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This study examined how two of Rothbart's temperament variables (Rothbart & Derryberry, 1981), negative affect and effortful control, along with childhood sexual abuse, (CSA) predict borderline personality disorder (BPD) symptoms. It was hypothesized that increased negative affect, increased CSA, and their interaction would predict BPD symptoms. It was further hypothesized that this relationship would be mediated by lower levels of effortful control. Questionnaires assessing effortful control, negative affect, CSA, and BPD were administered to 215 female undergraduates. Structural equation modeling supported the first hypothesis, but not the second. The data indicated that the interaction was specific to BPD when compared to avoidant personality disorder. These results provide support for the theory that temperament interacts with the environment to produce BPD.

THE INTERACTION OF TEMPERAMENT AND CHILDHOOD SEXUAL ABUSE IN PREDICTING SYMPTOMS OF BORDERLINE PERSONALITY DISORDER

by

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CHAPTER I

INTRODUCTION

Borderline personality disorder (BPD) is characterized by a pervasive and persistent pattern of instability in interpersonal relationships, instability of self-image, extreme and unstable affect, and marked impulsivity (American Psychiatric Association [APA], 2000). The median prevalence of BPD across demographic studies of psychopathology is 1.1% (Mattia & Zimmerman, 2001). However, when limited to clinical settings, the prevalence rate is much higher, ranging from 11% to 19% (Adams, Bernat, & Luscher, 2004). BPD is associated with extreme impairment in interpersonal relationships and an increased risk for both attempted and completed suicide. Approximately 60% to 70% (Gunderson, 2001) of those diagnosed with BPD attempt suicide, and about 10% successfully commit suicide (Gunderson & Ridolfi, 2001; Paris & Zweig-Frank, 2001).

It is clear from the nature and symptoms of BPD that there is a fundamental deficit in emotional self-regulation (Linehan, 1993). This deficit in emotional self-regulation is manifested in BPD as affective instability, marked reactivity of mood, and difficulty controlling anger (APA, 2000). It seems that individuals with BPD are prone to excessive and negative emotional reactions (e.g., anger, sadness) in the face of real and perceived internal and external negative stimuli. It also seems that these individuals have difficulty regulating their negative emotional responses once they have begun.

Childhood Sexual Abuse

In recent decades there has been a proliferation of research concerning the possible etiological factors involved in BPD. These have included parenting behaviors (e.g., Zweig-Frank & Paris, 1991), parental separation during childhood (e.g., Paris, Zweig-Frank, & Guzder, 1994), childhood neglect (e.g., Battle et al., 2004), and childhood sexual abuse (e.g., Zanarini & Frankenburg, 1997). Of these factors, childhood sexual abuse is the most consistently supported. Childhood sexual abuse may be defined as "sexual contact or conduct between a minor child (younger than 17 years old) and an adult or older person (at least five years older than the child)" (Bernstein, Ahluvalia, Pogge, & Handelsman, 1997, p. 341). Studies have shown rates of childhood sexual abuse ranging from 40% to 70% in individuals with BPD (Goodman & Yehuda, 2002). One study using state documented occurrences of abuse in a community sample showed that occurrences of sexual abuse predicted BPD, but not other personality disorders, after controlling for participant age and parental psychiatric disorders (Johnson, Cohen, Brown, Smailes, & Bernstein, 1999). Additionally, many have theorized that childhood sexual abuse is central to the development of BPD (e.g., Paris & Zweig-Frank, 1997; Posner et al., 2003; Zanarini et al., 1997). One theory in particular states that childhood sexual abuse may result in BPD by interfering with the development of self-regulatory abilities, including the effortful control of emotional reactions and the inhibition of impulsive reactions (Posner et al., 2003; Putnam & Silk, 2005). That is, childhood sexual abuse may cause or exacerbate distress until it is beyond a level that can be regulated, and this excessive distress may preclude an individual from developing successful self-

regulation strategies. This lack of self-regulation then comprises the majority of characteristics unique to BPD (e.g., instability in interpersonal relationships, poor affective regulation, impulsivity).

Although studies do show a consistent relationship between childhood sexual abuse and BPD, 30% to 60% of individuals with BPD do not report a history of childhood sexual abuse (Goodman & Yehuda, 2002). Additionally, a meta-analysis of 21 studies examining the relationship between childhood sexual abuse and BPD found a small pooled effect size of r = .28 (Fossati, Madeddu, & Maffei, 1999). Furthermore, it is estimated that 80% of people who are sexually abused as children do not develop any personality disorder (Goodman & Yehuda, 2002). Thus, it is apparent that there are more factors related to the etiology of BPD than childhood sexual abuse.

Temperament

Other potential contributors to the development of BPD are extreme (i.e., very high or very low) temperament traits. The exact definition of temperament is often unique to specific researchers and tends to vary across studies. However, there are certain characteristics of temperament that are common across studies which include a constitutional (i.e., genetic) origin, relative stability, and evidence of existence early in childhood (Rothbart & Bates, 2006). According to Rothbart and Bates (p. 3) the main difference between temperament and personality is that temperament is comprised of the "affective, activational, and attentional core of personality." Personality is more inclusive and involves other content such as skills, habits, content of thought, values, beliefs, and social cognition (Rothbart & Bates, 2006). Many theorists propose that there are

genetically-based factors, such as temperament traits, that work in concert with the environment in the development of BPD (Clark, 2005; Paris, 1994; Posner et al., 2003; Wolff, 1999). It is theorized that environmental factors such as childhood sexual abuse will only result in BPD when these genetically based predispositions are present.

Although there are several different models of temperament (e.g., Clark, 2005; Thomas, Chess, & Birch, 1970), Rothbart's model (Rothbart & Derryberry, 1981) was chosen for this study because of the central role that two specific traits are theorized to have in the development of BPD. These two temperament traits are negative affect and effortful control (Posner et al., 2003). Negative affect is the degree to which individuals react with negative emotions (i.e., fear, discomfort, sadness, frustration) to internal or external negative stimuli (Rothbart & Derryberry, 1981). The trait of negative affect is theorized to develop during infancy and remain relatively stable throughout the lifespan. In a meta-analysis of 152 longitudinal studies of personality and development, the temperament trait of negative emotionality (i.e., negative affect) was found to have an aggregate test-retest correlation coefficient of .35 for studies with samples between birth and twelve years (Roberts & DelVecchio, 2000). This correlation coefficient increased to .46 when controlling for the time interval of each study and the age of the samples. The authors of this study note that this is most likely a conservative estimate of trait consistency because of multiple factors. One of these factors is that in some studies the researchers used different measures at different assessment points for the same trait. Additionally, multiple longitudinal studies of adults have demonstrated moderate to high rank-order, mean-level, and individual-level stability of negative affect in early adulthood

(Vaidya, Haig, Gray, & Watson, 2002; Watson & Humrichouse, 2006; Watson & Walker, 1996). The stability of negative affect in early adulthood has been supported by spousal report (Watson & Humrichouse, 2006) and demonstrated across time intervals as long as seven years (Watson & Walker, 1996).

Negative affect has been theorized to be associated with BPD because of the high degree of extreme negative mood and volatile anger seen in BPD (Posner et al., 2003). Levels of negative affect as measured by the Adult Temperament Questionnaire (Evans & Rothbart, 2003) have been shown to be significantly elevated in patients with BPD as compared to controls (Posner et al., 2002). In addition, a meta-analysis (Saulsman & Page, 2004) of fifteen studies examining the association between the Five-Factor Model (Costa & McCrae, 1990) and personality disorders has shown that BPD is consistently and meaningfully related to the personality trait of neuroticism, which is conceptually similar to the trait of negative affect. It should be noted, however, that these constructs are somewhat different with negative affect being more focused on the immediate intensity of negative emotional reactions (Rothbart & Derryberry, 1991) and neuroticism involving negative emotional reactions, maladaptive thoughts, and poor coping responses (Costa & Widiger, 1994).

