

IDENTIFYING PRECURSORS TO BORDERLINE PERSONALITY DISORDER  
AMONG MALTREATED CHILDREN

A Thesis

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by

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## ABSTRACT

This study used the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN) data ( $N = 1281$ ) to investigate whether maltreated children demonstrated greater vulnerability to developing Borderline Personality Disorder (BPD) in adulthood through expression of potential precursors to the disorder. The 11 dimensions assessed were conceptualized by Rogosch and Cicchetti (2005) to comprise the BPD precursors composite score, and include: relational aggression, dislike by peers, negative self-perception, suicidal ideation, lability and dysregulated negative affect, poor effortful control, upsetting/demanding behavior, conflicted relationships, negative perceptions of peers, self-harm, and preoccupation with mother. Maltreated children had higher mean BPD precursors composite scores than nonmaltreated children. Physical abuse and neglect were associated with higher BPD precursors composite scores, and males had higher scores than females. Implications of these findings on understanding the etiology of personality disorders, early intervention for BPD, and directions for future research are discussed.

## BIOGRAPHICAL SKETCH

This paper was written by Diane Wach, MEd, LPC doctoral student in Human Development at Cornell University. Diane is a Research Support Specialist at the National Data Archive on Child Abuse and Neglect (NDACAN) in the Bronfenbrenner Center for Translational Research (BCTR) at Cornell University. She has worked as a psychotherapist diagnosing and treating diverse populations of clients in a wide-range of clinical settings. She worked with clients coping with stressors along a continuum from daily hassles, to clinical disorders, to trauma - including the September 11<sup>th</sup> attacks and the Washington, DC sniper incident. Her clinical expertise is in the areas of child maltreatment, crisis intervention, suicide intervention, trauma disorders, stress, and personality disorders. Diane's research is inspired by her clinical experience.

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## DEDICATION

To my clients.

*i'm more of the mental illness, trauma, and media school. well, i can do you trauma and mental illness without the media, and i can do you trauma and media without the mental illness, and i can do you all three concurrent or consecutive. but i can't give you mental illness and media without the trauma. trauma is compulsory. they're all trauma, you see.*

-adapted from Tom Stoppard, *Rosencrantz and Guildenstern are Dead*.

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This secondary analysis is a partial replication of the study:

Rogosch, F. A., & Cicchetti, D. (2005). Child maltreatment, attention networks, and potential precursors to borderline personality disorder. *Development and Psychopathology*, 17(4), 1071-1089. doi:10.1017/S0954579405050509

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## TABLE OF CONTENTS

IDENTIFYING PRECURSORS TO BORDERLINE PERSONALITY DISORDER AMONG MALTREATED CHILDREN .....	1
Introduction.....	1
Definitions and Overview .....	2
Child Maltreatment.....	2
Personality Disorder.....	4
Borderline Personality Disorder. ....	7
Etiology of BPD .....	11
Biology and Evolution. ....	12
Clinical Theory. ....	13
Symptomatology in Children and Adolescents. ....	15
Retrospective Research on Maltreatment and BPD .....	20
Summary of Retrospective Research. ....	22
Criticisms of Retrospective Research. ....	22
Cross-Sectional and Prospective Research on Maltreatment and BPD.....	24
Summary of Cross-Sectional and Prospective Research. ....	27
Criticisms of Cross-Sectional and Prospective Research.....	27
Replication Model: Rogosch and Cicchetti (2005) .....	28
HYPOTHESES .....	29
METHOD .....	31
LONGSCAN Sample .....	31
Operationalization of Variables.....	32
Exploratory Analyses .....	33

Maltreatment Age.....	34
Alleged versus Substantiated Maltreatment. ....	36
Maltreatment Subtype Operationalization.....	37
Precursor Assessment Age. ....	39
Precursor Trait Stability.....	40
Site Differences.....	41
Missing Data.....	41
Participants.....	45
Measures.....	47
Maltreatment. ....	47
Peer Relational Aggression. ....	48
Disliked by Others. ....	49
Negative Self-Perception. ....	50
Suicidal Ideation.....	51
Lability/Negativity. ....	52
(Lack of) Contentiousness. ....	53
Upsets Others. ....	54
Conflicted Relationship. ....	54
Negative Perceptions of Peers. ....	55
Self-Harm.....	56
Preoccupied with Mother. ....	57
BPD Precursors Composite Score.....	58
ANALYSES AND RESULTS.....	58
Comparing Maltreated to Nonmaltreated Group Score Means .....	60
Comparing Group Score Means Using Nonparametric Tests .....	62



Predictors of the BPD Precursors Composite Score .....	67
Likelihood of High BPD Precursors Composite Score.....	70
DISCUSSION.....	72
Limitations .....	78
CONCLUSIONS.....	79
Implications for Future Research.....	79
APPENDIX A - DSM-IV-TR Diagnostic Criteria for Borderline Personality Disorder .....	80
APPENDIX B – SAS Syntax .....	81
APPENDIX C - Proxy Variable Map of Lability/Negativity Dimension.....	82
APPENDIX D - Proxy Variable Map of (Lack of) Conscientiousness Dimension .....	84
APPENDIX E - Predictors of BPD Precursors Composite Score within Sites .....	86
REFERENCES .....	87

## LIST OF FIGURES

Figure 1. <i>t</i> -tests of Maltreated and Nonmaltreated Groups Compared with the Findings of Rogosch and Cicchetti (2005).....	63
Figure 2. Positively Skewed Distribution of Suicidal Ideation Scores.....	64
Figure 3. Likelihood of a High BPD Precursors Composite Score: Odds Ratio by Maltreatment Type.....	73

## LIST OF TABLES

Table 1. Exploration of Indicator Maltreatment Operationalizations on the BPD Precursors	
Composite Score Means.....	35
Table 2. Exploration of Hierarchy Maltreatment Operationalization on the BPD Precursors	
Composite Score Means.....	38
Table 3. Distribution of Removed Cases by Race.....	43
Table 4. Distribution of Missing Scores Across Dimensions.....	44
Table 5. Characteristics of the Analysis Sample by Alleged Maltreatment Subtype.....	46
Table 6. Raw and Standardized Dimension and Composite Score.....	59
Table 7. Comparison of Wach (2013) to Rogosch and Cicchetti (2005) Dimension Results..	61
Table 8. Comparison of Nonparametric and Parametric Results for Tests of BPD	
Dimension Score Differences Between Maltreated and Nonmaltreated Groups.....	66
Table 9. Predictors of BPD Precursors Composite Score.....	68
Table 10. Counts of Maltreatment Subtype by BPD Precursors Score Groups.....	71

## LIST OF ABBREVIATIONS

ACF – Administration for Children and Families

Add Health – The National Longitudinal Study of Adolescent Health

APA – American Psychiatric Association

ACASI – Audio Computer Assisted Self Interview

ASEBA – Achenbach System of Empirically Based Assessment

ASPD – antisocial personality disorder

BPD – borderline personality disorder

CCQ – California Child Q-Set

CDI – Children's Depression Inventory

CI – confidence interval

CIC – Children in the Community study

CLPS – Collaborative Longitudinal Personality Studies

CPS – child protective services

CSA – child sexual abuse

*d* – Durbin-Watson test statistic

DBT – Dialectical Behavior Therapy

*df* – degrees of freedom

*dff* – denominator degrees of freedom

DHHS – US Department of Health and Human Services

DIB – Diagnostic Interview for Borderline Patients

DIB-R – Diagnostic Interview for Borderline Patients – Revised

DMHDRU – Dunedin Multidisciplinary Health and Development study

DSM – Diagnostic and Statistical Manual of Mental Disorders (numeral is edition number)

DSM-IV-TR – Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision

$F$  – F-test statistic

FFM – five factor model (of personality)

HIV – human immunodeficiency virus

$H$  – test statistic for the Kruskal-Wallis (chi-square) test for the Wilcoxin scores

$H\#$  – hypothesis

IQ – intelligence quotient

LONGSCAN – Longitudinal Studies of Child Abuse and Neglect

$M$  – mean

MBT – Mentalization Based Therapy

MCMC – Markov Chain Monte Carlo

MCS – Maltreatment Classification System

MI – multiple imputation

MMCS – Modified Maltreatment Classification System

$N$  – sample number of cases

$n$  – subsample number of cases

NCANDS – National Child Abuse and Neglect Data System

NCCAN – National Center on Child Abuse and Neglect

NCS-R – National Comorbidity Survey Replication study

NDACAN – National Data Archive on Child Abuse and Neglect

NIMH – National Institute of Mental Health

NIS-4 – Fourth National Incidence Study of Child Abuse and Neglect

NOS – not otherwise specified

OCAN – Office on Child Abuse and Neglect

OR – odds ratio

$p$  – probability

PD – personality disorder

POPS – Perception of Peers and Self Inventory

P-P – regression standardized residual plot

PTSD – posttraumatic stress disorder

Q-Q – quantile-quantile normal probability plot

$r$  – (parametric tests) Pearson product-moment correlation coefficient

$r$  – (nonparametric tests) Spearman's rank correlation coefficient

SD – standard deviation

STRS – Student-Teacher Relationship Scale

$T$  – Student's test statistic

TANF– Temporary Aid to Needy Families

TRF – teacher report form (of the ASEBA)

TSCC-A – Trauma Symptom Checklist for Children, alternate version

US – United States (of America)

$\chi^2$  – chi-square test statistic

# IDENTIFYING PRECURSORS TO BORDERLINE PERSONALITY DISORDER AMONG MALTREATED CHILDREN

## Introduction

Borderline Personality Disorder (BPD) is a mental illness defined by enduring, pervasive patterns of behavior that include frantic efforts to avoid abandonment, intense unstable relationships, self-damaging impulsive acts, and affective instability (American Psychiatric Association, 2000). BPD is often diagnosed in persons who report a child maltreatment history, particularly physical or sexual abuse (National Institute of Mental Health, 2010). However, a relationship between trauma type and resultant psychopathology has not been established (Paris, 2003). Given the negative sequelae of neglect and emotional abuse (Burns, Jackson, & Harding, 2010; Chapple & Vaske, 2010; Festinger & Baker, 2010; Gaudin, 1999; Shaffer, Yates, & Egeland, 2009), one would expect to find BPD traits among populations with a history of these types of maltreatment, as well as physical and sexual abuse. The diagnostic symptoms of BPD usually present in adolescence or early adulthood. Children who demonstrate borderline traits do not always develop the disorder in adulthood, and many diagnosed as adults did not demonstrate traits in childhood (Cicchetti & Crick, 2009; Paris, 2003). Because it is a personality disorder, the symptoms do not appear spontaneously. There may be precursors to symptoms that manifest in different forms at discrete developmental stages. The etiology of the disorder is not well understood and the majority of research has been retrospective. BPD is notoriously treatment resistant and the identification of markers in children could facilitate early intervention.

The purpose of this study was to investigate whether maltreated children demonstrate a greater vulnerability to developing borderline personality disorder later in life than nonmaltreated peers. A second question was whether subtypes of maltreatment (including physical abuse, sexual abuse, neglect, and emotional abuse) influence the expression of potential precursors to BPD. Fred Rogosch and Dante Cicchetti (2005) constructed a model of 11 dimensions of

childhood precursors that constitute a vulnerability to BPD. They found maltreated children had higher mean BPD precursors composite scores (an aggregate measure of the 11 dimensions) than nonmaltreated children, and children with higher levels of BPD precursors were more prevalent in the maltreatment group. They were unable to draw conclusions about maltreatment subtype, and this may have been due in part to the small number of sexually abused children ( $n = 10$ ) in their sample ( $N = 360$ ). The current study uses proxy variables to assess the same 11 dimensional constructs in a larger study: Longitudinal Studies of Child Abuse and Neglect (LONGSCAN), with a sample of maltreated and nonmaltreated children ( $N = 1354$ ).

I begin by providing overviews of child maltreatment, personality disorder, and borderline personality disorder. I then discuss the etiology of BPD in relation to the diathesis-stress model, biology and evolution, clinical theory, and symptomatology in children and adolescents. Following that, I review some of the empirical findings relating child maltreatment to BPD. I then discuss the problems particular to retrospective studies, and present findings from the few cross-sectional and prospective empirical studies, including the 2005 Rogosch and Cicchetti study that inspired this work. Finally, I describe the research questions, methods, and results of this study and discuss conclusions and implications.

## **Definitions and Overview**

**Child Maltreatment.** Child maltreatment is a serious global problem. The most recent report from the National Child Abuse and Neglect Data System (NCANDS) estimates that in 2010 child protective services (CPS) agencies in the US received 3.3 million referrals alleging the maltreatment of 5.9 million children (DHHS, ACF, Administration on Children, Youth and Families, Children's Bureau, 2011). From these reports, it is estimated that 695,000 children were maltreated, with more than 75% neglected, more than 15% physically abused, and nearly 10% sexually abused. The NCANDS data is based on reports of maltreatment to CPS. The Fourth National Incidence Study of Child Abuse and Neglect (NIS-4) is a congressionally



mandated US data collection effort designed to assess child maltreatment beyond the scope of CPS reports, by including data on children who were not reported to CPS or whose cases were screened out without investigation. NIS-4 reports much higher child maltreatment incidence, estimating in the US 1.25 million children were harmed as victims of maltreatment and nearly 3 million were endangered, during a year of data collection from 2005 to 2006 (Sedlak et al., 2011).

Four categories of child maltreatment most commonly recorded by CPS agencies in the US are physical abuse, sexual abuse, emotional abuse, and neglect. There is some diversity in how these are defined among states and agencies. We will employ the definitions from the Modified Maltreatment Classification System (MMCS) used in the LONGSCAN study (Barnett, Manly, & Cicchetti, 1993; English & the LONGSCAN Investigators, 1997). Physical abuse is defined as the intentional infliction of injury by an adult to a child under her or his care. Sexual abuse is attempted or actual sexual contact with a child by the caregiver or other responsible adult. Neglect is defined under two standards: failure to provide or lack of supervision. Failure to provide entails insufficiency to meet the basic physical needs of the child including provision of food, shelter, and clothing. Lack of supervision is failing to furnish a safe environment for the child based on developmental stage needs. Thus, leaving a child unattended for an hour may constitute lack of supervision if the child is 3-years-old, but not if the child is 12-years-old, depending upon the maturity and cognitive ability of the child. Emotional abuse involves extreme thwarting of the basic emotional needs of the child, including acts that are insensitive to the child's developmental level. Some examples are belittling, ridiculing, ignoring, intimidating, threatening, confining, or isolating the child. Many other subtypes of child maltreatment exist, including medical neglect, educational neglect, and substance abuse by a caregiver, for example. This study will focus on the four most commonly used categories.

