concern that the manipulation would have fleeting effects. Moreover, the completion of the impulsivity task prior to the interpersonal task may introduce additional influences on performance on the latter task, potentially obscuring the effects of the manipulation. The covariate, importance of winning the gift card to the participant was a significant predictor of the amount of money that participants sent to the other player. The three-way interaction (BOR x Task x Order), as well as the remaining interaction terms (BOR x Task, BORxOrder, Task x Order) all failed to reach statistical significance. Furthermore, the main effects of Borderline status, Task, and Order failed to reach statistical significance (see Figure 3). As mentioned previously, it was assumed that this test would be statistically underpowered to detect a three-way interaction. The means and standard deviations for this analysis are presented in Table 2.
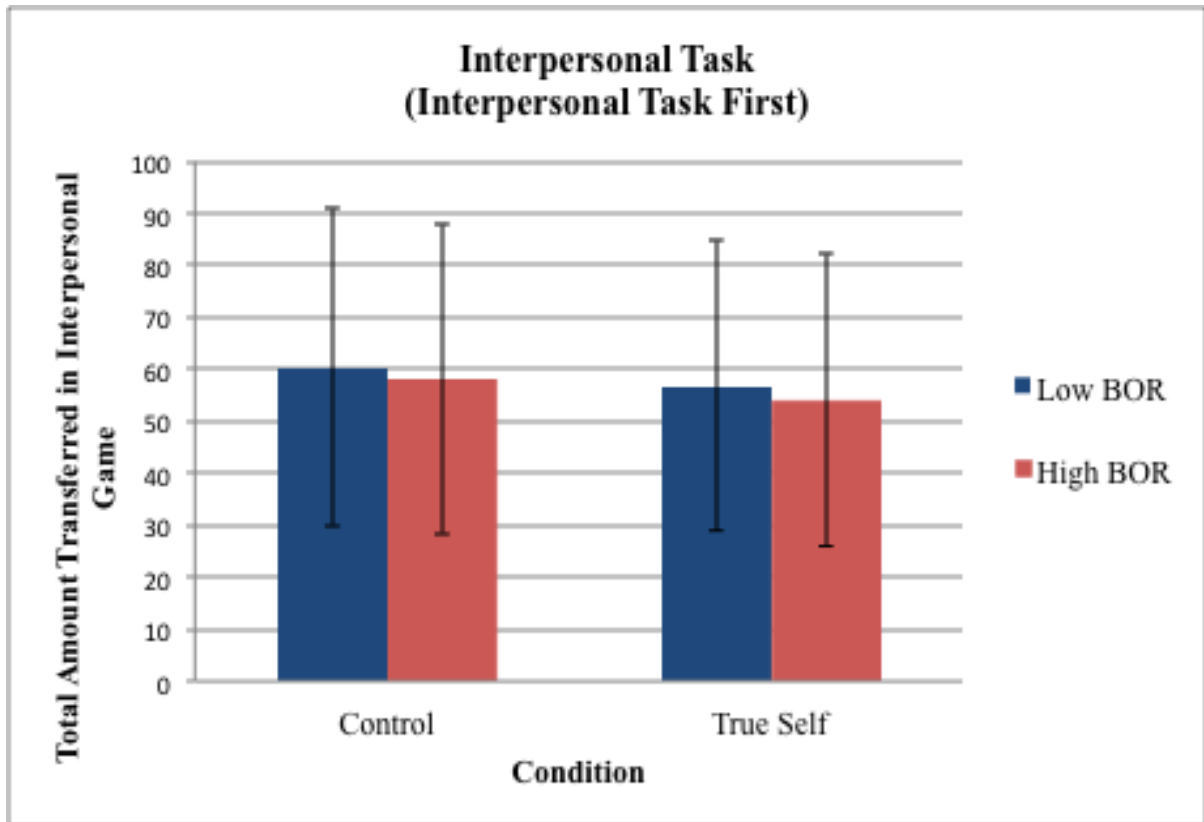
Figure 3. Money transferred to trustee as a function of borderline status and condition. This graph illustrates the total amount of money participants transferred to the "other player" across 5 rounds of the interpersonal trust game. Higher numbers reflect greater cooperation and trust behavior. This figure only includes those participants who completed the trust task immediately following the experimental manipulation.

Affective Instability as a Mediator

To account for baseline variance in affective arousal and valence, standardized residual change scores were obtained by regressing post-manipulation arousal and valence scores on their respective pre-manipulation scores (Cronbach, 1970). These

standardized residual scores were then used in the mediation analyses as indicators of affective reactivity.

The first model examined affective reactivity as a mediator in the relationship between identity coherence and impulsive behavior. All mediation analyses only included those participants who completed the respective behavioral task (impulsivity or interpersonal) immediately following the manipulation. Separate mediation analyses were conducted for affect valence and arousal. The results of a linear regression of impulsivity on identity coherence support the presence of a significant relationship (β= -.17, p< .05), indicating that poorer identity coherence is predictive of greater impulsive behavior. A regression of the affect valence residual score on identity coherence, as measured by the PAI BOR-I subscale, failed to reach statistical significance (see Figure 4) suggesting that a mediation pathway is not present and thus the relationship between identity and impulsivity is not the product of an affective valence reaction. A second mediation model examining affective arousal as a mediator of the relationship between identity diffusion and impulsivity was conducted. As illustrated in Figure 5, the relationship between identity diffusion and affective arousal failed to reach statistical significance. Together the failure to find a relationship between affective reactivity (both valence and arousal) provides support that the relationship between identity coherence and impulsivity as demonstrated in the present study is not attributable to changes in affective states.