Effortful control is conceptualized as an individual's ability to modulate emotional expressiveness and behavioral approach through active and conscious attentional control (Rothbart & Bates, 2006). It has been described as an individual's efficiency of executive attention (Rothbart & Sheese, 2007). Effortful control develops substantially during the preschool years and continues to develop throughout early and

middle childhood (Eisenberg, Smith, Sadovsky, & Spinrad, 2004; Rothbart & Bates, 2006). Its existence is hypothesized to be connected with neural executive and attentional systems, as well as systems related to emotional reactivity (Rothbart & Ahadi, 1994). An individual who has more effortful control should be more capable of inhibiting behavior related to affect, inhibiting impulsive reactions, refocusing attention after emotional reactions, and organizing oneself towards a non-mood-dependent goal. Thus, low levels of effortful control may explain the poor self-regulation that is characteristic of BPD. Accordingly, levels of effortful control as measured by the Adult Temperament Questionnaire (Evans & Rothbart, 2003) have been demonstrated to be significantly lower in individuals with BPD than controls (Posner et al., 2002). It should be noted that there are similar traits to effortful control in other models of temperament, such as Clark's (2005) disinhibition/constraint, which may be described as one's ability to inhibit impulsive behavior. However, Rothbart's effortful control fits better with an etiological model of BPD because of its clear role in emotion and behavior regulation, and its established development throughout childhood.

An important distinction between the traits of negative affect and effortful control is the order in which they are expressed in an individual. Negative affect reflects the initial emotional reaction to a stimulus or set of stimuli. Effortful control involves the cognitive activities occurring after the initial emotional reaction that serve to modulate that reaction. These two traits are hypothesized to play different roles in the development of BPD (Posner et al., 2003). Negative affect is hypothesized to be an underlying factor

that interacts with environmental experiences, while effortful control is hypothesized to be a central feature of BPD.

Like childhood sexual abuse, high negative affect is not expected to necessarily result in the development of BPD. In the study cited previously (Posner et al., 2002), participants with BPD were found to have elevated levels of negative affect and reduced levels of effortful control when compared to random control participants (Posner et al., 2002). Additional control participants were screened using the Adult Temperament Questionnaire (Evans & Rothbart, 2003) and included if they had similar elevated levels of negative affect, reduced levels of effortful control, and no diagnosis of BPD. Some of these participants did show some evidence of elevated borderline characteristics (i.e., moderate behavioral and emotional dysregulation); however, none met the full criteria for BPD. Although Posner et al. (2003) did not collect data on participants' history of childhood sexual abuse, they hypothesize that childhood sexual abuse is the primary catalyst in the actual development of BPD, but only when individuals are high in negative affect. The authors also hypothesize that childhood sexual abuse causes a disruption of the development of effortful control, which is necessary for the development of BPD.

Interaction of Childhood Sexual Abuse and Temperament

It has been theorized that the interaction of temperament and the childhood environment is the ultimate cause of BPD (Ahadi & Rothbart, 1994; Clark, 2005; Linehan, 1993; Paris, 1994). It is also theorized that the interaction of these variables is more important than either one alone (Clark, 2005), and that a biological predisposition (i.e., temperament) is necessary in order for an individual to develop BPD (Paris, 1994).

It has been suggested that it is likely impossible that the cluster of behaviors characteristic of BPD could be developed from an environmental stressor without the presence of elevated underlying traits (Paris, 1994). It is highly possible that this underlying trait is negative affect.

One pathway for this interaction was proposed by Posner et al. (2003). In this model, an individual who experiences childhood sexual abuse has an increased risk for developing BPD, but it depends on their level of negative affect. Those that experience childhood sexual abuse and have low negative affect will be resilient to the abuse and not develop elevated symptoms of BPD. However, if an individual with high negative affect is exposed to sexual abuse during childhood, the development of effortful control may be disrupted and lead to the emotion dysregulation that is characteristic of BPD. This theory would explain much of the evidence concerning the association between childhood sexual abuse and BPD, as well as temperament and BPD. Thus, negative affect should serve as a moderator of childhood sexual abuse in predicting both levels of effortful control and symptoms of BPD, such that increased negative affect will cause an increase in the magnitude of the positive relationship between childhood sexual abuse and symptoms of BPD.

Provided the limited evidence for the role of childhood sexual abuse in BPD, as well as the evidence supporting other negative childhood environmental variables, it seems reasonable to assume that many different negative childhood environmental variables play a role in the etiology of BPD. Childhood sexual abuse was chosen for this study because of its consistent relationship with BPD. No other childhood environmental

variable has such a well documented relationship with BPD. Thus, while many different negative childhood environmental variables could be used in this study, sexual abuse was selected because it holds the most empirical support. Additionally, by choosing only one environmental variable, the likelihood of obtaining a Type I error was reduced.

Other models of temperament, such as Clark and Watson's model (Clark, 2005) and Thomas and Chess's model (Thomas, Chess, & Birch, 1970) may also have traits that interact with the environment to produce BPD. However, as stated above, Rothbart's model of temperament (Rothbart & Derryberry, 1981) was chosen above these other models because of the specific roles that the traits (i.e., negative affect and effortful control) are theorized to play in the development of BPD (Posner et al., 2003). For example, negative affect was specifically hypothesized to be a predisposing factor for BPD based on its development in infancy, relative stability throughout the lifespan, and relationship to BPD. Effortful control was hypothesized to mediate the relationship between negative affect and childhood sexual abuse because of its ongoing development throughout childhood and its relationship to emotion regulation. Based on the specific role of these traits, Rothbart's model of temperament (Rothbart & Derryberry, 1981) seems to be more appropriate to test the theory that temperament interacts with the environment to produce BPD.

Nature of Personality Disorders

Many have argued that personality disorders, including BPD, are best conceptualized dimensionally, rather than categorically (Clark, 2005; Widiger & Trull, 2007). Others have provided empirical support for the dimensional representation of

personality disorders (Morey et al., 2003; Smith, Klein, & Benjamin, 2003). Due to the dimensional nature of personality disorders, it would be appropriate to use a large sample of non-clinical participants who may represent the continuum of BPD symptoms and also include individuals who may meet full criteria for BPD according to the Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (APA, 2000).

The variables of interest in this study (i.e., childhood sexual abuse, negative affect, effortful control) have also been implicated in the etiology of other Axis II disorders. For example, childhood sexual abuse has shown to be positively related to antisocial personality disorder (Schmidt, Humfress, & Treasure, 1997), and negative affect has been shown to be positively related to avoidant personality disorder (Morey et al., 2003). Due to this overlap in etiological factors between disorders, a comparison disorder, avoidant personality disorder, was used in this study.

Avoidant personality disorder is characterized by a pervasive pattern of social inhibition, hypersensitivity to negative evaluation, feelings of inadequacy, and behavioral avoidance of social situations (APA, 2000). Avoidant personality disorder is fundamentally different from BPD in that the impairment for the former is related to fear, anxiety, and worry associated with social interactions, and impairment for the latter is associated with emotional, intrapersonal, and interpersonal instability, as well as impulsivity. However, these two disorders do share some important features. Primarily, both disorders are associated with elevated neuroticism (Farmer & Nelson-Gray, 1995; Saulsman & Page, 2002). The difference in symptoms between the two disorders makes avoidant personality disorder a good comparison disorder. Additionally, the shared

feature of elevated neuroticism makes this comparison somewhat conservative. Replicating all analyses with avoidant personality traits as the criterion variable ensures that any significant findings are specific to symptoms of BPD and not to personality disorders or psychopathology in general. Additionally, studies have demonstrated that social phobia and avoidant personality disorder fall on different areas of the same continuum, with avoidant personality disorder being a more severe form of social phobia (Holt, Heimberg, & Hope, 1992; Tillfors, Furmark, Ekselius, & Fedrikson, 2004). For this reason, measures of avoidant personality disorder and measures of social phobia were combined to assess avoidant personality disorder.

According to the *DSM-IV-TR* (APA, 2000), personality disorders should not be diagnosed until the age of eighteen. It is also around this time that both personality and personality disorders are thought to crystallize. For these reasons participants of this study were recruited on the basis that they were at least eighteen years old.