Children who suffer maltreatment can experience short- and long-term adverse effects. Maltreated children are more likely to have difficulty negotiating physical, social, cognitive, and emotional developmental milestones. Potential maladaptive outcomes include mental disorders such as anxiety, depression, and posttraumatic stress disorder (PTSD); behavioral problems such as impaired social functioning or aggression; or substance abuse (Protecting Children from Child Abuse and Neglect, 2011). Maltreatment has also been linked to personality disorders, including BPD, through retrospective studies where adults diagnosed with personality disorders report having been victims of child abuse and neglect (Bandelow et al., 2005; Battle et al., 2004; Bradley, Jenei, & Westen, 2005; Herman, 1986; Ludolph et al., 1990; Ogata et al., 1990; Westen, Ludolph, Misse, Ruffins, & Block, 1990; Yen et al., 2002; Zanarini et al., 2002). Although it is a pathological experience, it is important to note that not all child maltreatment is classified as traumatic. Sometimes even child sexual abuse is not described as traumatic by the victim, and the child's perception of the meaning of a maltreatment experience has been shown to impact outcomes (Teicher et al., 2003). Although many children experience detrimental sequelae from maltreatment, many victims respond with resilience or recover with the aid of treatment interventions and lead productive lives.

**Personality Disorder.** *Personality* is the essence of the self; the characteristics of an individual that distinguish her or him from others. The term references stable traits, or patterns of repeated behavior and emotion within a person, rather than specific behaviors or temporary states. The five factor model (FFM) of personality is only one of many conceptualizations, but it is currently widely used and has the largest empirical literature base. It was developed using the lexical paradigm which hypothesizes that elements important to a culture will be deposited into the language (Costa Jr. & McCrae, 1990; Mullins-Sweatt & Widiger, 2006). Through categorization of the terms that describe personality traits, and through the use of factor analysis, five broad personality domains have emerged: extraversion, agreeableness,

conscientiousness, neuroticism, and openness to experience. Each of these dimensions is measured along a continuum from low to high within an individual. FFM development through the lexical paradigm has been studied in numerous languages and cultures, and studies have replicated the five domains (Mullins-Sweatt & Widiger, 2006). Using the FFM, an individual's personality can be depicted as a percentile score for each dimension scale.

A *personality disorder* (PD) is a mental health condition characterized by maladaptive, enduring, pervasive, inflexible patterns of behavior that deviate from societal norms. The fact that PDs consist of enduring patterns emphasizes that they are comprised of trait rather than state or behavioral deficits. Personality disorders may be extreme variants of normal traits that lead to maladaptive functioning, but diagnosis is not currently based in any normative model (e.g. FFM) of personality (Paris, 2003; Posner et al., 2003). The National Comorbidity Survey Replication study (NCS-R) findings estimate that 9.1% of the US population reported symptoms in one year's time that would qualify them to be diagnosed with a PD (Lenzenweger, Lane, Loranger, & Kessler, 2007; NIMH, 2010). In order to meet diagnostic criteria for PD, the individual's behavior problems must manifest in at least two of these four areas: cognition, affectivity, interpersonal functioning, and impulse control (APA, 2000). There are ten personality disorder diagnoses and they are organized into three clusters<sup>1</sup>. Cluster A includes paranoid, schizoid, and schizotypal personality disorders. In these, the person's behavior may seem odd or eccentric. The cluster B disorders are borderline, antisocial, histrionic, and narcissistic. Persons with cluster B diagnoses typically appear to be dramatic, emotional, or erratic. Cluster

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<sup>1</sup> There is also an 11th diagnostic category of *personality disorder not otherwise specified* (PD NOS), and there are three preliminary PDs designated for further research. See the *DSM-IV-TR* for more information (APA, 2000).

C personality disorders include avoidant, obsessive-compulsive, and dependent PD, which involve anxiety or fear.

The *Diagnostic and Statistical Manual of Mental Disorders (DSM)* advocates use of a multiaxial system for diagnostic coding (APA, 2000). In this system, Axis I is used to code the majority of mental disorders. Axis II is reserved for mental retardation and personality disorders. Axis III codes general medical conditions, IV is for environmental and social factors, and V is for an assessment of overall functioning. When the multiaxial system was created in 1980, the initial purpose of separating personality disorders and mental retardation was to ensure they would not be overlooked in the face of more prominent Axis I disorders (APA, 2000; Fowler, O'Donohue, & Lilienfeld, 2007). Axis I disorders tend to be *ego-dystonic*, or inconsistent with self-concept. Differentially, personality disorders have been shown to be *ego-syntonic*; an individual is typically aware of and accepting of the traits and behaviors of the personality disorder as being within her or his own self-concept (Fowler et al. 2007; Grove & Tellegen, 1991). Unfortunately, the multiaxial system has become a barrier to treatment because many health insurance companies now cover treatment of Axis I mental disorders only. This is an unjust decision because the comorbidity of Axis I and personality disorders, along with the maladaptive and disruptive nature of PD symptomatology, seem to render this distinction by axes arbitrary (Fowler et al. 2007; Lenzenweger et al., 2007). Additionally, negative prognoses attributed to Axis I disorders may in some cases actually be attributable to a comorbid Axis II disorder (Cohen, 2008).

The *DSM* is in the process of revision, and the *DSM-5* committee of the APA has proposed PDs be diagnosed with a new, hybrid categorical-dimensional model using the domains negative affectivity, detachment, antagonism, disinhibition versus compulsivity, and psychotocism (APA, 2012a). The rationale for the proposed change in nosology includes problems with the current diagnoses regarding comorbidity, heterogeneity, temporal instability,

frequent diagnoses in the “not otherwise specified” (NOS) category, and poor convergent validity (APA, 2012c). The limited study of PDs altogether has not provided strong evidence to support the current categorical diagnostic system. Given the natural continua from normative personality characteristics to varying levels of pathological symptomatology, the dimensions of PDs could be described on a continuum of general traits from normative to maladaptive in scale (Crick, Woods, Murray-Close, & Han, 2007; Fowler et al., 2007; Trull, 2005; Widiger, DeClercq, & DeFruyt, 2009). Dimensional models have demonstrated greater clinical utility because they provide more information on individual characteristics than the current *DSM* criteria, and they allow for more overlap among PDs (Lowe & Widiger, 2009). The utility of dimensional models of personality is promising. However, at the time of this research, the *DSM-IV-TR* is the accepted criteria for PD and is therefore referenced in this study.

**Borderline Personality Disorder.** Borderline Personality Disorder (BPD) is a Cluster B personality disorder characterized by dramatic, emotional, and erratic behaviors. It is a mental illness defined by a pervasive pattern of inflexible, maladaptive behaviors that include frantic efforts to avoid abandonment, intense unstable relationships, self-damaging impulsive acts, and affective instability (APA, 2000). Risky behaviors can include substance abuse, spending sprees, reckless driving, disordered eating, risky sexual behavior, and so forth. People with BPD often experience feelings of emptiness and anger. They frequently oscillate between idealization and devaluation of others, and for them nuance or gradation - for example, appraisal between “all good” and “all bad” - may be difficult to interpret (Kreisman & Straus, 1991). They may exhibit paranoia or periods of dissociation. Also, BPD sufferers may self-injure or undergo periods of suicidal ideation. The diagnostic criteria are listed in Appendix A. Employing the FFM, people with BPD tend to score low on agreeableness and high on neuroticism, with neuroticism depicted as a combination of emotion and arousal dysregulation, poor psychological defenses, impulsivity, and vulnerability to stress (Lenzenweger & Cicchetti, 2005; Skodol & Bender, 2003).

People with BPD also typically experience a greater number of stressful life events and perceive daily hassles to be more intense (Jovev & Jackson, 2006). The combination of diminished ability to cope and extreme emotional reactions may contribute to lower functioning (Jovev & Jackson, 2006; Mondimore & Kelly, 2011).

BPD has a population prevalence of 1.6%, estimated from reports of symptoms by participants in the NCS-R (Lenzenweger et al., 2007; NIMH, 2010). Females comprise 75% of the BPD diagnosed population (APA, 2000). Although the BPD population prevalence is low, 20% of psychiatric inpatient hospitalizations involve a diagnosis of BPD (APA, 2000; NIMH, 2010). Between 4% and 9% of those diagnosed with BPD complete suicide, and the rate of premature death due to other factors, including risky behaviors, is high (NIMH, 2010; Paris & Zweig-Frank, 2001). The *DSM* criteria for BPD do not elucidate the intense pain and suffering that embody the disorder (Bradley, Conklin, & Westen, 2007). Persons with BPD experience diminished quality of life, poorer relationships, and impairment in the workplace (Paris, 2003; Skodol et al., 2002). They are often stigmatized by the pejorative connotations of the diagnosis and are perceived as difficult (Gunderson, 2010). Demonstrating the high rates of costly treatment used by this population, a study by Zanarini, Frankenberg, Khera, and Bleichmar (2001) assessed the treatment histories of BPD inpatients ( $N = 290$ ), and found that over 75% had been in individual therapy, had previous hospitalizations, and had been prescribed medications. Despite the prevalence and unaccounted public health costs of the disorder, BPD has received little attention and funding compared to other mental health disorders (Gunderson et al., 2011).

The 3:1 greater incidence in BPD diagnosis of females to males is a controversial statistic many theories attempt to explain. One possibility is that there is an actual greater prevalence of the disorder among women. Between-gender differences in neurobiology and hormonal milieu can manifest from experiences. This is evidenced in a study by Teicher et al.

(2004) that found diminished corpus callosum<sup>2</sup> size to be associated with sexual abuse in girls, but to be instead related to neglect in boys. The true BPD prevalence in society is unknown and the gender disparity typical in clinical samples has not always been found in research samples. For example, BPD was equally prevalent among men and women in the NCS-R (Lenzenweger et al., 2007).

Some have hypothesized that clinician bias is responsible for the gender disparity in diagnosis, or perhaps the *DSM* criteria pathologize extreme adherence to stereotypic sex roles (Fowler et al., 2007). Gender differentiated expression of similar underlying symptoms could be a determinant: females may more often express impulsivity and hostility interpersonally, while males may be prone to do so through criminal or delinquent behaviors. Socialized differences in treatment seeking behaviors may also contribute to the incidence difference. Females are more likely to seek mental health treatment, whereas males tend to manifest symptoms through substance use and antisocial behaviors which can lead them to help systems not trained to identify BPD, like substance abuse treatment or the criminal justice system (Mondimore & Kelly, 2011). Thus, when presenting similar symptom constellations, women may be more likely diagnosed BPD, while men may receive a different diagnosis, such as antisocial personality disorder (ASPD) (Skodol & Bender, 2003; Warner, 1978). Seventy-five percent of those diagnosed with ASPD are male. Often referred to as psychopathy, ASPD is also a cluster B disorder. BPD and ASPD share some traits and are both characterized by manipulative

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<sup>2</sup> The corpus callosum is a band of neural fibers that connects the left and right cerebral hemispheres in the brain. It is the largest connecting fiber bundle in the brain, and diminished size of this structure has been linked to BPD in women (Rüsch et al. 2007). However, other studies have not found a correlation between corpus callosum size and BPD (Walterfang et al. 2010; Zanetti et al., 2007).

behavior, but the intention behind the behavior in ASPD is to profit or gain power rather than to gain the concern of caretakers as it is in BPD (APA, 2000). In women BPD and ASPD are highly comorbid (Fonagy & Bateman, 2008). Thus, BPD and ASPD could be alternate versions of the same trait pathology that manifest differently due to biological or social gender differences (Paris, 2000; Skodol & Bender, 2003).

BPD is notoriously unresponsive to treatment, and the clinical lore around this intractability has resulted in pessimism among treatment providers (Fowler et al., 2007). However, new research is cultivating hope with regard to the course of the disorder. For many of those afflicted, the symptoms eventually decline with age (Cohen, Crawford, Johnson, & Kasen, 2005; Cohen, 2008; Eckman, 1999; Johnson et al., 2000; Lenzenweger, Johnson, & Willett, 2004). In a study by Gunderson et al. (2011), a 10-year-course for adults with BPD ( $n = 175$ ) demonstrated high remission rates (85%) with low relapse rates (12%). However, even among those who did not meet diagnostic criteria during the later assessments, severe impairment in social functioning persisted.

Treatments for BPD have also started to show promise. The most recognized of these is Dialectical Behavior Therapy (DBT), the purpose of which is to teach skills for managing emotions, tolerating distress, focusing on the here-and-now, and maintaining relationships (Stoffers et al., 2012). DBT was developed by Marsha Linehan, a well-known psychologist who recently revealed her own struggles with BPD (Carey, 2011). A second therapy that has demonstrated success is Peter Fonagy's mentalization based therapy (MBT) approach (Fonagy & Bateman, 2008; Gunderson, 2010). The aim of this therapy is to stabilize the client's ability to make sense of the mental states of self and others; a skill theorized to have been derailed by disruption of the attachment system in early development, and which becomes unstable during emotional arousal in borderline personalities. These advances boost confidence that if BPD precursors could be identified, early intervention techniques could be successful.