Affective reactivity valence was also examined as a mediator of the relationship between identity coherence and interpersonal behavior. As illustrated in Figure 6, the

regression of the total amount transferred in the interpersonal task on identity coherence, as measured by the PAI BOR-I subscale failed to reach statistical significance. Additionally, the relationship between identity coherence and affective valence residual scores also failed to reach statistical significance, suggesting that there was not a pathway to mediate. Finally, affective arousal was examined as a mediator of the relationship between identity coherence and interpersonal behavior (see Figure 7). Regressing affective arousal residual scores on identity coherence failed to reach statistical significance.

DISCUSSION AND CONCLUSIONS

This study marks the first attempt to experimentally investigate the potential primacy of identity coherence as a driving mechanism for changes in the affective, interpersonal, and impulsivity components of borderline personality disorder. Despite promising treatments targeting identity coherence as a core component, there have not been any attempts, to our knowledge, to experimentally examine the contribution of identity coherence as a driving mechanism in the development and course of BPD. The present study employed a novel experimental manipulation of identity coherence to evaluate whether individuals with greater borderline personality features were more responsive to efforts to alter identity coherence compared to individuals with few borderline personality features. Additionally, it was hypothesized that individuals would vary in their affective, interpersonal, and impulsivity behavior based on their borderline characteristics and the manipulation (true-self or control) completed. Specifically, it was hypothesized that individuals with greater borderline personality features who completed the true-self manipulation would exhibit greater changes in affect, decreased interpersonal trust, and would demonstrate greater impulsivity.

Borderline Personality and Identity Coherence

Results from the present study are consistent with previous research demonstrating that borderline personality features are associated with impairments in identity coherence. Specifically, individuals with High Borderline features reported reduced self-concept clarity compared to their Low Borderline counterparts.

The present study also sought to establish a paradigm for the manipulation of identity coherence in individuals with borderline personality features. We examined the efficacy of the true-self task as a manipulation of identity coherence as a function of borderline personality features. Specifically, we examined the perceived ease or difficulty experienced while processing true-self information as a function of borderline features and true-self relevance of the task. The interaction of borderline features and task type failed to reach statistical significance. However, all participants, regardless of borderline status, consistently rated the true-self task as more difficult than a control verbal fluency task. This finding suggests individuals perceive their knowledge of their true-self to be less accessible than a more general category of knowledge. It is plausible this difference reflects a general tendency for individuals to engage in self-reflection exercises less frequently than exercises, which assess broader domains of knowledge. For instance, in Western cultures (where the present study took place), there is an increased emphasis on achievement in comparison to self-discovery and knowledge. Thus, despite the fact that many of one's goals and behaviors directed at achieving those may stem from true-self characteristics, there appears to be a perception that one does not know their true self well. Notably, despite the difficulty ratings associated with the task, those with Low Borderline features continued to self-report higher levels of self-concept clarity compared to the High Borderline features group. This finding may reflect a general resilience of those with Low Borderline features in which they are able to readily question their identity, while maintaining a clear sense of self.

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Furthermore, the results from our study indicate that individuals with High Borderline features reported greater difficulty completing both tasks compared to those with Low Borderline features. Further analysis of these findings indicates that among those individuals with High Borderline features, there was a modest effect difference between task type ($d = 0.20$), such that greater difficulty was experienced when completing the true-self task than the control task. This finding suggests that those with High Borderline features perceive their self-knowledge to be less extensive than their knowledge of a more general category. This finding is also evident in those with Low Borderline features. One possibility for the failure to find a statistically significant interaction is that individuals with borderline personality features have previously been found to exhibit a more negative evaluation of neutral stimuli compared to individuals with other psychological disorders and healthy controls (e.g. Kurtz & Morey, 1998; Sieswerda, Arntz, & Wolfis, 2005). Thus, regardless of their knowledge of a topic, those with high borderline features may be more likely to rate any neutral task as more difficult than low BOR controls. One potential method of ruling out this possibility would be through the use of a variable that was not based upon self-reported evaluative perceptions. For example, reaction time for generating words that describe the true-self was recorded in the present study. A t-test examining mean differences between Low Borderline and High Borderline groups length of time to complete the true-self task was statistically significant, ($t[187] = -2.41$, $p< .02$, $d = -0.36$) suggesting that Low Borderline individuals are able to generate a description of their true-self faster than High Borderline individuals. This result is consistent with the effect size difference

demonstrated in the self-reported difficulty analyses; however, if data regarding response time for the control conditions were available, it could potentially address whether bias was present in the self-report and present another assessment method. Although such data were not available in the present study, this remains an important focus for future investigations.

In sum, our findings supported theoretical accounts suggesting that individuals with high borderline personality experience less self-concept clarity compared to those with low levels of borderline features. Consistent with our hypothesis, there was a modest effect size difference suggesting that individuals with High Borderline features were more responsive to the identity coherence manipulation than those with Low Borderline features. More broadly our findings regarding the interplay of personality and social cognitive aspects of the self are noteworthy as it is one of the first studies to operationalize identity coherence (see Adler, et al., 2012 for alternative methods) and the first to our knowledge to experimentally manipulate state identity coherence.