Finally, BPD is diagnosed at a much higher rate in women than in men. The *DSM-IV-TR* estimates that 75% of individuals with BPD are women. Due to the high ratio of women in the overall BPD population, this study recruited only women as participants.

Hypotheses

The goal of this study was to examine the role of childhood sexual abuse and the temperament traits of negative affect and effortful control in the development of BPD. It was hypothesized that increased negative affect, increased childhood sexual abuse, and the interaction of negative affect and childhood sexual abuse would significantly predict

increased symptoms of BPD. It was further hypothesized that each of these three pathways would be mediated by decreased levels of effortful control. All analyses were also conducted using symptoms of avoidant personality disorder as the criterion variable.

CHAPTER II

METHOD

Participants

The sample consisted of 215 female undergraduates enrolled in introductory psychology classes. Ten participants responded to three or more Infrequency Scale items in the wrong direction, indicating that they probably responded in a random or careless manner. These participants were dropped from the sample. The remaining 205 participants ranged in age from 18 to 53 (M = 18.93, SD = 2.85). The participants were primarily Caucasian (65.9%) and African-American (27.3%) and came from families with an annual income of over $30,000 (79.5%). These participant characteristics are consistent with the characteristics for the student population of this university.

Materials

Demographic form. Basic demographic information was gathered including ethnicity, age, and family income.

Childhood Trauma Questionnaire. The Childhood Trauma Questionnaire (Bernstein & Fink, 1998) is a 25-item retrospective self-report of the frequency of neglect and abuse experienced in childhood (Appendix A). Scales for physical abuse, sexual abuse, emotional abuse, physical neglect, and emotional neglect are derived from the Childhood Trauma Questionnaire. Each item concerns how often events occurred in one's childhood and is rated on a five point likert scale ranging from one or "never true"

to five or “very often true.” Each scale consists of five items and yields a dimensional score ranging from five to twenty-five. Only the scale of sexual abuse was analyzed in this study.

The childhood trauma questionnaire has shown good internal consistency with an overall alpha of .96 and an alpha of .92 for the sexual abuse scale. (Paivio & Cramer, 2004). Test-retest reliability has been shown to be good with a coefficient of .85 for the total scale and a coefficient of .87 for the sexual abuse scale over an eight to ten week period (Paivio & Cramer, 2004). The childhood trauma questionnaire has also shown good convergent validity with clinician interviews, especially for sexual abuse (*r = .75*; Bernstein et al., 2003).

Wisconsin Personality Disorders Inventory – IV. The Wisconsin Personality Disorders Interview – IV (WISPI-IV; Klein et al., 1993) is a 214-item self-report of continuous symptoms of the *DSM-IV* personality disorders (Appendix B). The WISPI-IV includes scales for each of the personality disorders. Only BPD and avoidant personality disorder were used in the analyses in this study. Items are self-descriptive and are rated on a ten point likert scale ranging from zero or “never/not at all” to nine or “always/extremely”. Items for both the BPD scale and the avoidant personality disorder scale are summed and averaged across the number of items to obtain a dimensional score ranging from zero to nine.

Test-retest correlations for a two week period ranged from .71 to .94 for different personality disorder (PD) scales with an average of .88 (Klein et al., 1993). Test retest correlations for three to four month time intervals ranged from .72 to .80 in another study

(Barber & Morse, 1994). The WISPI-IV has high internal consistency with alphas ranging from .81 to .94 for different PD scales (Barber & Morse, 1994). The WISPI-IV has shown good discriminant validity between non-clinical controls and individuals with specific PDs, including BPD and avoidant personality disorder (Klein et al., 1993). Additionally, the WISPI-IV has shown high concurrent validity for individual personality disorder scales through significant correlations with the Millon Clinical Multiaxial Inventory – I (Millon, 1982) and the Personality Diagnostic Questionnaire (Hyler et al., 1988), as well as the Personality Disorders Examination (Loranger, 1988) and the Structured Clinical Interview for *DSM-III-R* – Personality Disorders (Spitzer, Williams, Gibbon, & First, 1990). Significant correlations for all four measures always included the BPD and avoidant personality disorder scales (Barber & Morse, 1994; Klein et al., 1993; Smith, Klein, & Benjamin, 2003).

Borderline Syndrome Index. The Borderline Syndrome Index (Conte, Plutchik, Karasu, & Jerrett, 1980) is a 52-item self-report of continuous symptoms of BPD (Appendix C). Items are self-descriptive and are answered “yes” or “no”. All yes responses are scored as one and all no responses are scored as zero, resulting in a total scale score ranging from zero to fifty-two. High internal consistency (r = .92) has been demonstrated with the Borderline Syndrome Index (Conte et al., 1980). Discriminant validity was also demonstrated as scores for patients with BPD were significantly higher than scores for groups of non-clinical controls, patients with depression, and patients with schizophrenia (Conte et al., 1980). Test-retest reliability for the borderline syndrome

index has been shown to be moderate over a three-year period (r = .57; Fine & Sansone, 1990).

Schizotypal Ambivalence Scale. The Schizotypal Ambivalence Scale (Kwapil, Mann, & Raulin, 2002) is a 19-item measure of ambivalence that is characteristic of both schizophrenia spectrum disorders and BPD (Appendix D). Each item is self-descriptive and rated as true or false. True responses are scored as one while false responses are scored as zero, resulting in a scale score that ranges from zero to nineteen . The Schizotypal ambivalence scale has been shown to have high internal consistency with alphas of .84 in two separate studies (Kwapil et al., 2002; Mann, Vaughn, & Kwapil, 2002). Test-retest reliability for the measure has been shown to be good with an intraclass correlation coefficient of .74 over a nine-week period (Mann et al., 2002). In a sample of college students, those scoring high ($SD \geq 1.96$; n = 26) on the Schizotypal Ambivalence Scale had significantly higher levels of BPD symptoms than those scoring low ($SD \leq .5$; n = 31) on the schizotypal ambivalence scale (Edmundson, Barrantes-Vidal, & Kwapil, in preparation). This difference had a large effect size of d = 1.03.

Infrequency Scale. The Infrequency Scale (Chapman & Chapman, 1986) is a 13-item measure designed to detect careless and random response styles (Appendix E). Items are self-descriptive and rated as true/false. Items of the infrequency scale are designed to have a very low probability of being endorsed in a certain direction. For example, the item “there have been a number of occasions when people I know have said hello to me,” being endorsed as false would be an indicator of random or careless responding. Participants endorsing three or more of these items in the unexpected direction were not

included in statistical analyses. Due to the true/false response format, the Infrequency Scale was imbedded within the Schizotypal Ambivalence Scale (Kwapil, Mann, & Raulin, 2002).

Social Phobia Scale and Social Interaction Anxiety Scale. The Social Phobia Scale (Appendix F) and Social Interaction Anxiety Scale (Appendix G) are self-report questionnaires that were developed together in order to assess fear of scrutiny while being observed or when performing a task, and anxiety experienced while interacting with others, respectively (Mattick & Clarke, 1998). Both scales consist of twenty self-descriptive items that are each rated on a five-point Likert scale from zero or "not at all" to four or "extremely." Each is summed and divided by twenty to yield a scale score of zero to four. Both scales have demonstrated adequate three month test-retest reliability, good internal consistency, good concurrent validity, and good discriminant validity (Mattick & Clarke, 1998).

Adult Temperament Questionnaire. The Adult Temperament Questionnaire (Evans & Rothbart, 2003) is a 177-item self-report of individual differences in emotional reactivity and self-regulation (Appendix H). Items are rated on a seven point likert scale from "extremely untrue of you" to "extremely true of you." The Adult Temperament Questionnaire includes thirteen scales that comprise four factors: negative affect, extraversion/surgency, effortful control, and orienting sensitivity. Items for each factor are summed and averaged across the number of items to obtain a dimensional score ranging from one to seven. Only the factors of effortful control and negative affect were used in the analyses in this study. The internal reliability of the Adult Temperament

Questionnaire is good with alphas ranging from .75 to .87 for the different factors (Critchfield, Levy, & Clarkin, 2004; Evans & Rothbart, 2003).