## Etiology of BPD

The etiology of BPD is not well understood, but is generally believed to be multifactorial. Biological/evolutionary, psychological, and psychosocial factors are potential contributors to development of the disorder. In the same way personality develops within a growing child, a disordered personality must develop over time. Symptoms do not appear spontaneously, but are not usually present until adolescence. The mean age to begin treatment for BPD is 18 ( $SD = 6$ ), but in many cases symptoms are reported at subclinical levels for years before diagnosis (Paris, 2005; Zanarini et al., 2001). Children who demonstrate borderline traits do not always develop the disorder in adulthood, and many diagnosed in adulthood did not demonstrate traits in childhood (Cicchetti & Crick, 2009; Cohen, 2008; Johnson et al., 2000; Paris, 2003). The concept of *multifinality* dictates that diverse outcomes may develop from a similar or shared starting point. For instance, among children who experience child maltreatment, some will develop adult BPD, and some will not<sup>3</sup> (Carlson, Egeland, & Sroufe, 2009). *Equifinality* is the opposite concept that a common outcome can develop from different starting points: among those diagnosed with BPD in adulthood, some will and some will not have child maltreatment histories. The multifinality and equifinality of the BPD diagnosis demonstrate the complexity of seeking precursors to the disorder (Cicchetti & Rogosch, 2002; Paris, 2005). The heterogeneity of the adult diagnosis further complicates the ability to seek child equivalents to adult symptoms. *DSM* criteria require presentation of five out of nine BPD symptoms to warrant diagnosis. Thus, two persons diagnosed with BPD could be alike on only one symptom (Bradley, Conklin, & Westen, 2005). In fact, there are 256 different possible symptom combinations that meet the *DSM-IV-TR* diagnostic criteria for BPD (Trull, Distel, & Carpenter, 2011).

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<sup>3</sup> In this example, most will not.

Most theorists attribute development of BPD to interacting factors of nature and nurture. The developmental psychopathology approach posits that pathological and normative development can be mutually informative (Cicchetti, 1993). We should consider the development of personality when investigating disordered personality, and study of PDs may inform our understanding of normal personality development. One theory of personality development involves the interaction of temperament and character (Skodol & Bender, 2003). Innate emotionality and behavioral tendencies (temperament) interact with cognitions and emotions from life experiences (character), to form the resultant personality. The diathesis-stress model contends that intra-individual (usually genetic or temperamental) vulnerabilities interact with environmental stressors to contribute to development of pathology. The level of vulnerability to an adverse environment is dependent upon genetic factors. Whether the mediating genes carry out developmental processes is “switched” on or off by nongenetic influences, such as a maltreatment environment (Moffitt, 2005). Using the diathesis-stress model within a developmental psychopathology framework, a person with a particular temperament who experiences trauma, stressors, or repeated negative experiences may develop BPD. Research suggests that it is this interaction between temperament and environmental risk factors that contributes to BPD development (Paris, 2005).

**Biology and Evolution.** Per the diathesis-stress model, some people may be biologically vulnerable to developing borderline pathology. Personality disorders appear to have a strong genetic influence. Although genotype alone does not account for personality disorder development, genotype-environment interactions have been found to predict risk for conduct disorder, a precursor of ASPD (Caspi et al., 2002; Foley et al., 2004). The heritability of personality disorders has been shown to range between 35% and 68% (Torgersen et al., 2000). Torgersen et al. (2000) conducted a twin study to examine heritability of PDs. They recruited twin-pairs ( $N = 129$ ) for whom at least one in the dyad had been treated for a mental disorder.

They then conducted life history and diagnostic clinical interviews, and found a heritability of .60 for PDs generally, .60 for cluster B PDs, and .69 for BPD specifically<sup>4</sup>. They also found that shared environmental effects may influence PD and BPD development. In a study by Coolidge, Thede, and Jang (2001), parents assessed the personality disorder features of their child twin-pairs ( $N = 112$ ) age 4 to 15, and found a .76 heritability for BPD. These findings suggest that PD syndromes may be more heritable than personality traits alone. Neurobiological manifestations of child maltreatment may also play a role in development of disorders (Teicher et al., 2003). These are beyond the scope of this work, but see Teicher et al. (2003) for a review.

From an evolutionary standpoint, those with BPD are one subgroup who have demonstrated autonomic nervous system regulatory differences that favor the fight or flight response (Austin & Riniolo, 2011). Behaviors that may have been adaptive to support defensive strategies in a dangerous situation, like an unsuitable childhood environment, become learned and generalized into adulthood. Behavioral and biological (e.g. increased corticosteroid production) responses to stress may have evolved to prepare an individual for life-long exposure to the stressful environment (Teicher et al., 2003; Teicher et al., 2004). In cases where the stressor is short-term or remedied the response becomes maladaptive.

**Clinical Theory.** BPD was originally conceptualized as an intermediary diagnosis of neurosis and psychosis, characterized by symptoms of each. Psychoanalyst Adolph Stern was the first to delineate the symptoms, and psychoanalyst Robert Knight coined the phrase “borderline state” in the 1940’s, describing the status as on the border between neurosis and psychosis (Gunderson & Links, 2008; Stern, 1938). The phrase became commonly used for atypical difficult cases, and the concept of a borderline syndrome was refined for the next few

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<sup>4</sup> In an earlier twin study Torgersen (1984) found BPD to be entirely environmentally determined.

However, the sample BPD group in that study was  $n = 10$ .

decades<sup>5</sup> until the criteria were standardized and the diagnosis was included in the *DSM-III* (APA, 1980). The current manifestation of BPD is no longer considered to be “on the border” of psychosis, although transient paranoia and dissociation remain symptom criteria.

Attachment theory postulates that self-concept, perception of the social world, and expectancies of relationships are modeled on the affective bond between the young child and caregiver (Bowlby, 1969; Levy, 2005). BPD is believed to originate from disorganized attachment caused by an early invalidating environment in which the identity and self-worth of the child are ignored or dismissed by someone in the role of nurturance (Bowlby, 1969; Fonagy & Bateman, 2008; Linehan, 1993; Mondimore & Kelly, 2011). Formative experiences with caregivers influence sense of self, sense of others, and the capacity to maintain a healthy boundary between self and others (Lyddon & Alford, 2007). BPD is seen as a self-other representational disturbance, with the attachment problems growing out of object relations difficulties<sup>6</sup> at their essence (Bender & Skodol, 2007; Kernberg, 1975). Many BPD patients recall their childhoods characterized by oscillating emotional neglect and control (Zweig-Frank & Paris, 1991a; Zweig-Frank & Paris, 1991b). This results in a lack of stability of internal images and expectancies, marked by fluctuating perceptions of self and of others. An environment with low closeness to parents, power-assertive punishment, and implementation of maternal guilt along with a general parental dismissiveness, can lead to an inability to regulate emotions or to self-soothe (Cohen, 1996; Cohen, 2008). Child maltreatment constitutes an extreme transgression of the self-other boundary, and an intolerable invalidation by the caregiver.

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<sup>5</sup> Various conceptualizations are attributed to Hoch, Knight, Kernberg, Grinker, Gunderson, and others (Gunderson & Links, 2008).

<sup>6</sup> In object relations theory, others are internalized as subconscious “objects,” and predicted behaviors of new others encountered in adulthood are based on those early mental models (Hamilton, 1989).

Reports of parental neglect and emotional abuse have been linked to BPD (Bradley, Conklin, & Westen, 2007). According to the research, 40% to 71% of BPD sufferers report a history of child sexual abuse, compared to 19% to 26% of controls (Zanarini, 2000). A more recent review estimates that 4% to 27% of the general population report a sexual abuse history (Palusci, 2011).

**Symptomatology in Children and Adolescents.** Many adult mental disorders have prodromal symptoms or childhood onset (Cohen, 2008). One such example is ASPD, which lists as a criterion for diagnosis a childhood conduct disorder onset prior to age 15<sup>7</sup> (APA, 2000). However, PD diagnosis in childhood and adolescence<sup>8</sup> is a controversial topic. The *DSM-III* warned against PD diagnosis in childhood (APA, 1980). The *DSM-IV-TR* permits the diagnosis of adolescents when the symptomatology is severe and persists for one year or longer (APA, 2000). Reluctance to diagnose PDs in childhood stems from concerns about the construct validity of these diagnoses within a developing child. Three arguments against the construct validity of adolescent PD include: the lack of personality integration, the influence of developmental stage on symptom presentation, and the potential to pathologize normal developmental episodes. Additionally, the stigma associated with the disorder means labeling a child BPD may yield persistent, negative iatrogenic social and medical consequences.

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<sup>7</sup> The *DSM-5* committee has proposed removing this criterion (APA, 2012b).

<sup>8</sup> *Child* and *adolescent* do not have agreed upon definitions in the field of psychology. For our purposes, we will define childhood as the period between birth and age 18, and adolescence from the onset of puberty to adulthood, or approximately age 10 to 18. We will use the term *young child* to identify a child under 10. Cited studies will employ the term used by the original authors with the understanding that it may be somewhat more narrow or broad than our ranges, but should be roughly similar.

The construct validity of childhood PD is challenged by the supposition that children's personalities are not yet fully integrated (Cicchetti & Crick, 2009; Miller, Muehlenkamp, & Jacobson, 2008; Reinecke & Freeman, 2007). The underpinning of this argument is that during the process of development, personality would not be stable enough to accurately characterize, let alone to designate as disordered. Recent research has demonstrated that although behavior and personality are less stable in youth than in adulthood, they are nonetheless relatively stable (Cohen, 2008; Crick et al., 2005; Shiner, 2009). In one study of maltreated and nonmaltreated children attending summer camp ( $N = 211$ ), trait stability for the dimensions of the FFM was demonstrated across ages 6, 7, 8, and 9 (Rogosch & Cicchetti, 2004).

Conducting a review of 36 publications over 32 years, Bondurant, Greenfield, and Tse (2004) found support for the existence of adolescent BPD. Both PD and non-PD adolescents have demonstrated similarity in stability of PD traits over time, and trait stability of adolescents with PD symptomatology relative to same-age peers has been shown equivalent to that of adult PD samples compared with their peers (Cohen et al., 2005). PDs in adults have less trait stability than originally presumed, and symptoms decrease with maturation and age<sup>9</sup> (Cohen et al., 2005; Cohen, 2008; Eckman, 1999; Johnson et al., 2000; DeClercq & DeFruyt, 2007; Lenzenweger et al., 2004). Still, several studies have demonstrated modest stability in child and adolescent BPD symptomatology. Through a review of the literature, Chanen et al. (2008) concluded that the stability of BPD in young people (age 10 to 24) is similar to that found in adults. In a community based longitudinal study, Johnson et al. (2000) found moderate PD trait stability over a two year period, but also a 28% decline in PD trait levels over a six year period between adolescence and young adulthood. Another study of BPD features in youth grades 4 to

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<sup>9</sup> The reason for symptom dissipation with age is unclear, but theorized mechanisms include: biological maturation, social learning, and conflict avoidance (Paris, 2002).

6 ( $N = 400$ ) found borderline features to be moderately stable over a short term of 18 months (Crick et al., 2005).

The potentiality for heterotopic symptom manifestation dependent upon developmental stage also calls into question the validity of childhood PD diagnosis (Crick et al., 2005; Miller, Muehlenkamp, & Jacobson, 2008; Reinecke & Freeman, 2007). Current PD diagnostic criteria did not originate from a developmental perspective and therefore may be invalid for adolescents. Using the adult criteria to evaluate adolescents could lead to inflated rates of false positives (Miller et al., 2008). The heterogeneity of symptomatology has led some to speculate that perhaps symptom expression is determined by age of PD onset (Sharp & Romero, 2007).

Several studies have found that the features of adolescent BPD do parallel those of adult BPD (Chanen, Jovev, McCutcheon, Jackson, & McGorry, 2008; Miller, et al., 2008). Sharp and Romano (2007) conducted a literature review of 58 studies between 1940 and 2006, and concluded that differences between adults and children in BPD symptom expression exist, but there has been enough overlap in presentation to warrant further investigation into child and adolescent diagnosis and precursors. Using factor analysis, Chabrol et al. (2004) found six factors of BPD that remained stable in a sample of adolescents ( $N = 616$ ). They found the factors differed from those obtained within an adult sample using the same instrument. This suggests that BPD in adolescence does exist, but is expressed differently from adult BPD due to developmental stage. BPD in adolescents may have more diffuse symptomatology, higher Axis II comorbidity, and lower predictive validity than its adult analogue (Bondurant, Greenfield, & Tse, 2004).

Studies have provided inconsistent results in the prevalence of BPD among clinical samples in heterogeneity of symptom presentation, stability of traits, and history of trauma exposure (Sharp & Romero, 2007). These findings are concordant with adult prevalence regarding presentation, trait stability, and trauma history. One area where BPD presentation in

childhood has not paralleled that of adulthood has been the gender disparity in incidence. The 3:1 female-to-male ratio of BPD presentation among adults has not been found in samples of youth (Paris, 2003). Crick, Murray-Close, and Woods (2005) speculated that this may be due to the use of clinical samples in most studies, and the fact that in youth males are more likely to be in these samples. However, despite the relatively equal number of boys and girls in their study, girls did report higher levels of borderline features.

A third threat to the construct validity of adolescent BPD is that current diagnostic criteria may pathologize normative developmental struggles when applied to adolescents. Unstable identity is a symptom of BPD, but Erikson's stage theory identifies the struggle of identity versus role confusion as the ubiquitous developmental challenge of adolescence. Lability and impulsivity are also symptoms, but adolescence represents the highest lifespan period of dopaminergic activity, and this can lead to intense emotions and sensation-seeking (Steinberg, 2012). Some research has revealed that enduring PD characteristics can occur that are markedly discernible from normative developmental struggles. Bradley, Conklin, and Westen (2005) found that among those with BPD, adolescent functioning suffered noticeably more in the areas of identity and anger control. Adolescents with BPD may not differ qualitatively from those without, but their behaviors can be more dramatic and their emotions more intense (Mondimore & Kelly, 2011). Diagnostic stability may depend on severity: Miller et al. (2008) found that diagnosis remained stable over time for a subsample with severe symptoms, while other individuals transiently met and failed to meet diagnostic criteria.