Identity Coherence and Affect

Results from the present study are consistent with earlier research demonstrating that individuals with higher levels of borderline personality features generally report more negative affective valence than Low BOR participants, although the groups did not differ in self-reported emotional arousal. The general negative valence/unhappiness reported is consistent with previous research suggesting that individuals with BPD experience more intense negative affective valence states (Herpertz, et al., 1999; Levine, Marziali, & Hood, 1997). However, our findings do not support certain theoretical

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characterizations of BPD as representing a state of emotional hyper-arousal as compared to healthy controls (e.g., Linehan, 1993). Although differences in arousal approached significance, the failure to find a difference is consistent with reports from the previous research of emotion representations of BPD, which suggest the affective descriptions of those with BPD, are strongly influenced by valence and minimally influenced by arousal (Suvak, Litz, Sloan, Zanarini, Barrett, & Hofmann, 2011). Thus, our finding may not be a product of actual emotional experience, but instead represent a general deficit in emotional evaluation (e.g. Kurtz & Morey, 1998) or labeling inherent in BPD.

Contrary to expectations, individuals with high borderline features did not exhibit greater affective reactivity in response to the identity manipulation compared to those who completed the control task. Notably, there was not a difference in reactivity across condition or borderline status. The failure to establish a finding may suggest that efforts to destabilize identity do not necessarily lead to affective changes. Previous research using this paradigm in undergraduates has not found differences in affective responses following the manipulation (Schlegel, et al., 2011); however, this research did not include pre- and post-manipulation measures of affect. Additionally, past research did not examine the role of individual differences and the effectiveness of the manipulation in producing affective responses. It is, of course still possible that a more intense manipulation (e.g. having to choose an alternative career path) might be needed to elicit hyper-reactivity. Nonetheless, the lack of a heightened emotional response to threat to identity coherence suggests that any subsequent effects of such threats in this study are not a byproduct of an associated emotional response.

Another possibility for this finding is that heightened affective reactivity is not as characteristic of the disorder as has previously been thought. A number of previous studies have failed to establish that high borderline individuals have stronger affective responses to both experimental emotion inductions (e.g. Herpertz, et al., 1999; Kuo & Linehan, 2009) and interpersonal stimuli. For instance, a recent study by Woodberry, Gallo, and Nock (2008) examined whether women with BPD features show self-report or physiological hyper-arousal in response to an invalidating (or validating) comment during a frustrating task. Their findings were consistent with the present study, such that individuals with high BPD features exhibited differential self-reported valence at baseline; however, they did not exhibit heightened affective responses to the invalidation as measured by self-report and psychophysiological mechanisms (Woodberry, et al., 2008). It is plausible that the affective disturbance in BPD is best captured by the subjective intensity of the emotional experience, which is primarily negative in valence. That is, intense negative affect in BPD appears to be more stable, or trait like, rather than fluctuating in response to external or internal stimuli as would be suggested by affective hyperreactivity. Needless to say, this does not preclude emotional sensitivity as part of the developmental pathway to the disorder. For example, it is plausible those with BPD have habituated affective responses to environmental stimuli as adults but generally experience stable negative affect. Developmentally, they may have exhibited greater reactivity to these same stimuli. Future research could examine this hypothesis longitudinally over the course of development for those at risk for BPD.

Identity Coherence and Impulsivity

Analyses were also conducted to examine whether disruptions to identity coherence lead to changes in impulsive behavior as a function of borderline features and order in which the tasks were presented. We posited that the identity coherence manipulation would have a short endurance and thus it was essential to counterbalance the presentation of the impulsivity and interpersonal tasks to capture this effect. Consistent with our hypothesis and theoretical accounts of the disorder, high borderline individuals who completed the true-self task exhibited more difficulties inhibiting their behavior than those who completed a control task, when the impulsivity task immediately followed the identity task. In contrast, low borderline individuals who completed the true-self task were better able to inhibit their behavior compared to those who completed the control task. Although prior research has not examined this relationship, this finding is consistent with theories asserting the primacy of identity disturbance (e.g. Kernberg, 1984; Bateman & Fonagy, 2006). Specifically, the challenge to self-coherence, as manifested in the perceived difficulty of the task, appeared to disrupt their ability to regulate their behavior, resulting in a greater number of commission errors during the impulsivity task. In theoretical accounts, identity coherence is primarily an ego function, which is responsible for regulating impulses and behaviors within the demands of the environment. From such a perspective, a threat or weakness in ego functioning (such as a challenge to identity coherence) may create a situation where the individual is less capable of managing other demands, or impulses resulting in poorly controlled behavior.

Additionally, having identity issues in isolation did not appear to be sufficient to produce behavioral disinhibition. The present study failed to find differences in impulsive behavior between high and low borderline individuals who completed the control task, regardless of the order in which the task was presented. This finding is inconsistent with previous research that has demonstrated those with borderline personality disorder are generally more disinhibited than those who do not have the disorder (Coffey, et al. 2011). Thus, it is plausible in some of these previous studies; situational challenges to identity coherence might have been responsible for observed deficits in the BPD participant's apparent difficulties in regulating their behavior.

In contrast to the finding for the high borderline group, those with low borderline personality features responded in a different manner on the impulsivity paradigm depending on the task. Specifically, those who completed the true-self task were better able to inhibit their responses compared to the low borderline individuals who completed the control task. The experience of integrating a representation of one's self, when one already possesses a coherent identity, appears to promote one's capacity to regulate their behavior. Similar to this finding, previous research has demonstrated that self-affirmations of one's core values leads to better self-control in experimental situations (Schmeichel & Vohs, 2009). The differential effectiveness of the true-self manipulation depending on borderline status indicates a potential source of intervention for regulating impulsive behavior. Impulsive behavior by nature is unpredictable; however, the current results suggest that we can predict situations in which it is more likely to occur for those with borderline personality. Monitoring circumstances in which BPD individuals might

experience threats to their sense of self, and developing methods to better integrate

aspects of the self-concept, may be potential targets for future treatments.