Procedure

Packets of questionnaires were administered by female undergraduate research assistants to groups of one to fifteen participants in lecture halls. The order of questionnaires was randomized within packets, with the exception of demographic forms which were always first. Participants were instructed to sit with at least one seat in between them and the other participants in all directions. Participants required between 75 minutes and 2 hours to complete all questionnaires and received course credit for participating in the study.

CHAPTER III

RESULTS

Prior to testing the main hypotheses, the variables were assessed for normality. The zero-order correlation between each of the variables with each other was then assessed. The latent structure of the BPD symptoms variable and the avoidant symptoms variable that would be used in the main analyses were assessed to determine if these variables had a solid structure. Finally, structural equation modeling was used to test the main hypotheses. The alpha level for all correlations and standardized regression weights was set at .05.

Table 1 contains the mean, standard deviation, skewness, and kurtosis of negative affect, effortful control, childhood sexual abuse, BPD symptoms as assessed by three measures, and avoidant personality disorder symptoms as assessed by three measures. Two variables were positively skewed and violated the assumption of normality used in structural equation modeling: the Borderline Syndrome Index (Conte et al., 1983) scale and childhood sexual abuse. The distribution of the Borderline Syndrome Index scale was normalized using a square-root transformation. The childhood sexual abuse variable was highly skewed and could not be transformed into a normal variable. The use of this skewed variable would violate the multivariate normality assumption necessary for structural equation modeling; therefore, the childhood sexual abuse variable was dichotomized. Any endorsement of abuse (i.e., scores above 5) was entered as a one,

while participants not endorsing abuse were entered as zero for this variable. Eighteen percent of participants endorsed some type of childhood sexual abuse in the current sample, which is consistent with the 18.5% rate of childhood sexual abuse found in a previous study of 373 American female college students (Nilsen, 2003).

The Pearson correlation between all of the original variables and the transformed Borderline Syndrome Index (Conte et al., 1983) scale are in Table 2. These correlations indicate a moderate positive relationship between negative affect and measures of BPD symptoms, and a moderate negative relationship between effortful control and measures of BPD symptoms. Childhood sexual abuse had a significant positive relationship with two of three measures of BPD symptoms and was also positively correlated with negative affect; although these relationships were small. The BPD measures had a moderate to strong relationship with each other.

The measures of avoidant personality disorder had strong relationship with each other. They had a moderate and positive association with negative affect and measures of BPD. The avoidant personality disorder measures were also significantly negatively associated with effortful control. Surprisingly, childhood sexual abuse was significantly positively correlated with one of the measures of avoidant personality disorder, the Social Phobia Scale. Finally, a strong negative relationship was observed between negative affect and effortful control.

Structural Equation Modeling using AMOS 7.0 software (Arbuckle, 2006) was used to test the hypotheses. In all analyses a latent variable of BPD was used with loadings from the three BPD scales. Likewise, a latent variable for avoidant personality

disorder was created using loadings from the three avoidant personality disorder scales. Prior to assessing the pathways and the fit of the models, the structure of the latent BPD symptoms and latent avoidant personality disorder symptoms variables were assessed. All standardized loadings on the BPD symptoms latent variable and on the avoidant personality disorder symptoms latent variable were significant and large (see *Figure* 1).

In the first model, negative affect and childhood sexual abuse were entered as observed exogenous variables. Pathways were entered from negative affect to BPD symptoms and from childhood sexual abuse to BPD symptoms. Negative affect and childhood sexual abuse were allowed to covary (see *Figure* 2). The model demonstrated good fit (Table 3) with a Comparative Fit Index above .90 (CFI = .98), Goodness of Fit Index above .90 (GFI = .98), and a standardized Root Mean Squared Residual below .10 (SRMR = .03). The Root Mean Square Error of Approximation was below .10 (RMSEA = .09, C.I. = .03 - .16). The Chi-square statistic was significant ($\chi^2 = 10.7$, df = 4, $p < .05$), indicating poor fit; however, the Chi-square statistic is rarely accepted as a sole indicator of good fit for many reasons including sensitivity to large sample sizes, unrealistic statistical assumptions (i.e., the model should have perfect population fit), and sensitivity to large correlations in the model (Kline, 2005). With regard to path coefficients, the paths from both negative affect ($\beta = .59$) and childhood sexual abuse ($\beta = .14$) to BPD symptoms were significant.

The second model built upon the first by adding the observed exogenous variable of the interaction of negative affect and childhood sexual abuse. To create this interaction, negative affect and childhood sexual abuse were each centered (i.e., the mean

of the variable was subtracted from each observation) and then multiplied by each other, as recommended by Aiken and West (1996). A pathway was then entered from the interaction of negative affect and childhood sexual abuse to BPD symptoms. Both negative affect and childhood sexual abuse were allowed to covary with the interaction between negative affect and childhood sexual abuse (see *Figure* 3*)*. The second SEM model also demonstrated good fit (see Table 3) on all of the noted fit statistics (χ^2 = 10.9, df = 6, *n.s.*; CFI = .98; GFI = .98; SRMR = .03; RMSEA = .06, C.I. = .00 - .12). In this model, the path coefficients from negative affect (β = .57) and the interaction of negative affect and childhood sexual abuse (β = .16) to BPD symptoms were significant. The path coefficient from childhood sexual abuse (β = .11, p = .10) to BPD symptoms was not significant.

The nature of the interaction of negative affect and childhood sexual abuse in predicting BPD symptoms was examined. For this analysis a BPD composite was created by combining the items from the Schizotypal Ambivalence Scale (Kwapil et al., 2002)), Borderline Syndrome Index (Conte et al., 1983), and the BPD scale of the WISPI-IV (Klein et al., 1993) in a principal components analysis. A simple slopes analysis was performed with childhood sexual abuse as the moderator and negative affect as the independent variable. The mean level of BPD symptoms was examined for both the abused and non-abused participants when their level of negative affect was at 2 standard deviations above (high) and below (low) the mean (see *Figure* 4). The standardized regression coefficient for those reporting childhood sexual abuse was .730 (*SE* = .103) and was statistically different from zero (p < .05). The standardized regression

coefficients for those not reporting childhood sexual abuse was smaller (β = .459, *SE* = .072) and also different from zero ($p < .05$). These regression coefficients indicate that for those participants who experienced childhood sexual abuse, the relationship between negative affect and BPD symptoms was substantially stronger.

The third model built upon the second model by adding in the observed endogenous variable of effortful control as a mediating variable. Direct paths from negative affect, childhood sexual abuse, and the interaction of negative affect and childhood sexual abuse to BPD symptoms were removed. Paths were added from negative affect, childhood sexual abuse, and the interaction of negative affect and childhood sexual abuse to effortful control. A path was also added from effortful control to BPD symptoms (see *Figure* 5). This model demonstrated poor fit (see Table 3) with only the Goodness of Fit statistic meeting the commonly held threshold for good fit (χ^2 = 75.4, df = 11, $p < .05$.; CFI = .82; GFI = .92; SRMR = .13; RMSEA = .17, C.I. = .13 - .21). In this model, only the paths from negative affect to effortful control (β = -.49) and from effortful control to BPD symptoms (β = -.40) were significant. The paths from childhood sexual abuse (β = .06) and the interaction of negative affect and childhood sexual abuse (β = -.06) to effortful control were not significant. Furthermore, when a follow-up analysis was conducted with an additional direct pathway from negative affect to BPD symptoms, the path coefficient from effortful control to BPD symptoms (β = -.13) was no longer significant. It appears that when the direct relationship between negative affect and BPD symptoms is taken into account, the mediating relationship of effortful control disappears.