Research has demonstrated some stability of BPD traits in children, and modest evidence linking personality in childhood to adulthood. A longitudinal, factor analytic study of BPD features in 6 to 12 year-old girls ( $N = 2451$ ), found dimensions of BPD features (e.g. impulsivity, negative affectivity, and aggression) to be reliable and stable over years, as measured by teacher and parent report (Stepp, Pilkonis, Hipwell, Loeber, & Stouthamer-Loeber,



2010). In another study, the charts of 86 hospitalized children (age 6 to 12) were assessed for BPD using a modified version of the Diagnostic Interview for Borderline Patients – Revised (DIB-R) and 31% of participants were scored as borderline (Greenman, Gunderson, Cane, & Saltzman, 1986). Lofgren, Bemporad, King, and Lindem (1991) conducted a follow-up study of 19 children who had been diagnosed as borderline 10 to 20 years following the diagnosis<sup>10</sup>. They found the diagnosis to be antecedent to an array of PDs, but not to adult BPD in particular, and not to Axis I disorders. The Dunedin Multidisciplinary Health and Development Study (DMHDRU) has now been collecting data on New Zealand a birth cohort ( $N = 1037$ ) for over 40 years (Department of Preventive and Social Medicine, Dunedin School of Medicine, University of Otago, 2012). Caspi (2000, 2003) used the Dunedin data ( $n = 1,000$ ) and found that temperament assessed at age 3 influenced personality into adulthood, although the effect size was small-to-moderate (Carey, 2011; Caspi, 2000; Caspi et al., 2003).

Diagnosis of PDs in young children is more controversial than diagnosis in adolescence. In young children, precursors of personality disorders may present as more dissimilar to the adult symptoms. Although some children demonstrate BPD symptoms in childhood, many who develop the disorder in adulthood did not express symptoms in childhood, and many who seemingly expressed childhood symptoms do not develop BPD (Cicchetti & Crick, 2009; Paris, 2003). There is some support for stable, diagnosable BPD symptom presentation in adolescents. Considering we do see impairing PDs in adolescence, the ethical response may be to diagnose and treat (Miller et al., 2008; Shiner, 2009). There is much less evidence for

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<sup>10</sup> See Lofgren et al. (1991) for a listing of the diagnostic criteria.

BPD presentation in young children, and thus the most appropriate approach to early intervention may be to identify precursors to BPD in latency<sup>11</sup> age children.

### **Retrospective Research on Maltreatment and BPD**

Retrospectively, BPD sufferers report histories of traumatic events. Many retrospective studies have found a relationship between child maltreatment and BPD (as well as among child maltreatment and other disorders), but there is considerable variation in maltreatment subtype rates among studies. This is particularly true with regard to child sexual abuse (CSA). The multifinality and equifinality of the disorder have obscured its relationship with child maltreatment. Nine retrospective studies of the relationship between childhood maltreatment and BPD symptomatology and one meta-analysis of the retrospective research are reviewed here.

Among the first studies to report a link between BPD and child abuse were Herman (1986), Ogata et al. (1990), and Westen, Ludolph, Misle, Ruffins, and Block (1990). Herman reviewed diagnostic summaries of 190 outpatients for physical and sexual violence. She found nearly one-third of female patients reported a history of victimization. Ogata et al. interviewed 42 inpatients about recollection of child maltreatment history and administered the Diagnostic Interview for Borderline Patients (DIB) (Gunderson, Kolb, & Austin, 1981; Ogata et al., 1990). They found significantly more BPD patients than depressed controls reported CSA, abuse by multiple perpetrators, and having been both sexually and physically abused. They did not find significant between-group differences for neglect or physical abuse alone. Westen et al. (1990) reviewed charts of adolescent inpatients ( $N = 50$ ) with BPD and controls with an affective or

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<sup>11</sup> The term *latency* refers to Freud's fourth stage of psychosexual development. It is the stage prior to puberty (the genital stage) when there is little sexual development or interest (Freud, 1962/2000).

eating disorder (Westen et al., 1990). They found self-reported physical and sexual abuse to be correlated with higher scores on the DIB, particularly scores of impulsivity.

Alternately, Fossati, Madeddu, and Maffei (1999) conducted a meta-analysis of 21 papers published between 1980 and 1985 investigating the relationship between CSA and BPD. They obtained a moderate pooled  $r = .279$ . The results did not support the theory that CSA is a risk factor or causal antecedent of BPD.

Yen and colleagues (2002) compared a group of personality disordered adults to a major depressive disorder comparison group in a subsample ( $N = 668$ ) of the Collaborative Longitudinal Personality Studies (CLPS) to investigate the link between trauma exposure and personality disorders (Gunderson et al., 2000; Yen et al., 2002). The four PDs included in the study sample were borderline, schizotypal, avoidant, and obsessive compulsive. They found 91.6% of the BPD sample ( $n = 167$ ) reported a trauma history, with more severe trauma such as sexual assault and personal attack most frequently reported. They concluded that a special relationship between BPD and sexual trauma (in childhood or adulthood) exists that does not hold for other PDs.

In a structured interview study of 290 hospitalized BPD patients, Zanarini et al. (2002) found that more than half of the sample reported CSA and/or neglect histories (62.4% and 92.1%, respectively). Among those with CSA histories, 82% reported the abuse was ongoing, 80% reported penetration as part of the abuse, and the severity of reported maltreatment was significantly related to severity of BPD and psychosocial impairment.

Golier et al. (2003) studied the relationship among trauma, PTSD, and BPD in a sample of 180 outpatients with PD diagnoses. Participants were assessed using structured clinical interviews and the Trauma History Questionnaire. Participants with BPD had significantly higher physical abuse rates (52.8% versus 34.3% of participants with other PDs) but did not

significantly differ in CSA rates. Overall, the association between early trauma and PTSD was modest, and was not unique to BPD over other PDs.

Battle et al. (2004) used the CLPS to investigate the link between child maltreatment and personality disorder (Gunderson et al., 2000). In a subsample of 600 adults, they found child maltreatment to be correlated with PD, with 73% of PD diagnosed participants reporting abuse, 83% reporting neglect, and 34% reporting CSA. BPD was found to be more consistently associated with sexual abuse, verbal abuse, and emotional abuse than other PDs.

Bradley, Jenei, and Westen (2005) interviewed a national sample of 524 randomly selected clinicians about their adult PD clients. They found physical and sexual abuse predictive of BPD symptoms, with disturbed family environment as a contributing mediator.

Using interviews of BPD patients and healthy controls ( $N = 203$ ) Bandelow et al. (2005) found family psychiatric disorders, child sexual abuse, separation from parents, and unfavorable parent rearing style significantly contribute to BPD development. BPD patients reported higher frequency and more severe trauma histories. Most notable among the findings was that only 6.1% ( $n = 4$  of 66) of BPD patients reported having no severe trauma history, while 61.5% ( $n = 67$  of 109) of the controls reported having experienced no severe trauma in their lifetime.

**Summary of Retrospective Research.** The preponderance of retrospective research (eight of the studies reviewed here) demonstrates that people with BPD symptoms in adulthood often report childhood maltreatment, particularly physical and sexual abuse histories. Golier et al. found the relationship not to be particular to BPD over other PDs, nor to CSA over other maltreatment types. The one meta-analysis reviewed (Fossati et al., 1999) did not support a special relationship between CSA and BPD.

**Criticisms of Retrospective Research.** This body of research has been criticized for a lack of integration across studies due to differences in definitions, operationalizations, methods, and measures. For instance, Ogata et al. (1990) found comorbid depression in their sample,

whereas Yen et al. (2002) used major depressive disorder to define a comparison group. Because of the lack of random sampling in these studies, there are numerous potential confounds. Many of the samples were largely treatment seeking, and the findings could be specific to BPD populations with more severe impairment or who are more likely to accept treatment. In the Bradley, Jenei, and Westen (2005) study, clinician diagnostic bias may have been confounded with BPD diagnosis, meaning that clinicians may apply a BPD diagnosis based on the maltreatment disclosure. The most common criticism of this body of research is the retrospective methodology itself. Retrospective research cannot establish causality, thus PD symptomatology could have preceded or contributed to maltreatment. Within a retrospective approach, autobiographical self-report can lead to inaccuracy through memory problems, distortion, and exaggeration or confabulation.

Memory inaccuracy is a problem for retrospective research in all populations. Some information can be lost because it is never coded or stored. Because memory is constructive, stored information can change over time through recounting, the inclusion of new information, distortion, introduction of estimations or inferences, or simple forgetting at the time of attempted retrieval (Tourangeau, 2000). Additionally, the recollections of BPD sufferers could be distorted by bias from current symptomatology (Paris, 2000; Zanarini et al., 2002), the tendency to distort the features of relationships (Zweig-Frank & Paris, 1991a; Zweig-Frank & Paris, 1991b), or all or nothing “black/white” thinking (Bandelow et al., 2005). Trauma memories of child maltreatment could also suffer distortion due to dissociation, unconscious repression, or intrusive recollections through nightmares and flashbacks. More severely ill patients may recall their maltreatment experiences as graver than an outsider might rate them (Zanarini et al., 2002). The possibility of exaggeration or confabulation is not inconsistent with BPD symptomatology. BPD sufferers may invent or embellish events for dramatic effect and influence. Additionally, exaggeration may increase with age: maltreatment may increase in severity or frequency as stories are disclosed

over time (Zanarini et al., 2002). Battle et al. (2004) found that older PD diagnosed study participants were more likely to report several types of abuse and neglect in their histories. However, this could also have been a study cohort effect. Aware of the possibility of confabulation, clinicians are generally conservative in indicating confidence in CSA reports, and rely on several factors including corroboration, involvement of authorities or systems, and intact memories of CSA before treatment to allay their skepticism (Bradley, Jenei, & Westen, 2005). Thus, it would be prudent for researchers to employ objective means of maltreatment verification.

### **Cross-Sectional and Prospective Research on Maltreatment and BPD**

Past conceptualizations of antecedents to PDs have been based on clinical theory and on retrospective research encumbered with the problems described in the previous section. Longitudinal research is challenging to conduct due to the requisite time investment, financial expense, and difficulty retaining participants. Given the low incidence of BPD in the general population, it is labor intensive and expensive to identify, recruit, and retain those who may develop BPD in adolescence or adulthood. BPD sufferers often drop out of treatment, and may be likely to drop out of a study. Use of a high-risk sample (e.g. a maltreatment sample) can increase the potential number of BPD cases in a study. Children cannot be randomly assigned to a maltreatment environment; negating the possibility of conducting randomized controlled trials. This makes it more difficult to rule out confounding variables and to establish causality. Still, some cross-sectional and prospective studies of child maltreatment and BPD symptomatology have been conducted. One cross-sectional and five prospective studies are reviewed here, along with two prospective studies of child mistreatment that does not employ the usual CPS definitions of maltreatment.

In a study by Guzder, Paris, Zerkowitz, and Feldman (1999), 94 school-age children in day treatment were assessed for BPD diagnosis, psychopathology, risk factors, and parental

psychopathology. Methods of assessment included clinical interviews, questionnaires, and record reviews from multiple sources including the child, the school, social agencies, and families. Although not prospective, the study was cross-sectional and not retrospective, thus the findings are not impacted by potential fabrication or memory difficulties. Children with current borderline pathology were found to have higher rates of physical abuse, sexual abuse, severe neglect, family breakdown, and parent criminality. The majority of children in this study experienced single episode CSA by a nonrelative or stranger, which may be more traumatic than other forms of CSA. CSA and parental criminality had the strongest link to latency age BPD symptomatology.

In the Children in the Community (CIC) study, a longitudinal study using a representative community sample ( $N = 738$ ), Johnson, Cohen, Brown, Smailes, and Bernstein (1999) administered psychosocial and psychiatric interviews to youth-mother dyads six times between 1975 and 1993. Maltreatment data were obtained from both state records and (in later waves) child self-report. They found participants with documented child abuse or neglect were four times as likely to be diagnosed with a PD in young adulthood, and found sexual abuse and neglect to be associated with BPD.

Rogosch and Cicchetti (2004) studied FFM organization in a camp sample of 6-year-old children ( $N = 211$ ) and found maltreated children exhibited lower agreeableness, openness, and conscientiousness, and higher neuroticism than nonmaltreated children. Additionally, they found children who experienced both neglect and abuse had a particularly vulnerable profile. Assessing the group longitudinally at ages 7, 8, and 9, they found maltreated children continued to exhibit liabilities, and showed stability in the dimensions assessed. BPD adults typically demonstrate two of the found factors: high neuroticism and low agreeableness, indicating personality profiles may be antecedent to potential adult PDs.

Carlson, Egeland, and Sroufe (2009) analyzed data from a longitudinal sample ( $N = 162$ ) of young mothers in poor communities, and their first-born children. The participants were recruited between 1975 and 1977 and measures administered prior to the birth of the child, at several points in childhood and adolescence, and when the children had grown to adults. They found BPD symptomatology at age 28 to be mildly but significantly correlated with early abuse between 12 and 18 months of age ( $r = .20, p < .05$ ) and with cumulative measures from age 4 to 18 of physical abuse ( $r = .28, p < .01$ ) and sexual abuse ( $r = .19, p < .05$ ), as well as with other environmental factors. They also found distorted organization of the self in family relationships<sup>12</sup> to have a mediating effect between attachment disorganization and BPD symptomatology.

Widom, Czaja, and Paris (2009) conducted a prospective study to identify BPD in adults with documented maltreatment histories. They drew criminal court substantiated records of child abuse and neglect from a metropolitan US region between 1967 and 1971. The children were matched with nonmaltreated controls on multiple demographic characteristics. Between 1989 and 1995, the now-adult participants were located, re-interviewed, and administered a structured diagnostic assessment. The researchers found more abused and neglected participants (14.9% versus 9.6% of the comparison group) met the criteria for BPD diagnosis in adulthood. Physical abuse ( $OR = 2.09, 95\% CI [1.07, 4.08], p \leq .05$ ) and neglect ( $OR = 1.68, 95\% CI [1.09, 2.59], p \leq .05$ ) were the strongest predictors. They did not find CSA history increased BPD risk. Also, they found males to be more likely to be diagnosed with BPD, and particularly physically abused or neglected men. They also identified several factors that mediated the relationship between child maltreatment and BPD, including: parental substance

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<sup>12</sup> Distorted self-organization/representation was assessed in a family drawing task at age 8. See Carlson et al. (2009) for details.



abuse, parental unemployment, not graduating high school, drug abuse, major depressive disorder, and PTSD.