Identity Coherence and Interpersonal Behavior

It was expected that interpersonal trust behavior would differ for high borderline

individuals who completed the control task versus those who completed the true-self

task, when the interpersonal task was presented immediately following the manipulation.

As outlined earlier, several theorists assert the identity diffusion and interpersonal

disturbance characteristics of BPD are closely interconnected (e.g. Bateman & Fonagy,

2004; Kernberg, 1984) such that having a diffuse sense of self leads to distorted

interpersonal interactions (Kernberg & Caligor, 2005). Our findings failed to support this

notion, such that there was not a differential effectiveness of the true-self task and

borderline features on cooperative behaviors in the trust task. Additionally, contrary to

our expectations, there was not a significant difference between High BOR and Low

BOR trust behaviors. Previous research utilizing this task (Unoka, et al., 2009)

demonstrated a significant difference in trust behavior between BPD individuals and

those diagnosed with Major Depressive Disorder (MDD) and healthy controls.

Specifically, BPD individuals transferred less money to the fictional other player over

the course of the trials compared to both the MDD group and the healthy controls. One

potential reason for the difference in findings is the clinical status of the patients from

the Unoka et al. (2009) study, whereas our participants were undergraduates with

borderline personality features. It is plausible the level of interpersonal functioning and

trust necessary to successfully enroll and engage in the higher education process is

greater than that of individuals who are in a patient population. Alternatively, the current

study conducted experimental sessions in a group format, such that up to 6 participants

were present in the laboratory for each session. The presence of others (despite not

knowing whom one was paired with) may have elicited more cooperative behavior

compared to the anonymity when completing the task without seeing the potential other

player. Consistent with our results, another study (Bartz et al., 2011) reported that BPD

and healthy control participants did not differ on actual cooperative behavior in a trust

game paradigm. Moreover, individuals with BPD also reported greater expectations that

their partner would behave in a trusting manner (Bartz, et al., 2011). Although these

findings agree with the results of the present study, they are inconsistent with the

theoretical tenets of BPD suggesting pervasive interpersonal disturbances. Future

research should examine additional factors that may influence trusting behaviors such as

the closeness of the relationship. For instance, theoretical accounts of BPD propose that

interpersonal and self-other representational disturbances typically occur in relationships

with significant others. Identity relevant disturbances may have a greater influence on

interpersonal behavior when the other "player" is someone whom they have a stronger

attachment to as compared to a stranger. Additionally, the Trust Game is not a dynamic

interchange between players and lacks much of the contextual information that is

inherent in everyday social interactions. It is plausible that cues from the social

environment serve as feedback that either confirm or disconfirm one's identity

organization and those with BPD use the environment as a means to regulate the

behavior. Thus, future research should examine the influence of identity coherence in more dynamic interpersonal situations.

Affective Instability as a Mediator

Affective reactivity was posited as a potential mediator of the relationship between identity coherence and interpersonal and impulsive behaviors. Contrary to our hypothesis, there was not a relationship between identity coherence (as measured by the PAI BOR-I scale) and affective reactivity. This finding suggests that affective reactivity is unlikely to be a mediating factor for the relationship between identity coherence and impulsive behavior. That is, our finding that High BOR individuals who complete a manipulation of identity coherence exhibit greater behavioral disinhibition is not attributable to changes in their mood (either valence or arousal) that may have occurred as a result of the altered identity coherence.

Additional analyses of the mediation model also failed to establish relationships between affective reactivity and impulsive behavior as well as interpersonal behavior. As discussed above, the interpersonal task failed to show relationships with other theoretically meaningful variables. However, there was a significant relationship with identity coherence and impulsive behaviors. The failure in the present study to find a relationship between affective reactivity and impulsivity is fairly striking as some theoretical accounts (e.g. Linehan, 1993) suggest the primary function of the impulsive behavior in BPD is to regulate one's affective change. That is, individuals with BPD generally respond with greater emotional reactivity to stimuli and in order to manage this experience, they engage in behaviors such as cutting, spending money they do not have,

or promiscuous sexual behaviors. Despite these accounts and consistent with our findings, previous research has also suggested that personal salience of stimuli are essential to findings of affective reactivity in BPD. For example, Sprague and Verona (2010) demonstrated that individuals with BPD exhibit greater behavioral disinhibition when stimuli are relevant to their current condition rather than general negative affective stimuli. Thus it appears the role of identity coherence in influencing impulsive behaviors operates in a manner that does not directly involve affective reactivity or affective state.

With the separation of identity coherence ratings and affective ratings, the current results add to the extant literature by showing that patterns of behavior can be uniquely associated with disturbances in identity rather than a combination of these components. Thus, despite the general negative affect states reported by those with high BPD features, greater identity diffusion was still associated with greater behavioral disinhibition. This suggests that while trait negative affect may be a risk factor for impulsive behavior, trait identity diffusion independently increments this prediction.