The final SEM model involved reanalyzing the second model, but with avoidant personality disorder symptoms as an added endogenous variable. In this model, paths were specified from negative affect, childhood sexual abuse, and the interaction of negative affect and childhood sexual abuse, to both BPD symptoms and avoidant personality disorder symptoms (see *Figure* 6). The model had poor fit (see Table 3) on all fit statistics (χ^2 = 154.5, df = 21, $p < .05$.; CFI = .83; GFI = .89; SRMR = .13; RMSEA = .18, C.I. = .15 - .20). In this model, there were significant path coefficients from negative affect (β = .57) and the interaction of negative affect and childhood sexual abuse (β = .16) to BPD symptoms. There was also a significant path coefficient from negative affect to avoidant personality disorder symptoms (β = .47). However the interaction of negative affect and childhood sexual abuse did not predict avoidant personality disorder symptoms (β = .10).

CHAPTER IV

DISCUSSION

This study sought to test the long held theory that temperament interacts with negative childhood environmental experiences to produce BPD. In this study, a specific temperament trait, negative affect, and a specific negative childhood environmental experience, sexual abuse, were examined. Furthermore, based on theoretical work by Posner et al. (2003), effortful control was examined as a potential mediating variable in this process. The results provide support for the interaction of temperament (negative affect) and negative childhood environmental experiences (sexual abuse) in predicting increased symptoms of BPD. While accounting for each other, both increased negative affect and increased childhood sexual abuse predicted increased BPD symptoms. When the interaction of these two variables was added into the model, it predicted BPD symptoms over and above the contribution of negative affect and childhood sexual abuse alone.

It should be noted that childhood sexual abuse is not necessary for the development of BPD. Prior research has indicated a modest relationship between childhood sexual abuse and BPD symptoms and diagnoses (Fossati et al. 1999), which is reflected in the small correlations (r = .06 - .24) and small standardized path coefficients (β = .11 - .14) in this study. Additioanlly, a review by Goodman and Yehuda (2002) showed that rates of childhood sexual abuse in individuals with BPD rangie from 40% to

70%. Several other environmental variables may also interact with negative affect in order to produce BPD. For example, Bierer et al. (2003) demonstrated in their sample of personality disordered subjects that childhood experiences of emotional abuse were predictive of BPD, while physical and sexual abuse were not. Perhaps, for some individuals high in BPD symptoms or diagnosable with BPD, other environmental variables such as emotional abuse interact with negative affect to produce increased symptoms of BPD. Childhood sexual abuse is clearly not the only negative childhood environmental experience that results in BPD.

In this study and in Posner et al.'s (2003) study, negative affect had a strong association with BPD symptoms. Similar to childhood sexual abuse, negative affect may be one of multiple temperamental or biological" variables that, in conjunction with environmental stressors, result in increased symptoms of BPD. For example, Linehan (1993) hypothesizes that some "biological" variable must be present prior to a negative childhood environmental experience (i.e., invalidation) in order to cause BPD. Similarly studies by Ni et al. (2007) and Lyons-Ruth et al. (2007) have demonstrated that allelic variations of genes related to impulsivity, aggression, and suicidality predict the presence of a BPD diagnosis and increased BPD symptoms. Thus, negative affect may be one of multiple predisposing variables that interact with the environment to produce BPD.

Despite the use of one specific model of temperament in this study, Rothbart's model (Rothbart & Derryberry, 1991), other models of temperament and personality may also be viable. For example, given the consistent relationship found between BPD and the Five Factor Model traits of high neuroticism and low agreeableness (Saulsman & Page,

2004), one may argue that these traits are predisposing elements that interact with negative childhood environmental experiences to produce BPD. The Rothbart model was chosen for this study because of its well defined theoretical role in the development of BPD across time (Posner et al., 2003). However, this does not mean that other models of temperament and personality do not include predisposing traits that interact with negative childhood environmental experiences to produce BPD.

It should also be mentioned that some limited research supports the familial transmission of BPD. Two early studies have provided support for the increased rate of transmission among probands diagnosed with BPD (Baron, Gruen, Asnis, & Lord, 1985; Zanarini, Gunderson, Marino, & Schwartz, 1988). Another study comparing monozygotic and dizygotic twins demonstrated the heritability of specific BPD traits from parents to children (Coolidge, Thede, & Jang, 2001). These findings, however, do not necessarily mean that genes are involved in the transmission of BPD. Levy (2005) noted in a recent review that mothers with BPD have a tendency towards several negative parenting behaviors (e.g., intrusiveness, low warmth). These children also tend to show more psychopathology, including symptoms consistent with adult BPD. Children of parents with BPD may have a greater likelihood of also developing the disorder; however, it is unclear at this time what the exact contributions of heredity and parenting are. It is very likely that the findings from these heritability and parenting studies reflect the (inherited) temperament by environment interaction found in this study.

The results also demonstrate the specificity of the interaction between negative affect and childhood sexual abuse by simultaneously using negative affect, childhood

sexual abuse, and the interaction of negative affect and childhood sexual abuse to predict both symptoms of BPD and symptoms of avoidant personality disorder. These analyses showed that increased negative affect was important to increased symptoms of both disorders. However, childhood sexual abuse and its interaction with negative affect were predictive only of BPD symptoms. Thus, it appears that the theory tested in this study is specific to BPD, at least in comparison to another personality disorder with overlap in features.

The results did not support the second hypothesis that effortful control would serve as a mediator between negative affect, childhood sexual abuse, and the interaction of negative affect and childhood sexual abuse, and BPD symptoms. It is likely that the low levels of effortful control associated with BPD in previous work (Posner et al., 2003) were not spurious, but indicated a different relationship than the one proposed by Posner et al. Low levels of effortful control may simply be a symptom of BPD, rather than a mechanism involved in the development of the disorder. A meta-analysis of studies examining the relationship between cognitive functioning and BPD (Ruocco, 2005) indicates that many areas of cognitive functioning, including executive attention, are reduced in samples of individuals with BPD. Given the significant relationship between effortful control and BPD found in this study and others, it appears that low levels of effortful control are a core symptom of BPD.

Taken together, these findings support the widely held theory that BPD develops from the interaction of temperament and the environment. In this study, a specific temperamental variable, negative affect, and a specific environmental variable, childhood

sexual abuse, interacted to predict increased symptoms of BPD above and beyond what either variable alone predicted. The nature of the interaction was also consistent with this theory in that increased symptoms of negative affect in conjunction of increased levels of childhood sexual abuse were predictive of increased symptoms of BPD.

There are several limitations to this study that should be addressed. One limitation is that retrospective reports were used as an index of childhood sexual abuse. Retrospective reports of past events are often and appropriately criticized because they may be influenced by cognitive biases. In addition, individuals with BPD are often suspected of dissembling, misinterpreting, and misremembering previous social interactions (Bailey & Shriver, 1999). However, retrospective reports are a common, useful, and often necessary methodology in the study of adult psychopatholgy and personality disorders in particular. For childhood sexual abuse, it has been argued that retrospective self-reports are the best assessment method available, as family members and state and federal agencies are often unaware of the abuse that is occurring (Hulme, 2004).

Another limitation of this study is that the measurement of temperament in adulthood is used as an index of lifelong and relatively stable traits. As stated in the introduction, it is theorized that negative affect becomes stable in infancy. There is also empirical evidence demonstrating moderate stability of negative affect from birth to age twelve (Roberts & DelVecchio, 2000) and within early adulthood (Vaidya et al. 2002; Watson & Humrichouse, 2006; Watson & Walker, 1996). Therefore, measurements in early adulthood may be accepted as reasonable indicators of negative affect throughout

the lifespan. A longitudinal study beginning in childhood and extending into adulthood would be a more thorough test of the hypotheses in this study. This type of study should be conducted in the future to add more validity to these findings by ruling out potential retrospective biases and by clearly demonstrating the presence of increased negative affect prior to negative childhood environmental experiences.

The measurement of the temperament trait of negative affect in particular poses an additional limitation. Given the substantial amount of negative affect inherent in individuals with BPD, it is possible that the relationship between negative affect and BPD demonstrated in these results is largely due to the overlap between these two constructs. That is, negative affect may only predict BPD, because the respective questionnaires largely measure the same construct. This important point was considered prior to the study, resulting in the selection of two questionnaires that focus primarily on non-affective BPD symptoms. The items comprising the BPD scale of the WISPI-IV (Klein et al., 1993) mostly assess interpersonal patterns of thinking and behaving and specific impulsive behaviors. The Schizotypal Ambivalence Scale (Kwapil et al., 2002) assesses ambivalence related to both cognition and affect. Thus, the BPD symptoms composite used in this study is a construct that taps into multiple areas of BPD functioning aside from negative affect. Furthermore, the correlations between negative affect and the different measures of BPD symptoms were in the moderate range and much less than what would traditionally constitute a collinearity problem.