Lower levels of maltreatment and mistreatment may also contribute to BPD development. In the CIC study, families ( $N = 593$ ) were interviewed four times from childhood to adulthood (Johnson, Cohen, Chen, Kasen, & Brook, 2006). Ten types of parenting behavior in childhood were associated with elevated PD risk in early adulthood, assessed using the Structured Clinical Interview for *DSM-IV* PDs. In particular, low parental affection or nurturing and aversive parenting behavior, such as harsh punishment, were correlated with BPD. In another prospective longitudinal study ( $N = 6050$ ), Winsper, Zannarini, and Wolke (2012) found family adversity and suboptimal parenting to be antecedents to BPD symptoms at age 11, with Axis I diagnosis and childhood IQ as mediators between suboptimal parenting and BPD outcome.

**Summary of Cross-Sectional and Prospective Research.** The six cross-sectional and prospective studies of child maltreatment reviewed here link maltreatment to BPD. A preponderance of the studies link physical abuse, sexual abuse, or neglect specifically to BPD. The two studies that investigated child mistreatment found relationships between suboptimal parenting and BPD symptomatology. The findings suggest that a relationship exists between child maltreatment, or possibly child mistreatment or adversity, and development of BPD in adulthood.

#### **Criticisms of Cross-Sectional and Prospective Research.**

The research on BPD suffers from a lack of integration across studies with regard to definitions, operationalizations, methods, and measures. This is true for cross-sectional and prospective research as it is for retrospective studies. Prospective methodology overcomes the problems of memory impairment, distortion, and exaggeration or confabulation that are a concern in retrospective self-report. However, prospective studies have limitations. The most

common limitations in the studies reviewed include: attrition (Rogosch & Cicchetti, 2004; Winsper et al., 2012), low prevalence of PDs that result in obtaining small samples which limit analyses (Johnson, et al., 1999; Rogosch & Cicchetti, 2004, Carlson et al., 2009), use of BPD symptom or symptoms as outcome variable(s) rather than BPD diagnosis<sup>13</sup> (Johnson, et al., 1999; Carlson et al., 2009); and lack of investigation into genetic or biological contributors to BPD (Guzder, 1999; Johnson et al., 1999; Rogosch & Cicchetti, 2004; Widom et al. , 2009; Johnson et al., 2006; Winsper et al., 2012).

### **Replication Model: Rogosch and Cicchetti (2005)**

Rogosch and Cicchetti (2005) constructed a model with 11 dimensions of potential childhood precursors that were conceptualized to constitute a vulnerability to subsequent emerging BPD. The dimensions included features of emotional negativity and volatility, diminished effortful control, relationship difficulties, distorted internal representations, and thoughts or behaviors relating to self-injury or suicide. The dimensions were then used to derive a BPD precursors composite score.

The sample for the study included 360 children (maltreated  $n = 185$ , nonmaltreated  $n = 175$ ) age 6 to 12 attending a one-week summer camp, who participated in a variety of self-report, peer-report, and counselor-report research assessments. The children also completed computer tasks designed to assess attention network efficiency.

The attention component of the study was based on a correlation found between BPD and problems with conflict resolution and cognitive control (Posner et al., 2003). Rogosch and Cicchetti (2005) assessed the alerting, orienting, and conflict attention networks by measuring

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<sup>13</sup> Although Widom et al. (2009) used diagnosis, they assessed only current BPD diagnosis through a structured survey rather than a clinical interview. Rogosch and Cicchetti (2005) assessed personality dimensions rather than diagnostic criteria in their study.

reaction time for various stimuli in a computerized task<sup>14</sup>. They found that maltreated and nonmaltreated children did not differ in their attention network scores. However, children with high BPD precursors scores demonstrated diminished efficiency in processing of the conflict attention network. They theorize that there may be both experiential and cognitive/behavioral precursors to BPD.

Regarding the BPD precursors dimension model, Rogosch and Cicchetti (2005) found maltreated children had higher mean BPD precursors composite scores than nonmaltreated children, and children with higher levels of BPD precursors were more prevalent in the maltreatment group. Significant subtype differences did not emerge and this may have been due to the small sample size, and in particular the small CSA group ( $n = 10$ ). The similarities in impairment found in the maltreatment group suggests that a subgroup of maltreated children may have a greater vulnerability to BPD development. There may be a pathway by which maltreated children demonstrate precursor symptoms and behaviors that precede adult BPD.

## HYPOTHESES

The current study is a secondary data analysis the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN) data ( $N = 1281$ ) to investigate whether maltreated children demonstrated greater vulnerability to the expression of potential precursors of Borderline Personality Disorder (BPD) that may be linked to developing BPD in adulthood. The model for this study was informed by the Rogosch and Cicchetti (2005) study *Child maltreatment, attention networks, and potential precursors to borderline personality disorder*. Due to the limited findings regarding attention in the original study and to the available data, attention networks were not investigated in this study. The hypotheses are listed below.

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<sup>14</sup> See Rogosch and Cicchetti (2005) for procedure details.

H1. Children with child abuse and/or neglect histories (age 0 to 6) will have significantly higher BPD precursors composite scores (age 6 to 12) than children without maltreatment histories.

H2. Maltreated children will be more likely than nonmaltreated to be classified in a high BPD precursors composite score group.

These hypotheses are based on the prediction that children who encounter stress through maltreatment will be more likely to suffer greater impairment; here, in the form of BPD symptomatology. The BPD precursors composite score is a measure created by aggregating the 11 dimensions in which a child would be expected to show signs of greater risk for developing BPD, and the derivation is explained in the *Method* section of this paper.

H3. The findings of Rogosch and Cicchetti (2005) will be replicated in this larger, national sample.

The LONGSCAN sample is over three times the size of the Rogosch and Cicchetti (2005) study sample. LONGSCAN and the Rogosch and Cicchetti studies measure similar behavioral and psychosocial outcomes. The age ranges are similar between the samples, and in both studies the nonmaltreated comparison group is statistically at risk of maltreatment based on socioeconomic status, substantial adversity, and other variables.

H4. Children who experienced neglect or emotional abuse will be as likely to have a high BPD precursors score as those with sexual or physical abuse histories.

Neglect and emotional abuse also impact attachment in early relationships and cause stress in children. As such, they would also be likely to elicit BPD symptomatology. Different types of psychological maltreatment may predict different maladaptive behaviors, with degradation (a type of emotional abuse) leading to BPD in particular (Allen, 2008).

## METHOD

A secondary analysis of a subset of the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN) data ( $N = 1354$  children) was conducted to investigate precursors of BPD traits. The study is a partial replication of the Rogosch and Cicchetti (2005) study. As a secondary analysis, proxy variables were chosen from the available data to represent the constructs in the original study. The independent variable is child maltreatment, operationalized as one or more allegations of child physical abuse, sexual abuse, neglect, or emotional abuse occurring between birth and age 6. The dependent variable is the BPD precursors composite score. This score was created by assessing each of the 11 dimensional constructs of precursors from the Rogosch and Cicchetti (2005) model over ages 6 to 12, aggregating the standardized scores, and standardizing that score.

### **LONGSCAN Sample**

The Longitudinal Studies of Child Abuse and Neglect is a consortium of five child maltreatment studies in the US<sup>15</sup>. The LONGSCAN dataset includes survey data from in-person, computerized, and telephone interviews, of maltreated and nonmaltreated children ( $N = 1354$ ), and their caregivers and teachers, from ages 4 to 12. The nonmaltreated children included in the sample are children who are statistically at risk of maltreatment either due to socioeconomic factors or to medical risk factors. Of the assessments and interviews administered, some were standardized instruments and some were developed for the study by the consortium or the site principal investigators. Additionally, periodic reviews of CPS and central registry records were conducted in order to assess maltreatment. Data were collected between 1991 and 2007.

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<sup>15</sup> Details on the design and methodology of the LONGSCAN study can be obtained from the National Data Archive on Child Abuse and Neglect at [ndacan.cornell.edu](http://ndacan.cornell.edu). A summary is provided here.

The dataset includes pooled data from the five separate studies. Three of the sites are urban regions, one is suburban, and one is statewide. The studies have different selection criteria, but share measures, definitions for operationalizing and coding variables, and researcher training. The East cohort ( $n = 282$ ) consists of urban children who were clients at one of three pediatric clinics. Children in the at-risk group demonstrated inadequate growth in the first two years of life (failure to thrive) or had a parent with HIV infection or drug use. The comparison group includes low-income children without those risk factors. In the urban Midwest sample ( $n = 245$ ) one-third of the children were receiving comprehensive CPS services following a report, one-third received only the CPS intervention following a report, and one-third were neighborhood controls about whom a CPS report had not been made. The Northwest sample ( $n = 254$ ) included urban children with a CPS report for suspected maltreatment, who were judged to be at moderate risk for future maltreatment. The cohort from the South ( $n = 243$ ) were urban, suburban, and rural children identified as high risk at birth by a state public health tracking effort. Matched controls were recruited in a 2:1 ratio. The Southwest suburban sample ( $n = 330$ ), consisted of children placed in foster care due to confirmed maltreatment.

### **Operationalization of Variables**

In this study, the maltreatment sample is defined as the group of children having a maltreatment allegation recorded by CPS between birth and age 6. Maltreated children were defined as children who had any allegation of maltreatment. Maltreated children were also classified into four maltreatment subtypes (physical abuse, sexual abuse, neglect, or emotional abuse) if they had an allegation of that subtype of maltreatment. Nonmaltreated children were defined as those for whom no allegation of maltreatment was made. The nonmaltreated groups were recruited as being at high-risk for maltreatment. Assignment to the nonmaltreatment group does not guarantee that the child has not experienced maltreatment, only that no report had been made to CPS.

The dependent variables were mapped by dimension to replicate the Rogosch and Cicchetti model, creating a measure for each: relational aggression, dislike by peers, negative perception of self, suicidal ideation, lability and dysregulated negative affect, poor effortful control, upsetting/demanding behavior, conflicted relationships, negative perceptions of peers, self-harm, and preoccupation with mother. An average of scores between ages 6 and 12 was recorded for each dimension, and the scores were standardized. The standardized dimension scores were summed to calculate a BPD precursors composite score, and that score was standardized.

### **Exploratory Analyses**

Exploratory analyses were conducted to compare the definitions chosen for the variables with other possible operationalizations of those variables, including some employed by Rogosch and Cicchetti (2005). Exploratory analyses also investigated the maximum age cut-off of a maltreatment allegation for inclusion in the maltreatment group, the manner in which to operationalize maltreatment, and the manner in which to operationalize subtypes of maltreatment. An illustration of the impact of these operationalizations on the comparison of BPD precursors composite score means between maltreated and nonmaltreated groups can be found in Tables 1 and 2<sup>16</sup>. Additionally, exploratory analyses were conducted to determine the

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<sup>16</sup> The degrees of freedom (*df*) used to calculate the *p*-values for the *t*-tests appear large due to the multiple imputation (MI) procedure. The *df* value is not related to the number of observations or the number of variables, it is instead related to the difference in the between-regression variation relative to the within-regression variation. Thus, a *df* substantially greater than the number of observations is not a concern because for any value greater than 150 the *t*-table will approximate a standard normal distribution (Allison, 2001). For a more in-depth explanation, see Allison (2001, pp. 47-50).

ages at which to assess precursors, the stability of the precursors as the child aged, and which sites to include in the analyses.

**Maltreatment Age.** Preliminary analyses looked at children maltreated at some point (or several) between birth and age 6, as well as those maltreated between birth and age 12. It should be noted, that these are ages at which the report, not the maltreatment itself occurred. For example, neither a child maltreated at age 11, nor a child maltreated at age 4 would be included in the 0 to 6 maltreatment category in this longitudinal dataset if the first report was made at age 11. As is shown in Table 1 (see Footnote 16), the exploratory analyses demonstrated negligible differences in BPD precursor composite score means between operationalizing maltreatment as reported between birth and age 6 or as reported between birth and age 12.

The theorized model is a path of early maltreatment (ages 0 to 6), followed by latency period precursors to BPD (ages 6 to 12), leading to adolescent and adult BPD symptoms (age 13 and older). This approach does not allow for causal inferences to be made because characteristics of the BPD precursors may have existed prior to the maltreatment report. Still, temporality is one of Hill's criteria that can, along with other factors, suggest a possible causal relationship (Ball & Links, 2009). Hill's criteria have been used to support the assertion that childhood trauma is an etiologic factor in BPD development. When maltreatment is operationalized as having been identified between birth and age 12, this continuity is not as clear-cut. Although the use of temporality cannot lead to any assertions of causality, operationalizing the variables so that one temporally precedes the other strengthens the possibility that the correlation being explored may in reality be a causal relationship. However, despite the young age at which the maltreatment is reported, the possibility that BPD precursor traits preceded the maltreatment cannot be ruled out. Based on initial hypotheses, the 0 to 6 model was retained for the full analyses.