Limitations and Future Directions

One limitation of the present study was the use of undergraduates with borderline personality features rather than a clinical sample of individuals with borderline personality disorder. Previous research has suggested that undergraduates with borderline personality features of magnitudes similar to that examined in the present study exhibited impairments in functioning, comorbidity of Axis I disorders, and affective dysregulation to a similar extent as individuals formally diagnosed with

borderline personality disorder (Trull, et al., 1997). Despite this finding, the severity and pervasiveness of impairments in clinical samples is likely to be of greater magnitude than undergraduates. The current participants demonstrated adequate functioning to be able to maintain enrollment in college coursework and navigate other challenges to identity and interpersonal functioning that are inherent in individuals at this developmental stage. An additional concern with the use of undergraduates as mentioned previously, is the developmental stage at which they are at is consistent across all participants. Individuals who are attending college are, appropriately, typically still exploring and have not yet firmly committed to an identity (Kroger, Martinussen, & Marcia, 2010). Thus, our efforts to destabilize identity coherence may have had a different impact compared to an individual who is past this developmental time point due to the normative nature of the experience for college students.

Furthermore, additional research is needed to refine and characterize the nature of impact produced by the identity coherence manipulation. Although our findings support the use and effectiveness of the task by the difficulty ratings obtained; these were potentially impacted by negative distortion biases in the borderline sample and there was not a difference exhibited on the Self-Concept Clarity measure. Further refinement in terms of how to best measure the effectiveness of the task is important. Response time for completion of the task seems to be promising, as it is not influenced by self-presentation biases; however, it does not speak to the larger construct that is being manipulated. One possibility may be to establish convergence of identity coherent (incoherent) behaviors with this task and other indicators of identity incoherence, such as

the Life Story Narratives (Adler, Chin, Kolisetty, & Oltmanns, 2012) as mentioned previously.

Another limitation in the present study was the sample size and power for calculating effect sizes. Our initial power estimates were based on an effect size difference obtained from the pilot data for the pre-post measure of Self-Concept Clarity. Although both pre- and post-manipulation measures of SCC were obtained, we could not estimate the effect size due to the pre-manipulation measure being administered with the pre-screening materials for the semester, which was between 1 week and up to 4 months prior to subject's participation in the experiment. This widely varying period of time between measurements would allow for the possibility of confounds to influence the measurement. Furthermore, the novelty of the true-self task and limited understanding of the length of time it would exert an effect played an important role in the determination that all post-manipulation tasks would be counterbalanced and included as part of the statistical analysis. By taking this into account, we effectively reduced our power (and sample size) by half of the original proposed total. Although this did not influence the results of the impulsivity task or affect ratings (everyone completed affect measurements immediately following the manipulation), it is not clear if the failure to find results for the interpersonal trust task is due to decreased power or a true lack of relationship between these variables.

Another limitation of the present study, which is inherent in all experimental designs, is the lack of ecological validity of the tasks and findings. Although the experimental design allowed for strict experimental control to examine causal

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mechanisms, it is unclear how one would assess and measure destabilization or threats to identity coherence in everyday circumstances. Furthermore, the interpersonal trust task did not involve the dynamic interplay that is inherent in social interactions, including feedback and the use of contextual and facial expressions of the person with whom one is interacting. We used deception to enhance the believability that they were interacting with another person in the room who was also completing the task. Despite the fact that the study was conducted in groups of individuals and efforts were made to enhance the believability that participants were in fact interacting with another individual, it is unclear if participants had been informed by previous volunteers or if they were suspicious during the task as to whether or not they were interacting with another individual. Finally, there have not been studies examining how performance or behavior on the impulsivity (or interpersonal) tasks translates to actual impulsive or disruptive interpersonal behaviors in one's life. Future research should examine the generalizability of performance on these tasks to see if this is predictive of actual behaviors in one's daily functioning.

Despite these limitations, there are a number of strengths to the study. First, although it was also listed as a limitation, the experimental nature of the study design was important in establishing the effectiveness of a manipulation of identity coherence and tracking causal relationships. The true-self paradigm is a realistic, generalizable and noninvasive procedure, for the examination of the primacy of identity disturbance in BPD. Furthermore, the effects of this manipulation on affect, interpersonal behavior, and impulsivity were measured using standardized assessment instruments and behavioral

tasks previously demonstrated to represent core impairments in those with borderline personality disorder. Prior studies have failed to address the role of identity coherence in BPD due to difficulties operationalizing and measuring/manipulating this construct. Additionally, previous research using naturalistic or longitudinal methods typically does not control for the events that occur between measurements or other confounds that may influence the interpretation of their findings.

This study was the first to experimentally examine the role of identity as a primary driving component of borderline personality disorder features. In addition to improving upon the aforementioned limitations, the present study also suggests areas for future research. The present study focused on identity coherence as the driving force for disruptions in other components of the disorder. Future research should clarify and develop alternative indicators of the effectiveness of the task in altering identity coherence. It is possible that implicit indicators, such as response time, as we began to explore in the present study, are better suited for assessing the fluency of a topic. Additionally, the development of self-report measures, which better capture the nomological network of identity coherence, will improve our understanding of the changes that occur in response to challenges to one's identity. Although we were specifically interested in the role of identity coherence for the present study, it is unclear how the content of one's identity influences the remaining factors as well. Future studies could examine factors related to the content produced such as the valence of characteristics, how coherent aspects are with one another, and whether altering instructions for the type of content to be produced (e.g. list positive characteristics of

yourself) leads to similar changes in the affective, interpersonal, and impulsivity domains.