The use of a college sample to assess the etiology of a clinical phenomenon was another limitation. Although there is evidence that BPD symptoms fall on a continuum

from low and adaptive levels to high and maladaptive levels, it would be more convincing to demonstrate the relationships found in this study in a sample of individuals diagnosable with *DSM-IV-TR* defined BPD. Future studies should attempt to replicate the findings of this study using clinical samples of individuals diagnosed with BPD. Another limitation resulting from the use of a college sample was a low incidence of childhood sexual abuse. Only 18% of participants reported any history of childhood sexual abuse; however, even with a low incidence of childhood sexual abuse, a significant relationship was found between childhood sexual abuse and BPD symptoms.

Despite the limitations of this study, it is an important first step in providing empirical evidence for a ubiquitous theory that has been held for nearly two decades (Linehan, 1993; Paris, 1993). As one of the most common disorders represented in psychiatric in-patient units and with suicide rates estimated around 10% (Gunderson & Ridolfi, 2001; Paris & Zweig-Frank, 2001), it is essential that the causes of BPD be better understood. By understanding the etiology of BPD we may better understand the nature of it and be better equipped to develop prevention or early treatments to alleviate the symptoms. Future studies must build upon this work in order to further validate this theory and to provide specificity with regard to the environmental variables and predisposing variables involved.

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Appendix. Tables and Figures

Table 1

Mean, standard deviations, skewness, and kurtosis of negative affect, effortful control, Borderline Syndrome Index (original and normalized), Schizotypal Ambivalence Scale, BPD scale of the WISPI-IV, avoidant personality disorder scale of the WISPI-IV, Social Phobia Scale, and Social Interaction Anxiety Scale.

	Mean	Standard Deviation	Skewness (S.E. = .170)	Kurtosis (S.E. = .338)
Negative Affect	4.23	0.61	0.39	0.24
Effortful Control	3.96	0.64	-0.14	0.20
BSI	8.57	8.25	1.52	2.78
√BSI	2.54	1.45	.19	-.28
SAS	6.02	4.58	.80	-.17
WISPI BPD	1.84	1.31	.80	.07
WISPI APD	2.52	1.75	.64	-.19
SPS	1.04	0.70	.93	.76
SIAS	1.26	0.75	.48	-.34
Childhood Sexual Abuse[a]	6.22	3.88	3.71	13.28

[a] The descriptive statistics displayed for the childhood sexual abuse variable are for the original skewed continuous

variable.

Table 2

Pearson correlation between negative affect, effortful control, childhood sexual abuse, Borderline Syndrome Index, Schizotypal Ambivalence Scale, BPD scale of the WISPI-IV, avoidant personality disorder scale of the WISPI-IV, Social Phobia Scale, and Social Interaction Anxiety Scale.

	Negative Affect	Effortful Control	Sexual Abuse	√BSI	SAS	WISPI BPD	WISPI APD	SPS	SIAS
Negative Affect	1	-.491*	.142*	.549*	.455*	.351*	.407*	.417*	.416*
Effortful Control	-.491*	1	-.021	-.275*	-.350*	-.325*	-.271*	-.253*	-.316*
Sexual Abuse[a]	.142**	-.021	1	.236*	.143*	.060	.086	.152*	.045
√BSI	.549*	-.275*	.236*	1	.694*	.446*	.522*	.420*	.410*
SAS	.455*	-.350*	.143*	.694*	1	.517*	.505*	.461*	.439*
WISPI BPD	.351*	-.325*	.060	.446*	.517*	1	.668*	.372*	.342*
WISPI APD	.407*	-.271*	.086	.522*	.505*	.668*	1	.605*	.688*
SPS	.417*	-.253*	.152*	.420*	.461*	.372*	.605*	1	.745*
SIAS	.416*	-.316*	.045	.410*	.439*	.342*	.688*	.745*	1

[a]Due to the skewed nature of the childhood sexual abuse variable, it was scored dichotomously as abused versus non-abused.

*$p < .05$, two-tailed.

Table 3

Model fit statistics for all four SEM models.

	CFI	GFI	SRMR	RMSEA (C.I.)	χ^2 (df)
Model 1	.98	.98	.03	.09 (.03 - .16)	10.7 (df = 4)
Model 2 with interaction	.98	.98	.03	.06 (.00 - .12)	10.9 (df = 6)
Model 3 with mediation	.82	.92	.13	.17 (.13 - .21)	75.4 (df = 11)
Model 4 with APD symptoms	.83	.89	.13	.18 (.15 - .20)	154.5 (df = 21)

Figure 1. Standardized loadings for the latent BPD symptoms and avoidant personality disorder symptoms variables.

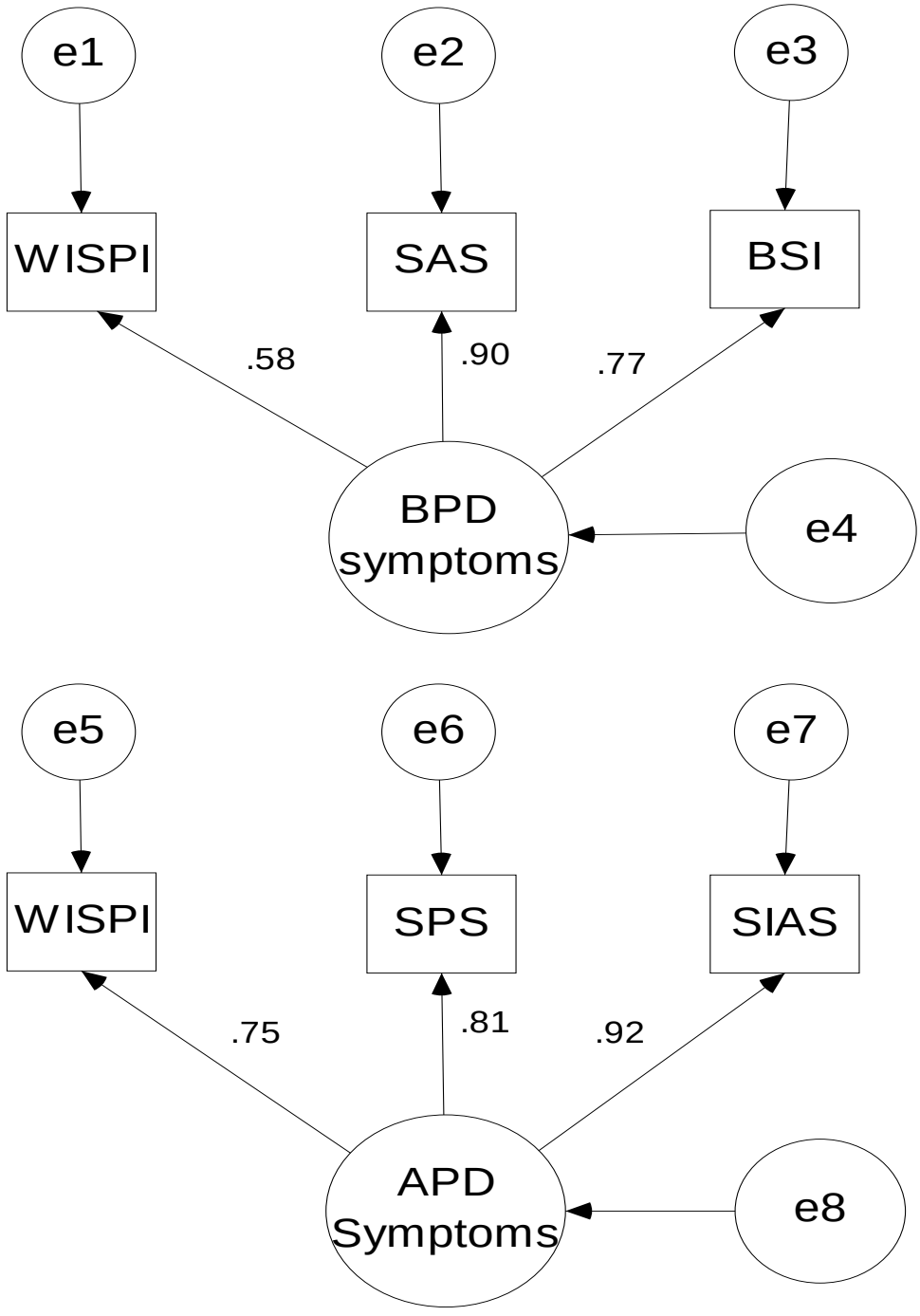

Figure 2. First SEM model with negative affect and childhood sexual abuse predicting BPD symptoms.