Table 1

*Exploration of Indicator Maltreatment Operationalizations on the BPD Precursors Composite Score Means*

Report Type	Ages	Maltreatment Type	Nonmaltreated			Maltreated			<i>t</i>	<i>p</i>	<i>df</i>
			<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>			
alleged	0 - 6	Any Maltreatment	515	-0.20	1.05	766	0.13	0.97	5.61 ***	.000	769
substantiated	0 - 6	Any Maltreatment	704	-0.08	1.00	577	0.10	1.06	3.06 **	.002	537
alleged	0 - 12	Any Maltreatment	438	-0.24	0.99	843	0.13	1.04	6.07 ***	.000	296
substantiated	0 - 12	Any Maltreatment	633	-0.11	1.02	648	0.11	1.05	3.81 ***	.000	374
alleged	0 - 6	Sexual Abuse	515	-0.20	0.97	134	0.12	0.94	3.34 **	.001	618
alleged	0 - 6	Physical Abuse	515	-0.20	0.97	303	0.29	1.16	6.06 *** <sup>a</sup>	.000	386
alleged	0 - 6	Neglect	515	-0.20	0.97	663	0.14	1.05	5.56 ***	.000	488
alleged	0 - 6	Emotional Abuse	515	-0.20	0.97	318	0.18	1.10	5.17 ***	.000	879
substantiated	0 - 6	Sexual Abuse	704	-0.08	1.00	52	0.19	1.11	1.90	.058	2763
substantiated	0 - 6	Physical Abuse	704	-0.08	1.00	126	0.10	1.09	1.70	.086	221
substantiated	0 - 6	Neglect	704	-0.08	1.00	457	0.11	1.07	3.08 **	.002	416
substantiated	0 - 6	Emotional Abuse	704	-0.08	1.00	157	0.16	1.12	2.60 **	.008	1329
alleged	0 - 12	Sexual Abuse	438	-0.24	0.99	195	0.20	1.01	5.15 ***	.000	583
alleged	0 - 12	Physical Abuse	438	-0.24	0.99	426	0.30	1.11	7.53 *** <sup>a</sup>	.000	323
alleged	0 - 12	Neglect	438	-0.24	0.99	743	0.16	1.06	6.37 ***	.000	304
alleged	0 - 12	Emotional Abuse	438	-0.24	0.99	422	0.16	1.04	5.85 ***	.000	819
substantiated	0 - 12	Sexual Abuse	633	-0.11	1.02	73	0.22	1.07	2.69 **	.007	4206
substantiated	0 - 12	Physical Abuse	633	-0.11	1.02	173	0.18	1.16	3.18 **	.002	157
substantiated	0 - 12	Neglect	633	-0.11	1.02	509	0.13	1.70	3.77 ***	.000	299
substantiated	0 - 12	Emotional Abuse	633	-0.11	1.02	208	0.19	1.09	3.64 ***	.000	647

*Note.* Subtypes based on indicator. Child may be categorized into zero to four subtype indicators.

*df*s reflect the difference in between-regression variation relative to the within-regression variation for the MI procedure<sup>16</sup>. See Allison (2001, pp. 47-50).

<sup>a</sup> Equal variances not assumed.

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

**Alleged versus Substantiated Maltreatment.** An allegation of child maltreatment is defined as a report of child maltreatment made to and officially recorded by CPS. Substantiation is defined as a finding by CPS at the conclusion of an investigation that maltreatment indeed occurred. Exploratory analyses were conducted to compare the operationalization of maltreatment as allegation (report) to that of substantiation. Thus, in our operationalizations, the allegations group consists of children with one or more report of maltreatment regardless of the conclusion of the CPS investigation (as indicated, unfounded, etc.); and the substantiation group includes all children who had an allegation and a CPS determination that maltreatment had indeed occurred. The between-group differences of maltreated and nonmaltreated children on the BPD precursors composite score was significant in both cases, although the effects were diminished when operationalized as substantiation rather than allegation. The results are in Table 1 (see Footnote 16). Additionally, there is no significant difference between group scores for substantiated physical or sexual abuse (age 0 to 6), whereas there are for alleged physical or sexual abuse (age 0 to 6). These differences may be due to many factors, but one possibility is small sample size. Only 41.5% of the allegations for age 0 to 6 physical maltreatment ( $n = 303$ ) are substantiated ( $n = 126$ ), and only 38.8% of the allegations for age 0 to 6 sexual maltreatment ( $n = 134$ ) are substantiated ( $n = 52$ ). Also, preliminary analyses demonstrated that child sexual abuse allegations were often substantiated as another subtype. This may be due to the difficulty involved in proving sexual maltreatment through a CPS investigation.

Hussey et al. (2005) found in a high-risk maltreatment sample (actually, four sites from the LONGSCAN data) that many behavioral and developmental outcomes (they investigated 10, including: anxiety, PTSD, socialization, and internalizing and externalizing behaviors) are indistinguishable between groups with substantiated and unsubstantiated reports. Additionally, the LONGSCAN consortium reports that a review of approximately 5% of the cases demonstrated that inter-rater reliability for classifying maltreatment based on CPS narratives

was higher in the allegations category than in the substantiations category<sup>17</sup>. For these reasons, maltreatment is operationalized as allegations in this study.

**Maltreatment Subtype Operationalization.** Dichotomous (yes/no) indicator variables were used to operationalize maltreatment for each maltreatment subtype and for any maltreatment overall. For a comparative analysis, subtypes were also operationalized using a hierarchical classification system to replicate the method of Rogosch and Cicchetti (2005). The hierarchy is sexual abuse > physical abuse > neglect > emotional abuse. Thus, a child was categorized as being in only the “highest” group of experienced maltreatment subtype. In the Rogosch and Cicchetti (2005) study, this classification was done to consolidate maltreatment subtype groups, where participants often experienced multiple types of abuse. The researchers reported using a hierarchy to control for greater incidence of neglect. The hierarchy was ordered based upon frequency of the subtype occurrence (sexual abuse was low,  $n = 10$ ) and on the degree to which the subtype violated cultural norms.

The impact of using the hierarchical maltreatment operationalization on between-group (maltreated and non) BPD precursors composite score means using the LONGSCAN data is shown in Table 2<sup>18</sup> (see Footnote 16). The overall effect is a reduction in significant between-

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<sup>17</sup> Kappa coefficients for coding the findings and conclusions sections (substantiations) were lower than from the allegations sections (Runyan et al., 2010). Findings Kappas ranged from .45 to .84 ( $M = .72$ ); conclusions Kappas ranged from .14 to .73 ( $M = .54$ ); and allegations Kappas ranged from .49 to .88 ( $M = .76$ ).

<sup>18</sup> The numbers do not all sum to the full sample ( $N = 1281$ ) because in nine cases, the maltreatment allegation was for parental substance use rather than one of the four maltreatment subtypes listed. These children were retained in the maltreatment group because they did have a maltreatment allegation, and also the number of children having only this subtype allegation was small.

Table 2

*Exploration of Hierarchy Maltreatment Operationalization on the BPD Precursors Composite Score Means*

Report Type	Ages	Maltreatment Type	Nonmaltreated			Maltreated			<i>t</i>	<i>p</i>	<i>df</i>
			<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>			
alleged	0 - 6	Sexual Abuse	515	-0.20	1.05	134	0.12	0.94	3.34 ***	.001	618
alleged	0 - 6	Physical Abuse	515	-0.20	1.05	233	0.32	1.22	5.67 *** <sup>a</sup>	.000	366
alleged	0 - 6	Neglect	515	-0.20	1.05	379	0.04	1.01	3.43 **	.001	444
alleged	0 - 6	Emotional Abuse	515	-0.20	1.05	11	-0.20	0.88	-0.60	.996	204
substantiated	0 - 6	Sexual Abuse	704	-0.08	1.00	52	0.19	1.11	1.90	.058	2763
substantiated	0 - 6	Physical Abuse	704	-0.08	1.00	111	0.07	1.11	1.43	.156	167
substantiated	0 - 6	Neglect	704	-0.08	1.00	365	0.09	1.05	2.58 *	.010	415
substantiated	0 - 6	Emotional Abuse	704	-0.08	1.00	25	0.02	0.88	0.52	.516	695
alleged	0 - 12	Sexual Abuse	438	-0.24	0.99	195	0.20	1.01	5.15 ***	.000	583
alleged	0 - 12	Physical Abuse	438	-0.24	0.99	303	0.28	1.14	6.56 *** <sup>a</sup>	.000	299
alleged	0 - 12	Neglect	438	-0.24	0.99	325	-0.03	0.98	2.92 **	.004	224
alleged	0 - 12	Emotional Abuse	438	-0.24	0.99	11	-0.61	0.77	-1.19	.236	239
substantiated	0 - 12	Sexual Abuse	633	-0.11	1.02	73	0.22	1.07	2.69 **	.007	4206
substantiated	0 - 12	Physical Abuse	633	-0.11	1.02	150	0.17	1.11	2.84 **	.005	144
substantiated	0 - 12	Neglect	633	-0.11	1.02	372	0.08	0.99	2.94 **	.003	451
substantiated	0 - 12	Emotional Abuse	633	-0.11	1.02	27	-0.01	0.87	0.50	.620	1229

*Note.* Subtypes based on hierarchical classification. Child may be categorized into only one hierarchy category.

Hierarchy: Sexual abuse > Physical Abuse > Neglect > Emotional Abuse.

*dfs* reflect the difference in between-regression variation relative to the within-regression variation for the MI procedure<sup>16</sup>. See Allison (2001, pp. 47-50).

Some allegations were substantiated as another maltreatment subtype.

The numbers do not all sum to the full sample ( $N = 1281$ ) because in a few cases, the maltreatment subtype was parental substance use rather than one of the four subtypes listed: alleged maltreatment ( $n = 9$ ); age 0-6 substantiation ( $n = 24$ ); for age 0-12 substantiation ( $n = 26$ ).

<sup>a</sup> Equal variances not assumed.

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

groups differences for maltreatment types that are categorized lower in the hierarchy.

Theoretically, it is difficult to argue that any one subtype of maltreatment has greater impact than another, particularly without accounting for frequency, severity, and duration of the maltreatment, relationship with the perpetrator, age of onset, and other such factors. The use of indicator variables facilitates consideration of all of the maltreatment subtypes experienced by each child, and the number of cases in the sample is sufficiently large enough to allow this to be done. Thus, the hierarchy is abandoned in favor of the use of dichotomous indicator variables.

**Precursor Assessment Age.** Data on the dependent variables were collected from some participants at and prior to age 4. Pearson correlation coefficients demonstrated that most dimension scores at age four were significantly different from scores at other ages. Across ages 6 to 12 scores correlated well, demonstrating some trait stability. For example, relational aggression was rated low at age 4 for children who consistently had high scores at ages 6, 8, 10, and 12. This is expected given that a teacher, for instance, is unlikely to rate a preschooler's acting out behavior as highly problematic due to developmental expectations that some such behavior is normative. Supporting this idea in the LONGSCAN dataset, using a Likert scale rating from 1 to 5, no 4-year-old children were scored a 4 or 5 for relational aggression, while some did receive those scores at ages 6, 8, 10, and 12. The correlation coefficients for the relational aggression scores at ages 6 to 12 with the other ages (excluding age 4) ranged from .34 to .86,  $p = (.000, .058)$ , while the correlation coefficient ranges for the age 4 relational aggression score with the other ages ranged from -.25 to .35,  $p = (.448, .842)$ . The other dimensions demonstrated similar findings, and so all age 4 and prior dependent variable data were removed from the analysis.

An average score over the latency period of age 6 to 12 was used to measure the dependent variables for the following reasons: (1) this age range matches the ages of participants in the Rogosch and Cicchetti study, (2) the age 4 data (time point below age six)

was removed because it did not correlate with the later measures, (3) this is the period during which one would expect to find precursors, because into adolescence some actual symptoms of the disorder may emerge (4) the traits correlate within subjects and are presumed to be relatively stable, (5) this operationalization allows for focus on a narrow developmental period (6) assessing personality traits over this time period may decrease the likelihood of maturational and developmental symptom decline over ages 10 to 25 which has been demonstrated in a proportion of those with BPD<sup>19</sup> (Cohen et al., 2005), and (7) stability of BPD dimensions across this specific age range has been established in a prior study (Stepp et al., 2010).

**Precursor Trait Stability.** Trait stability is the presupposition that a given personal trait will not vary greatly over time within an individual. Trait stability was examined through bivariate correlation of measures within a given dimension, longitudinally over ages. Spearman's  $r$  was used because many of the dimension distributions violated assumptions of normality. Seven of the dimensions were measured at more than one time point. Of these, five demonstrated significant trait stability: relational aggression (range of Spearman's  $r$  across ages = (.28, .52),  $p < .0001$ ), lability/negativity ( $r = (.44, .61)$ ,  $p < .0001$ ), upsets others ( $r = (.29, .48)$ ,  $p < .0001$ ), negative perception of peers ( $r = (.14, .41)$ ,  $p$  range = (.000, .006)), and consciousness ( $r = (.25, .62)$ ,  $p$  range = (.000, .026)). The two that did not demonstrate stability were self-harm ( $r = (-.04, .70)$ ,  $p$  range = (.000, .242)) and suicidal ideation ( $r = .05$ ,  $p = .141$ ). This is expected given the impulsive and transient nature of these experiences, the fact that they were assessed by teachers, and the fact that each was assessed using only one item.

For each dimension, all available scores age 6 to 12 were used, based on the assumption of trait stability. The suicidal ideation and self-harm dimensions were retained

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<sup>19</sup> Although for approximately one-fifth of the Cohen et al (2005) Children in the Community (CIC) study participants ( $N \sim 800$ ), symptoms increased over this time period.

despite their low trait stability because both present as periodic, not ongoing, symptoms in BPD. Therefore, having one or few incidences of these could predict vulnerability to the disorder.

**Site Differences.** Among the five sites in the LONGSCAN study, significant between-site differences with regard to maltreatment subtype, residential status, and other characteristics exist. However, they were not investigated in this study because the study questions did not require between-site comparisons. It is imperative to keep in mind that the sampling methods used dictate that the results of the study are not generalizable to the entire US population. There were significant between-site differences ( $p < .05$ ) for the BPD precursors composite score and for seven of the dimension scores (relational aggression, dislike by others, negative self-perception, suicidal ideation, upsets others, conflicted relationship, and preoccupation with mother).

The purpose of the LONGSCAN study was to obtain the largest possible sample of maltreated children to compare with at-risk nonmaltreated controls. Because the between-site differences did not pertain to the study questions, all five sites were retained for the analyses. Details about between site differences can be found in the *Predictors of the BPD Precursors Composite Score* subsection of this paper.

### **Missing Data**

The original LONGSCAN sample is comprised of 1354 cases. Once all measures for BPD precursor dimensions were created, 73 cases were removed because they had no valid scores for any of the 11 dimension scales. Pearson's chi-square test of independence demonstrated that these removed cases did not differ from those retained with regard to gender ( $\chi^2(1, N = 1354) = 1.13, p = .287$ ), household income level ( $\chi^2(10, N = 1325) = 8.98, p = .535$ ), maltreatment status ( $\chi^2(1, N = 1354) = 1.55, p = .214$ ), or on the majority of maltreatment subtypes (physical maltreatment:  $\chi^2(1, N = 1354) = 1.59, p = .207$ ; sexual maltreatment:  $\chi^2(1, N$

= 1354) = .26,  $p = .613$ ; neglect:  $\chi^2(1, N = 1354) = 2.71, p = .100$ ). Alleged emotional maltreatment, however, was significantly higher ( $n = 26$ ) in the subsample of removed cases compared to retained cases:  $\chi^2(1, N = 1354) = 4.24, p = .039$ . Emotional abuse was alleged in 35.6% of the removed subsample, whereas emotional maltreatment allegations are present in only 25.4% ( $n = 344$ ) of the original sample ( $N = 1354$ ).