More broadly, these findings also suggest areas of future research with respect to the development and tailoring of treatment interventions. Although these findings need to be replicated, they suggest that state changes in perceived coherence of identity can produce a greater disturbance in the ability to regulate behavior for those with high levels of borderline features. Clinically, impulsive behaviors in those with BPD can range from self-harming behaviors such as cutting, to more risky behaviors such as promiscuous sexual behavior, to even more extreme such as a suicide attempt. Fluctuations in identity coherence likely occur relatively frequently and as they are inherent in mental processes, without the knowledge of others. According to the results from the study, interventions should aim to reduce these fluctuations in those with BPD to prevent the exacerbation of impulsive behaviors. Although treatments such as TFP target identity coherence, being very direct and challenging of the diffuse self may lead to further complications. Thus, when providing interventions, one should be mindful of the potential problems that could occur in other domains. Additionally, the findings also suggest a point of intervention for healthy individuals. Completing the true-self task appeared to serve as an intervention, by improving performance on the impulsivity task. A number of recent research studies have suggested that self-affirmations can have positive qualities on individuals' behavior and self-views (e.g. Logel & Cohen, 2012). Therefore, future research could examine the potential use of this task as an intervention for situations that require greater cognitive control.

Conclusion

The present study involved an experimental examination of the primacy of identity disturbance in eliciting changes in the affective, interpersonal, and impulsive components of borderline personality disorder. In summary, the results suggest that individuals with high levels of borderline personality features generally report reduced self-concept clarity and are more susceptible to efforts to alter the coherence of their identity than those with lower levels of borderline personality features. Destabilization of identity coherence led to greater difficulties inhibiting behavior in those with high levels of borderline features, whereas it improved behavioral control in those with low levels of borderline features. These results support theoretical articulations of BPD that indicate impulse control problems are a means of regulating one's internal self-state. Contrary to some characterizations of the disorder, there was no evidence to suggest that alterations of identity coherence led to an exaggerated emotional response or disturbed interpersonal behavior. This finding is consistent with a number of studies examining affective reactivity to emotion induction procedures, interpersonal stimuli, and now alterations in identity coherence indicating that BPD is better characterized by severe, trait negative affect valence compared to healthy controls rather than hyper-reactivity. Moreover, the failure of interpersonal behavior to vary as a function of borderline personality status or experimental task type indicates the importance of dynamic influences during interactions as a potential sources for variability in behavior. Although further research is needed to clarify the mechanisms linking identity and affective dysregulation and interpersonal behavior, psychosocial interventions aimed at

maintaining and developing a stable sense of identity may be beneficial for reducing the

impulsive behaviors in BPD, which are potentially most critical for establishing the

patient's safety.

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APPENDIX A

Table 1.

Demographic and baseline characteristics for each group

	Low BOR, Control (n = 116)		Low BOR, True Self (n = 119)		High BOR, Control (n = 83)		High BOR, True Self (n = 70)			
	M	SD	M	SD	M	SD	M	SD	Test Statistic (df)	Significant Post-Hoc Comparisons
Age	18.80	0.91	19.00	1.06	18.53	0.75	18.61	0.91	$F(3,384)= 5.00**$	2 > 3
Education	12.75	0.98	12.96	1.00	12.65	0.80	12.80	1.07	$F(3, 374)=1.77$	
PAI-BOR	48.82	5.95	49.16	5.97	76.27	5.40	74.74	4.42	$F(3,384)= 697.99***$	1,2 < 3,4
PDQ-BOR	1.55	1.33	1.44	1.22	4.96	1.75	4.70	1.64	$F(3,384)=164.11***$	1,2 < 3,4
SCC	45.04	7.7	45.34	8.51	30.86	7.38	30.67	8.25	$F(3,384)=100.57***$	1,2 > 3,4
Importance of Money	2.75	1.16	2.75	1.15	2.42	1.32	2.24	1.17	$F(3,384)= 3.90**$	1,2 > 4
SAM-V, pre	3.12	1.52	3.39	1.48	4.18	1.56	4.81	1.76	$F(3,384)=21.19***$	1,2 < 3,4
SAM-A, pre	6.21	1.99	6.45	1.74	6.05	1.87	6.59	1.75	$F(3,384)=1.44$	
Sex	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*		
Male	40	34.5	44	37	21	25.3	25	35.7	$\chi2(3) = 3.35$	
Female	76	65.5	75	63	62	74.7	45	64.3		
Race										
Caucasian	91	78.4	85	71.4	60	72.3	49	70	$\chi2 (15) = 7.07$	
Black	1	0.9	2	1.7	1	1.2	2	2.9		
Hispanic	17	14.7	21	17.6	17	20.5	13	18.6		
Asian	5	4.3	7	5.9	4	4.8	5	3.8		
Native American	1	0.9	1	0.8	0	0	1	1.4		
Other	1	0.9	3	2.5	1	1.2	0	0		

**p< .01, ***p< .001

Note. PAI-BOR = Personality Assessment Inventory, Borderline Features Scale, PDQ-BOR = Personality Diagnostic

Questionnaire-4 Borderline Personality Disorder Scale Score (sum of criteria met), SCC = Self-Concept Clarity scale score

(greater scores indicate more coherent sense of self), Importance of Money = Importance of winning gift card during

Interpersonal Task (rated on a 5-point Likert scale, greater scores indicate increased importance), SAM-V = Self Assessment

Manikin- Valence prior to manipulation (higher scores indicate greater unhappiness), SAM-A = Self Assessment Manikin –

Arousal prior to manipulation (higher scores indicate feelings of calmness).

Table 2.