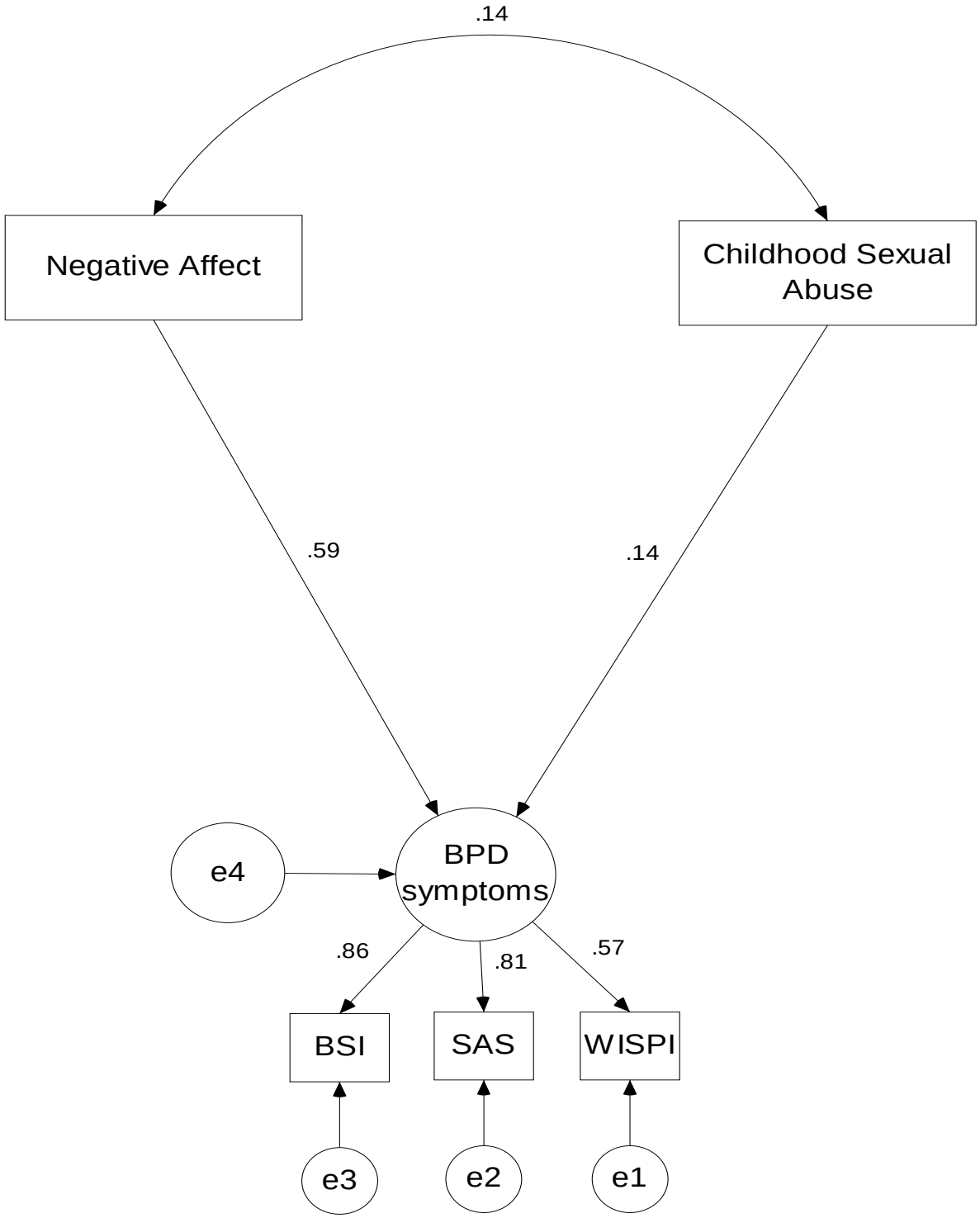

Figure 3. Second SEM model with negative affect, childhood sexual abuse, and the interaction of negative affect and childhood sexual abuse predicting BPD symptoms.

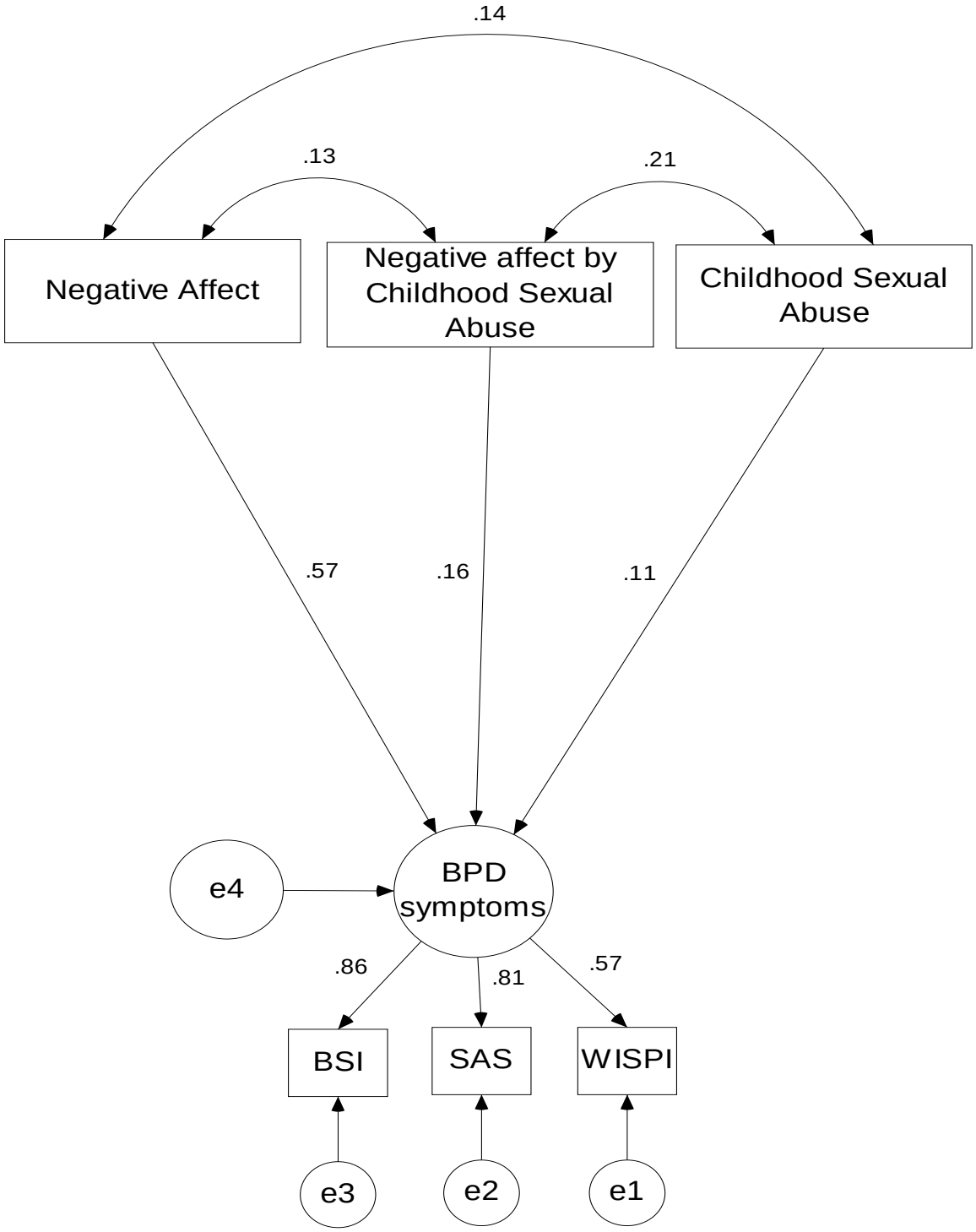

Figure 4. The interaction between negative affect and childhood sexual abuse in predicting BPD symptoms.