The removed cases also differed with regard to race,  $\chi^2(6, N = 1353) = 21.44, p = .002$  (see Table 3). Of the 73 missing cases, 30 were White (41.1%) whereas they represented only 25.3% of the retained non-missing sample cases. 31.5% of the missing cases were Black children ( $n = 23$ ), while they represented 54.5% of the retained cases. Hispanic children<sup>20</sup>, Mixed Race children, and children of Other Races were all slightly overrepresented among missing cases.

After removal of the 73 cases with insufficient data for imputation, in the remaining dataset ( $N = 1281$ ) 84.17% of cases had complete information. No data were missing in 46.7% of cases, with 30.2% missing only one or two dimension scores. See Table 4 for the distribution of missing scores. Multiple imputation (MI) was used for 15.83% of cases with missing data. Only the dimension scores were imputed; the LONGSCAN maltreatment data is complete for all cases. The procedure is one by which the missing values are replaced with plausible values within the range of valid values. This is done randomly and multiple times to create multiple possible datasets for analysis, in which, taken together each missing value has been replaced by a random sample of possible missing values (SAS Institute Inc., 2011). Ten imputations were created using SAS PROC MI (SAS Institute Inc., 2011). Ten iterations provided adequate

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<sup>20</sup> Although Hispanic is an ethnicity and not a race, it has been grouped with race in this study, because that is how the variable was categorized in the LONGSCAN Consortium data.



Table 3

*Distribution of Removed Cases by Race*

Race/Ethnicity	Removed Cases	%	Retained Cases	%
Caucasian	30	41.1	324	25.3
African American	23	31.5	698	54.5
Hispanic	7	9.6	90	7.0
Mixed Race	11	15.1	150	11.7
Other	2	2.7	19	1.5
Total	73	100.0	1281	100.0

*Note.*  $N = 1354$ .

Table 4

*Distribution of Missing Scores Across Dimensions*

<i>n</i> Missing	Frequency	%	Cumulative %
0	598	46.7	46.7
1	169	13.2	59.9
2	218	17.0	76.9
3	52	4.1	81.0
4	93	7.3	88.2
5	27	2.1	90.3
6	38	3.0	93.3
7	17	1.3	94.6
8	32	2.5	97.1
9	11	0.9	98.0
10	26	2.0	100.0

*Note.* *N* = 1281.

Dataset is 84.17% complete before multiple imputation.

variability in the scores. The Markov Chain Monte Carlo (MCMC) method was used because the missing pattern was arbitrary. The syntax for multiple imputation of the data is in Appendix B. The BPD precursors composite score for those cases missing one or more dimension scores ( $n = 683$ ,  $SD = 4.93$ ) was compared to those with complete scores ( $n = 598$ ,  $SD = 5.69$ ) using an independent samples  $t$ -test for equality of means. Levene's test for equality of variances was statistically significant  $F(1,1279) = 14.48$ ,  $p = .000$ , therefore the assumption of homogeneity of variance was violated and the Welch-Satterthwaite method was used to adjust the pooled estimate for the error term of  $t$  and the degrees of freedom. Inspection of Q-Q Plots revealed that scores were normally distributed for both groups. No significant difference was found between complete and incomplete score groups  $t(1190) = 1.31$ ,  $p = .191$ .

## Participants

For the final analyses, the participants were 1281 children, maltreated ( $n = 766$ ) and nonmaltreated ( $n = 515$ ). Multiple subtypes of maltreatment were experienced by 56.1% of the maltreated group. Equally distributed by gender (48.9% male and 51.1% female), the sample is majority Black (54.5%), followed by White (25.3%), Mixed Race (11.7%), Hispanic (7%) (see Footnote 20), and Other Race (1.5%). Table 5 summarizes select sample characteristics by maltreatment type.

The percentage of participants with sexual abuse allegations was significantly greater for females  $\chi^2(1, N = 1281) = 28.99$ ,  $p < .000$  than males. Race differed significantly between maltreated and nonmaltreated groups  $\chi^2(6, N = 1281) = 84.05$ ,  $p < .000$ , and differed significantly between groups within all maltreatment subtypes. A higher percentage of Blacks (41.5%) had maltreatment allegations than any other race. Whites had the highest percentage of physical (35.8%) and sexual (35.8%) maltreatment, while Blacks had the highest percentages of emotional abuse (36.0%) and neglect (46.3%) allegations. The median category for

Table 5

*Characteristics of the Analysis Sample by Alleged Maltreatment Subtype*

	Baseline (1281)	Any (766) %	Physical (303) %	Sexual (134) %	Emotional (318) %	Neglect (663) %
<b>Gender</b>						
Male	626	47.7	51.2	26.9	48.4	48.9
Female	655	52.3	48.8	73.1	51.6	51.1
<b>Race/Ethnicity</b>						
Black	698	45.1	31.8	26.1	36.0	46.3
White	324	28.9	35.8	41.0	34.4	28.5
Mixed Race	150	15.8	20.2	22.4	17.7	15.4
Hispanic	90	8.8	9.3	9.0	10.7	8.6
Other	19	1.5	3.0	1.5	1.3	1.2
<b>Annual Household Income</b>						
< \$5,000	170	9.4	5.1	2.3	8.1	9.8
\$5,000 – \$19,999	696	56.6	62.7	60.6	58.9	56.8
\$20,000 – \$34,999	238	20.1	19.0	23.5	20.1	19.7
\$35,000 – \$49,999	103	9.6	8.1	9.1	9.1	9.4
> \$50,000	49	4.4	5.1	4.5	3.9	4.3

*Note.*  $N = 1281$ .

Children can be coded as having more than one maltreatment subtype.

Annual household income data is missing for 25 cases ( $n = 1256$ ).

household income was \$5,000 to \$19,999 per year with 54.3% of cases falling into that range ( $n = 696$ ). Household income data was missing for 25 cases. Household income differed significantly between maltreated and nonmaltreated groups  $\chi^2(4, N = 1281) = 31.27, p < .000$ , and differed significantly between groups within all subtypes. See Table 5 for the distributions.

## Measures

Rogosch and Cicchetti chose their 11 dimensions based upon their review of the literature, with regard to precursors found in BPD youth. Their measures were administered during a one-week summer camp to children ranging in age from 6 to 12. The measures for this study were chosen or developed to match the measures used by Rogosch and Cicchetti (2005) as closely as possible. When available, the identical instrument was used. If the instrument was not in the dataset, survey questions were matched item-by-item. If neither of the first two methods were workable, the constructs were matched as closely as possible. Due to the presumption of trait stability, scores were averaged across ages 6 to 12. After they were calculated, all raw scores were standardized.

**Maltreatment.** The Modified Maltreatment Classification System (MMCS) was used to assess maltreatment (Barnett, Manly, & Cicchetti, 1993; English & the LONGSCAN Investigators, 1997). The experience of maltreatment was categorized into four subtypes: sexual abuse, physical abuse, neglect, and emotional abuse. For subtype definitions as they are operationalized in the LONGSCAN study, see The *Child Maltreatment* subsection of this paper.

A records review of county-level CPS files was conducted by the LONGSCAN consortium. Data were abstracted by trained personnel in an attempt to standardize definitions across jurisdictions where protective services procedures may differ (Runyan, Martin, Bangdiwala, & Lewis, 2004; Runyan et al., 2010). Kappa coefficients for MMCS codes from the allegations narrative used in these analyses ranged from .73 - .87 ( $M = .80$ ) (Runyan et al., 2010). Dichotomous variables were used to describe maltreatment between birth and age 6:

maltreated or nonmaltreated, and for each subtype. The most commonly recognized subtypes of abuse were analyzed, and these replicated Rogosch and Cicchetti's subtype choices. Other subtypes present in the LONGSCAN dataset, for example educational neglect or parental substance abuse, were not investigated in this study.

Rogosch and Cicchetti (2005) used the Maltreatment Classification System (MCS) to assess for maltreatment. In their study a Department of Human Services record review was conducted and cases were coded (Barnett, Manly, & Cicchetti, 1993). The MMCS incorporates maltreatment subtypes and categories of severity that were not part of the MCS. These additional categories were not used in this study, thereby making the maltreatment measure identical for the two studies. Rogosch and Cicchetti (2005) used a hierarchical classification system in which a child was classified into only one category: sexual abuse > physical abuse > neglect > emotional abuse, whereas in this study, an indicator variable was used for each subtype of maltreatment. See the above *Maltreatment Subtype Operationalization* subsection of the *Exploratory Analysis* section for more information on the two operationalizations.

**Peer Relational Aggression.** Peer relational aggression is a construct used to assess covert, between-peer verbal attacks, and upsetting or demanding behavior. Instability in interpersonal relationships is a *DSM* criterion for adult BPD (APA, 2000). Additionally, Crick et al. (2005) found latency age relational aggression to be associated with borderline features. Relational aggression was measured using two items from the Peer Aggression Subscale of the Teacher's Estimation of Child's Peer Status instrument (Cassidy & Asher, 1992; Hunter et al., 2003). The respondent was the teacher and the items were assessed at child-ages 6, 8, and 12, via a handwritten form sent by mail. The two questions used were "starts arguments or fights" and "gets angry easily". Teachers were asked to check the response that best describes the child on a five-point Likert scale from 1 (*one of the kids with the most nominations*) to 5 (*one of the kids with the fewest nominations*). The scores for the items were reversed so the problem

behavior would yield the higher score in accord with the other dimensions. The two items were summed, and the sums were averaged over time.

The items used in this study were mapped from the Rogosch and Cicchetti (2005) use of the Peer Sociometric Ratings scale (Coie & Dodge, 1983). The two items used in the original study were assessed by multiple peers on a three-point Likert scale (*not very true*, *sort of true*, *very true*): “Child Name upsets everyone, wants everyone to do things his/her way”, and “Child Name, when s/he is mad at someone, refuses to play or talk to the person, will try to get others not to like the person, will spread rumors or talk behind the person’s back.” In the LONGSCAN dataset, no assessments were given to peers. However, Lemerise and Dodge (1990) found the Teacher’s Estimation of Child’s Peer Status instrument to be correlated positively with students’ ratings of their peers,  $r(100) = .55$  to  $.65$ , in a sample of elementary school students (as cited in Hunter et al., 2003), demonstrating that teacher responses may be the best approximation to peer ratings for this dimension. The items used in this study were less specific in content, but paralleled the original items in the construct.

**Disliked by Others.** The disliked by others dimension measures dislike of a child by her or his peers. The label borderline has itself been a misappropriated pejorative term for disliked patients in some circles. In a study that assessed borderline features, peer rejection was highly correlated with relational aggression, another BPD feature (Werner & Crick, 1999). One item from the Peer Aggression Subscale of the Teacher’s Estimation of Child’s Peer Status instrument (also used for peer relational aggression, and described above) was used (Cassidy & Asher, 1992; Hunter et al., 2003). The respondent was the teacher and the items were assessed at child-ages 6, 8, and 12 by written response. In this case, the teacher was asked, “Overall, how much is this child liked by classmates?” and responded with a Likert score from 1 (*very well liked*) to 5 (*liked very little*). The scores were averaged over time.

The item used was a proxy for the Peer Sociometric Ratings scale of the Rogosch and Cicchetti (2005) study where multiple peers rated how well they liked or disliked each child using a three-point Likert scale (Coie & Dodge, 1983). Because no assessments were given to peers in the LONGSCAN dataset, this was the best approximation for the item (Coie & Dodge, 1983). In a study of elementary school students by Lemerise and Dodge (1990), the Teacher's Estimation of Child's Peer Status instrument was positively correlated with students' ratings of their peers,  $r(100) = .55$  to  $.65$  (as cited in Hunter et al., 2003).

**Negative Self-Perception.** Negative self-perception is defined as the view of oneself in the context of relationships with regard to impressions of the social attributes that describe the self, along with what children cognitively know about the self and what they affectively feel about the self (Rudolph & Hammen, 1995). The object relations disturbance of BPD is believed to result in a self-loathing and subjective experience of emptiness (Bender & Skodol, 2007; Kernberg, 1975). The 1992 version of the Loneliness and Social Dissatisfaction Scale full score was used as the proxy for this dimension (Cassidy & Asher, 1992; Hunter et al., 2003). The instrument assesses self-reported feelings of loneliness and dissatisfaction with peer relationships. The instrument was administered to the child during the age 6 interview. It consists of 24 questions, eight of which are decoy questions about general life and hobbies to promote relaxation during the interview. Examples of the questions are: "Are you good at working with other kids at school?" and "Is it hard to get kids in school to like you?" The response choices are no, sometimes, and yes. The score is calculated by reverse-coding as needed, and summing all non-decoy responses. This instrument was scored by the LONGSCAN Consortium and a score data file was provided. The authors of the instrument report a Chronbach's alpha for internal reliability of .79, and the LONGSCAN consortium report a range of .61 to .84 across racial groups and sites (Cassidy & Asher, 1992; Hunter et al., 2003).



Rogosch and Cicchetti (2005) used the Self Subscale of the Perception of Peers and Self Inventory (POPS) to measure this construct (Rudolph & Hammen, 1995). The subscale is a 15 item four-point Likert scale, ranking items from 1 (*not at all true*) to 4 (*very much true*) with questions similar to those in the Loneliness and Social Dissatisfaction Scale. Examples of POPS questions include: "I am good at helping other kids to feel better when they are upset," and "There are a lot of things about me that other kids really like" (Rudolph & Hammen, 1995). The construct was mapped at the scale level due to the similarity of the items between the measures.