*Interpersonal and impulsive behavior for each group and order of task presented*

	Low BOR Control		Low BOR True-Self		High BOR Control		High BOR True-Self	
	M	SD	M	SD	M	SD	M	SD
Interpersonal Behavior								
Interpersonal First	60.33	30.53	56.82	27.83	58.14	29.94	54.25	28.25
Impulsivity First	58.15	31.09	59.82	28.84	58.73	27.48	58.78	30.66
Impulsive Behavior								
Impulsivity First	60.28	20.86	68.16	21.08	59.44	23.34	52.24	24.40
Interpersonal First	62.62	21.62	56.69	24.84	58.89	19.05	57.58	21.52

Note. Interpersonal behavior is represented as the amount of money transferred to the other participant during the task.

Impulsive behavior is represented as the percentage of trials that the participant appropriately inhibited their response. Higher

scores indicate better behavioral control whereas lower scores represent greater behavioral disinhibition.
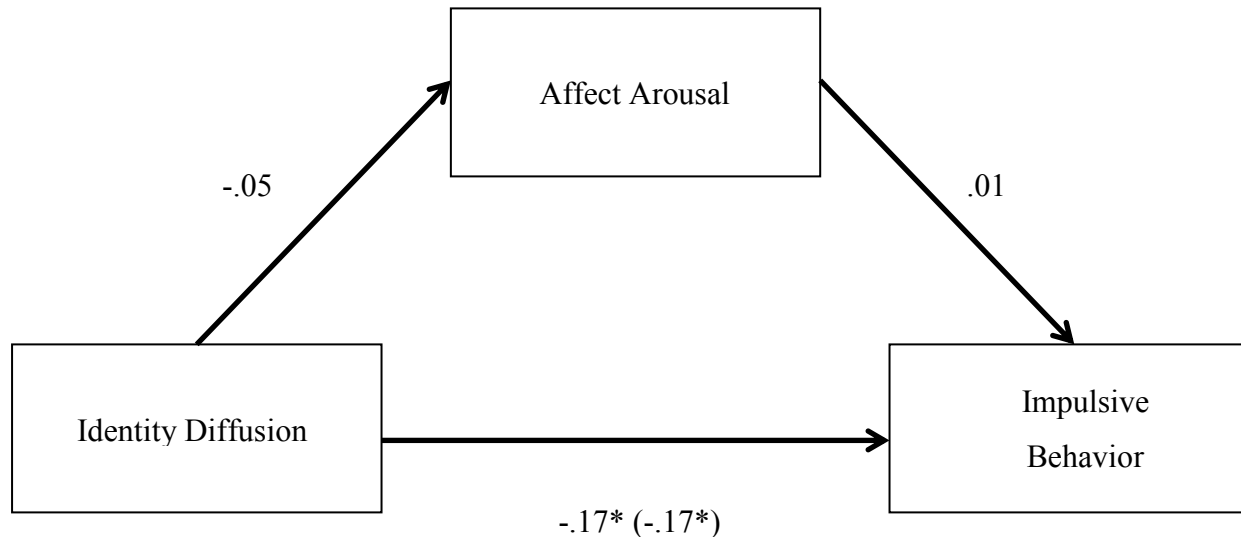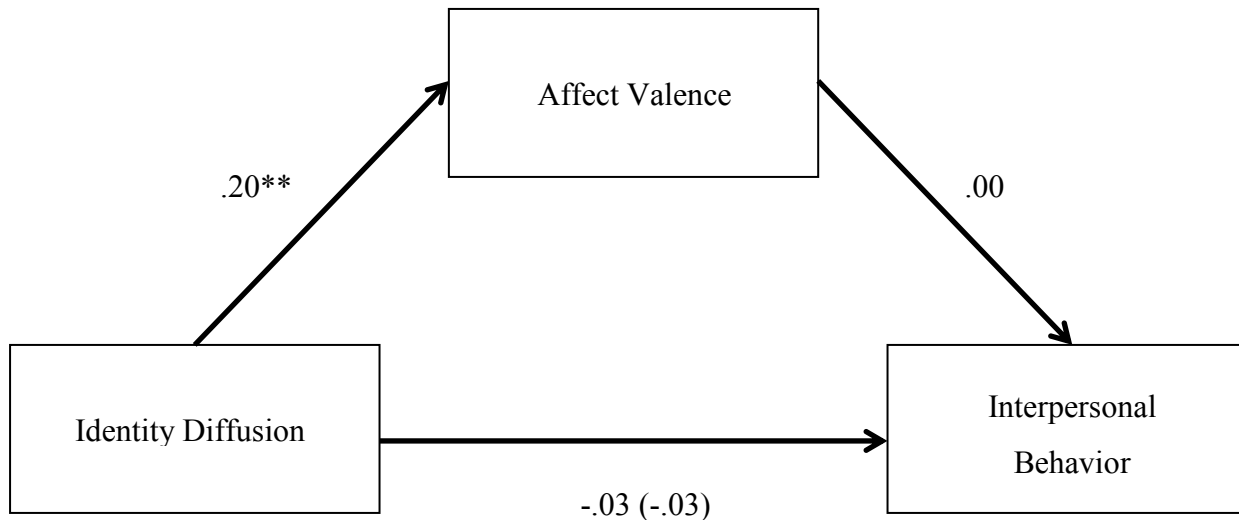
APPENDIX B
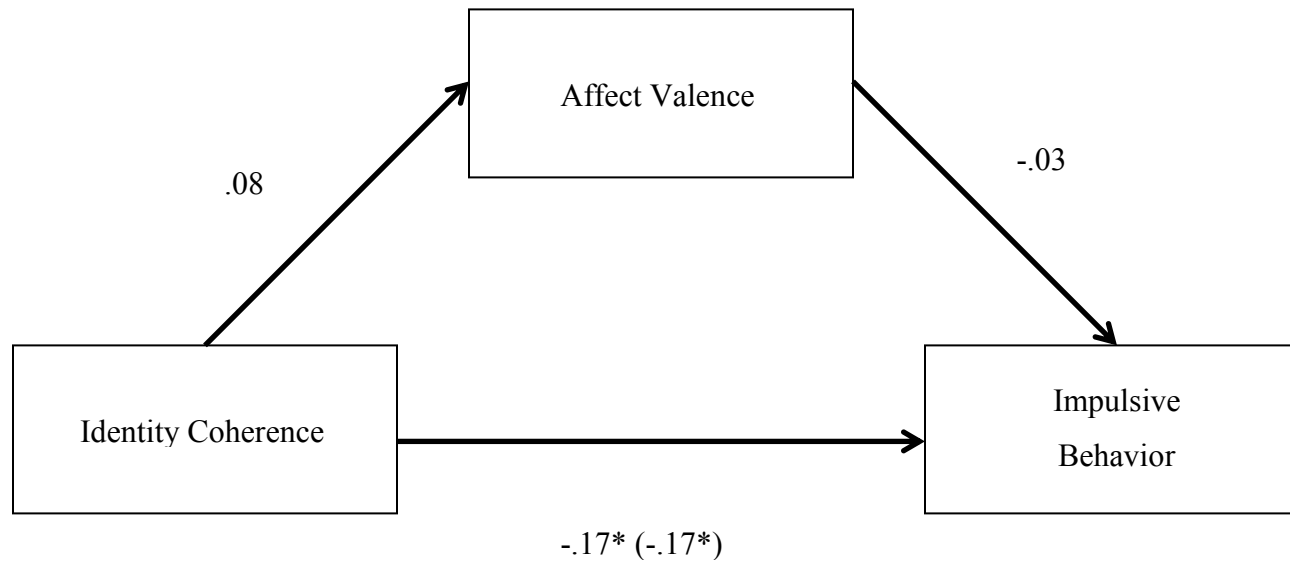
*p< .05