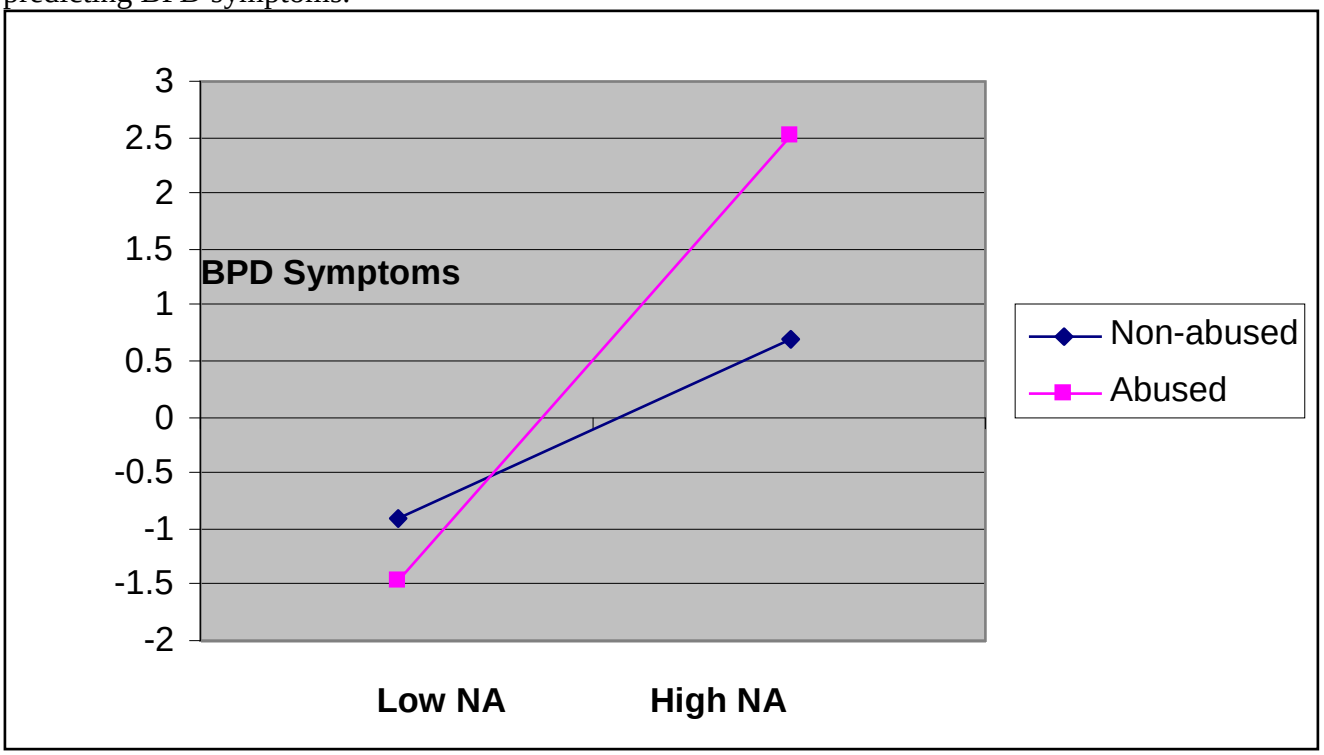

Figure 5. Third SEM model with effortful control as a mediating variable.

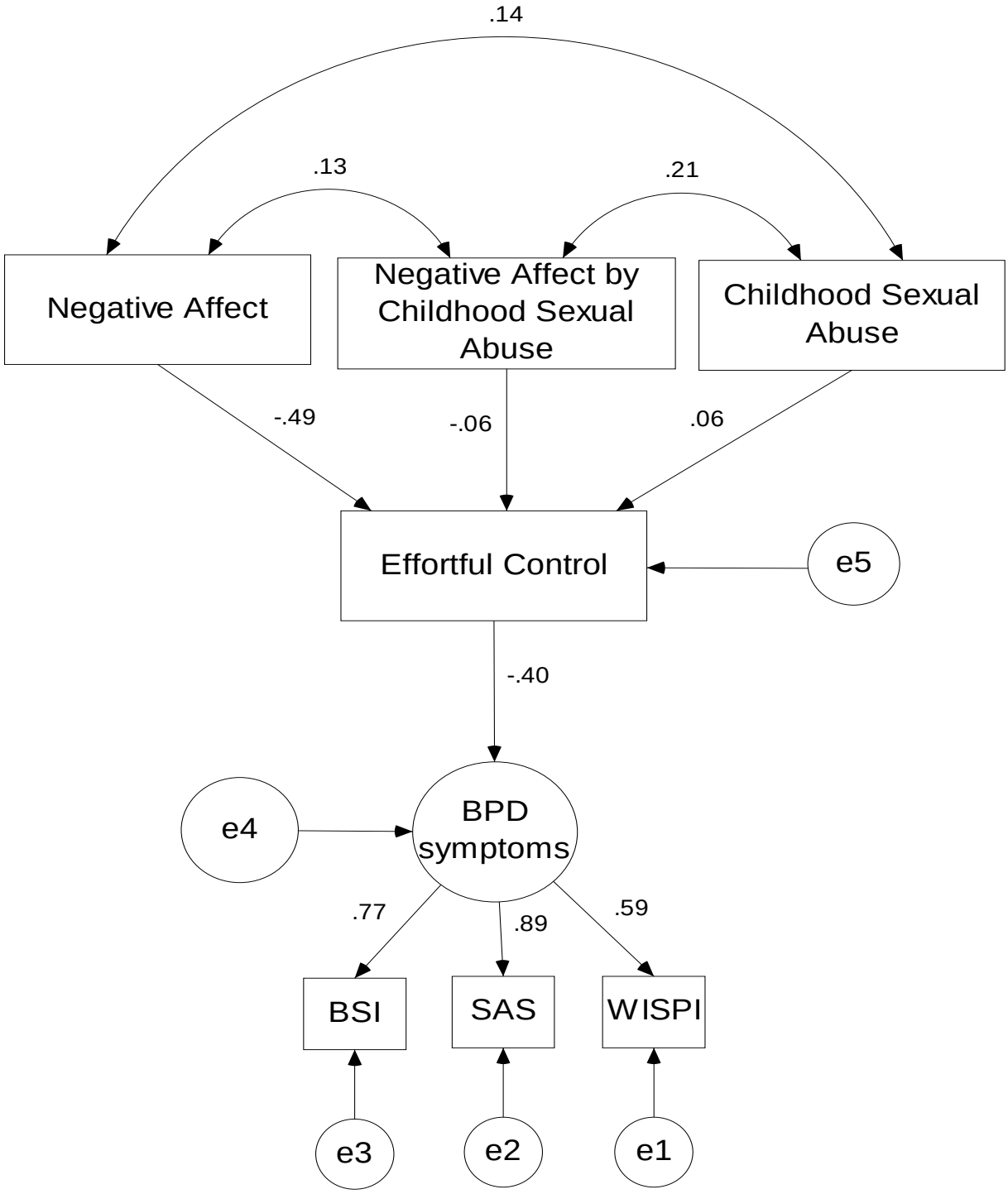

Figure 6. Final SEM model with paths to BPD symptoms and avoidant personality disorder symptoms.