Figure 4. Affect valence as a mediator of relationship between identity and impulsive behavior. All analyses are for those participants who completed the impulsivity task immediately following the experimental manipulation. Standardized beta coefficients are presented.

| Affect Arousal |
| Identity Diffusion |
| Impulsive Behavior |

-.05

.01

-.17* (-.17*)

p < .05

Figure 5. Affect arousal as a mediator of the relationship between identity and impulsive behavior. All analyses are for those participants who completed the impulsivity task immediately following the experimental manipulation. Standardized beta coefficients are presented.
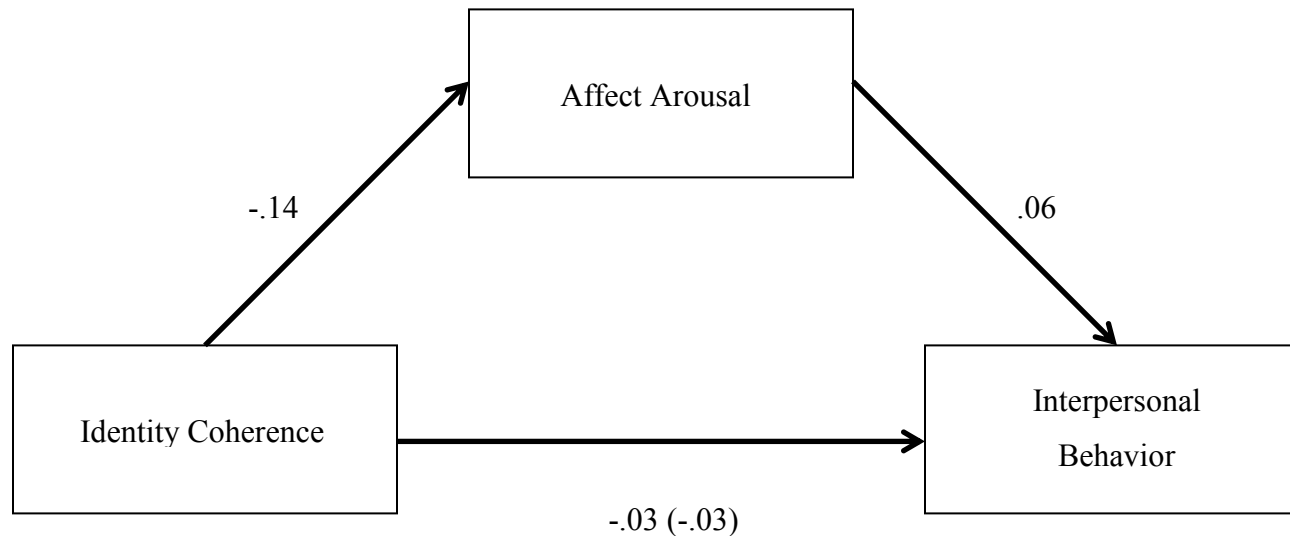
Affect Valence

.20**

.00

Identity Diffusion

-.03 (-.03)

Interpersonal
Behavior

**p< .01

Figure 6. Affect valence as a mediator of the relationship between identity and interpersonal behavior. All analyses are for those participants who completed the interpersonal task immediately following the experimental manipulation. Standardized beta coefficients are presented.

Figure 7. Affect arousal as a mediator of the relationship between identity and interpersonal behavior. All analyses are for those participants who completed the interpersonal task immediately following the experimental manipulation. Standardized beta coefficients are presented.