**Suicidal Ideation.** Suicidal ideation is defined by thoughts or desire to kill oneself. Suicidal ideation in children under age 12 has been considered to be rare, but recent research demonstrates it to be more prevalent than previously believed, with incidence estimates of ideation among 7 to 12 year-olds ranging from 1.9% to 10.0% (Tishler, Reiss, & Rhodes, 2007). Additionally, in adolescents with BPD, impulsiveness and aggression have been correlated with suicidal behavior (Horesh, Orbach, Gothelf, Efrati, & Apter, 2003). Suicidal ideation and attempts are common among adult BPD populations, and maltreatment (particularly CSA) has been correlated with suicidal ideation (Soloff, Lynch, & Kelly, 2002). One item from the Trauma Symptom Checklist for Children - Alternate Version<sup>21</sup> (TSCC-A) was used to assess suicidal ideation (Briere, 1996; Hunter et al., 2003). The respondent was the child and the dimension was assessed via in-person interview at age 8 and using the Audio Computer Assisted Self Interview (ACASI) at age 12. In the ACASI format, the respondent hears the interview questions and options via headphones, while reading them on a monitor, and responds privately at her or his own pace using a computer. The child was asked to rate the statement "Wanting to kill

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<sup>21</sup> The alternate version of the instrument omits questions on sexual concerns and issues. The omission has no impact on the use of the single item in this study.

yourself" on a four-point Likert scale including 0 (*Never*), 1 (*Sometimes*), 2 (*Lots of time*), and 3 (*Almost all of the time*). The scores were averaged over time.

A single item was also used by Rogosch and Cicchetti (2005) to measure suicidal ideation. They used the Children's Depression Inventory (CDI) (Kovacs, 1992). The item was measured on a three-point Likert scale including 0 (*I do not think about killing myself*), 1 (*I think about killing myself but would not do it*), and 2 (*I want to kill myself*).

**Lability/Negativity.** Labile mood is a form of dysregulated affect demonstrated through emotion that is continually, unexpectedly, or volatily changing, and that may often be negative in valence. Irritable and labile mood are characteristics of adult BPD. Goodman et al. (2010) surveyed parents about the infancy, toddlerhood, and childhood of their female offspring ( $n = 234$  BPD diagnosed,  $n = 87$  non-BPD siblings). They found the trajectory for BPD to be distinct from non-BPD siblings: In infancy moodiness was significantly higher, although the effect size was small. Continued differences in moodiness, coupled with interpersonal difficulties in toddlerhood and childhood were distinct from non-BPD siblings. In adolescence impulsivity, acting-out, and self-destructive behaviors including self-harm, and suicidal ideation and threats are markedly different between groups.

In this study, lability/negativity was assessed using 11 items selected from the 118 items on the Achenbach Teacher's Report Form (TRF) (Achenbach, 1991; Hunter et al., 2003). The respondent was a teacher, or two teachers in 90 cases, and the instrument was administered via mailed survey when the child was 6, 8, 10 (optional by site), and 12. Items were chosen to match the Rogosch and Cicchetti (2005) measure items. It was not possible to match all items, but 11 of 15 were matched. In those cases where two teachers reported on one student at age 12, the age 12 scores were averaged, and then that mean value was averaged with the other ages, so that the age 12 assessment would not have greater weight than the past assessments. The items were summed, and the scores were averaged over time.

Rogosch and Cicchetti (2005) used the Lability/Negativity Subscale of the Emotion Regulation Checklist (ERC) to measure this construct (Shields & Cicchetti, 1997). The respondents were camp counselors. A chart of the matching with detail about the two measures can be found in Appendix C.

**(Lack of) Contentiousness.** This dimension was designed to measure effortful control versus lack of direction. Effortful control is the ability to plan, focus attention, and to inhibit impulses. Conscientiousness is a carefulness and self-discipline that has been linked to effortful control (Rogosch & Cicchetti, 2005). BPD patients have been shown to report and demonstrate lower effortful control (Clarkin & Posner, 2005). Additionally, Kim, Cicchetti, Rogosch and Manly (2009) identified self-regulation, through ego resiliency and ego control, as potentially important to identify pathways to PD. In a study of maltreated and nonmaltreated children ( $N = 449$ ) ages 6 to 10, they found the experience of physical or sexual abuse, or multiple subtypes of abuse was related to ego undercontrol and externalizing symptomatology, while early onset of maltreatment was related to low, decreasing ego resiliency and more internalizing symptomatology. In this study, lack of contentiousness was assessed using three items selected from the 118 items on the Achenbach Teacher's Report Form (TRF) (Achenbach, 1991; Hunter et al., 2003). The respondent was a teacher, and the mailed survey instrument was administered at child-ages 6, 8, 10 (optional by site), and 12. Items were chosen to match the Rogosch and Cicchetti (2005) measure items. It was not possible to match all items, and only three of nine were matched due to the limitations of the available data. The items were reverse-coded, summed, and the scores were averaged over time<sup>22</sup>.

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<sup>22</sup> In 90 cases, the TRF was administered to two teacher respondents at age 12. For those cases the age 12 scores were averaged, and then that mean value was averaged with the other ages, so that the age 12 assessment would not have greater weight than the past assessments.

The California Child Q-Set (CCQ) was used by Rogosch and Cicchetti (2005) to obtain Five Factor Model Conscientiousness Scale Score (Block & Block, 1969). Two counselors responded per subject and the items were reverse-coded and summed. A chart of the matching with detail about the two measures can be found in Appendix D.

**Upsets Others.** Upsets others is a dimension measuring behavior peers may find to be upsetting or demanding. BPD sufferers can be experienced as emotionally upsetting to their peers, and instability in interpersonal relationships is a *DSM* criterion for adult BPD (APA, 2000). This dimension was assessed using one item from the 118 items on the Achenbach Teacher's Report Form (TRF) (Achenbach, 1991; Hunter et al., 2003). The survey instrument was mailed to the teacher to complete at child-ages 6, 8, 10 (optional by site), and 12. The teacher was asked to rate the statement "Disturbs other pupils," on a 3-point Likert scale including 0 (*Not true as far as you know*), 1 (*Somewhat or sometimes true*), and 2 (*Very true or often true*). The ratings were then averaged across teachers at each age, and those scores were averaged over time (see Footnote 22).

In the Rogosch and Cicchetti (2005) study, one item from the Peer Sociometric Ratings scale was used to assess upsetting or demanding behavior (Coie & Dodge, 1983). Multiple peers were asked to rate the child on the statement, "Child Name upsets everyone, wants everyone to do things his/her way," using a three-point Likert scale (*Not true*, *Sort of true*, or *Very true*). The TRF item for this study is less specific than the item used in the original study, but is the best available proxy for the construct.

**Conflicted Relationship.** The conflicted relationship dimension is intended to assess antagonistic interpersonal difficulties with adults, and is appropriate to measure due to the interpersonal difficulties associated with BPD. The My Family and Friends questionnaire was administered in-person to the child at age 8 (Hunter et al., 2003; Reid & Landesman, 1986). The Conflict Score of this instrument was used as a measure of conflict via getting angry with others.

The instrument is a card sort that asks the child to rank persons in her or his social network by how often she or he becomes angry with them. After the sort, the interviewer asks the child to provide a rank for each individual by pointing to the category on a barometer prop that demonstrates how angry the child gets with that person (even if they do not show it). The categories are: not very angry; a tiny bit angry; a little angry; somewhat angry; very angry; or very, very angry. The Conflict Score provided in the LONGSCAN dataset summarizes the child rating for conflict across all individuals in the network on a scale from 0 to 50. The measure has an acceptable Cronbach's alpha for internal validity of .72 across the entire instrument (Reid, Landesman, Treder, & Jaccard, 1989).

Rogosch and Cicchetti (2005) used the teacher as a proxy for interpersonal antagonism with all adults on the conflicted relationship dimension. They employed the 12 items that form the Conflicted Subscale from the Student-Teacher Relationship Scale (STRS) (Pianta, 2001). The respondents were counselors, and they were asked to rate the child on a five-point Likert scale from 1 (*Definitely Does not apply*) to 5 (*Definitely Applies*) on statements like: "This child and I always seem to be struggling with each other," and "This child sees me as a source of punishment." The current study was able to assess for conflict across multiple relationships, potentially increasing the construct validity over the STRS.

**Negative Perceptions of Peers.** The object relations disturbance of BPD, defined by difficulties with internal representations of self and others, is believed to result in attributions of malevolence to others, mistrust of others, and expectation and fear of being mistreated (Bender & Skodol, 2007; Kernberg, 1975). The LONGSCAN Peer Relationships measure is a self-report by the youth of her or his relationship with peers, administered at age 12 using the ACASI computer interview system (Knight, Smith, Martin, Lewis, & the LONGSCAN Investigators, 2008). This study used three questions about how other peers treat the child, from the seven question survey. The child responds to the questions: "How many of the other kids at school are

friendly toward you?" "How many kids at school just ignore you?" and "How many of the other kids at school are unfriendly or mean to you?" using a four-point Likert scale from 1 (*Almost no one*) to 4 (*Almost all the kids*). The first item is reverse coded, and the three responses are summed.

Rogosch and Cicchetti (2005) used a 12 item Peer Subscale of the 27 item Perception of Peers and Self Inventory (POPS) to measure perception of others (Rudolph & Hammen, 1995). The child rated items like, "Other kids are pretty helpful when you need them," and "Other kids are really out to get you" on a four-point Likert scale from 1 (*not at all true*) to 4 (*very much true*). Items were reversed-coded as needed, and summed. The questions used in this study provided a good proxy for the construct because both studies assess perceptions of the friendliness and meanness of peers. However, the measure for this study employs only one-fourth the number of questions of the original.

**Self-Harm.** Self-harm is the deliberate behavior of hurting one's own body through cutting or burning, for example. Self-harm does not need to involve intent to end one's life; it can be a means of emotional coping. A meta-analysis of 18 studies found converging evidence that affect-regulation is a primary function of deliberate, non-suicidal self-injury (Klonsky, 2007). This coincides with the difficulty regulating emotions that is core to BPD. Self-harm was measured using one item from the Achenbach Teacher's Report Form (TRF) (Achenbach, 1991; Hunter et al., 2003). The paper TRF was mailed to the teacher at child-ages 6, 8, 10 (optional by site), and 12. The statement, "Deliberately harms self or attempts suicide," was presented and teachers rated it on a four-point Likert scale with regard to the child as 0 (*Not true as far as you know*), 1 (*Somewhat or sometimes true*), 2 (*Very true or often true*). The ratings were then averaged across teachers over time (see Footnote 22).

Rogosch and Cicchetti (2005) used this identical item from the TRF to assess self-harm. Several counselors responded per child, and the score was averaged across counselors.

Although the identical item was used in both studies, one problem with this measure is that due to the wording of the item, it confounds self-harm with the separate dimension of suicidal ideation.

**Preoccupied with Mother.** The preoccupied with mother dimension is meant to assess preoccupation with an attachment figure. Preoccupied (also known as ambivalent) attachment is characterized by high anxiety when near to, and low avoidance of, the attachment figure. Preoccupied attachment has been associated with BPD development, and maltreated children demonstrate higher rates of preoccupied attachment to their mothers than nonmaltreated children (Stronach et al., 2011). Preoccupation was assessed using a version of the Quality of Relationship with Mother scale<sup>23</sup> (Knight et al., 2008). It was administered to the child using the ACASI system at age 12. Two subscales were used for this study. The Quality of Relationship subscale has six statements like, “Does she trust you?” and “Do you make decisions together about things in your life?” The Level of Recent Involvement (of Mother) subscale has ten statements like, “Have you talked about your friends or things you were doing with friends,” and “Have you played a sport with her”. Both are rated on a five-point Likert scale from 1 (*never, or not at all*) to 5 (*always, or very much*). The items for each subscale were reverse coded and summed, and the subscales were standardized. The standardized subscale scores were then summed.

Rogosch and Cicchetti (2005) measured preoccupied and avoidant coping using the Preoccupied Subscale of the Relationship Stance Questionnaire (RSQ) (Finnegan & Hodges, 1996). The child was read 18 short vignettes of stressful situations and was presented with hypothetical preoccupied and nonpreoccupied reactions. The child chose one response and rated whether it was “sort of true” or “really true” for them. For example, one vignette involves

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<sup>23</sup> Adapted from The National Longitudinal Study of Adolescent Health: Add Health (Harris et al., 2009).

losing and then finding her or his mother in a shopping mall, and the responses involve staying worried they may be separated again, or quickly getting over being upset. The items are scored: 0 (*nonpreoccupied*), 1 (*sort of preoccupied*), and 2 (*really preoccupied*), and summed. Rogosch and Cicchetti (2005) report an internal consistency of .75 on the Preoccupied Subscale within their sample. Although the methodology is different between the two instruments, this was the only viable proxy within the LONGSCAN dataset for attachment with mother.

**BPD Precursors Composite Score.** The BPD precursors composite score was calculated by standardizing all the dimension scores, imputing missing dimension scores, summing the z-scores across dimensions, and standardizing the result. The raw and restandardized scores can be found in Table 6. Raw BPD precursors composite scores across all imputations ranged from -1.85 to 2.50 ( $M = 0$ ,  $SD = 0.52$ ), with restandardized composite z-scores ranging from -3.56 to 4.83.

## ANALYSES AND RESULTS

Analyses were conducted using SAS 9.3 and SPSS 19. StatTransfer 11 was used to convert the data from one software package to the other. The analysis dataset was built in SPSS using the methods described above for creating the measures and the dataset was multiply imputed in SAS for analyses. All analyses were conducted on the multiply imputed dataset except for descriptive demographic statistics and raw dimension scores. Several analyses were conducted. Student's *t*-tests compare the maltreated and nonmaltreated mean scores on each dimension and on the BPD precursors composite scores. These tests were conducted to compare results to the identical tests run by Rogosch and Cicchetti on their data. Nonparametric tests were then used to compare dimension and composite scores between the maltreated and nonmaltreated groups, due to the positively skewed distribution of many of the dimension scores, including: peer relational aggression, negative self-perception, suicidal ideation, lability/negativity, upsets others, negative perception of peers, and self-harm. Following



Table 6

*Raw and Standardized Dimension and Composite Scores*

Dimension	<i>n</i>	Raw Scores			z Scores
		<i>M</i>	<i>SD</i>	Range	Range
Relational Aggression	1163	4.47	2.27	(1 , 10)	(-1.52 , 2.43)
Disliked	1164	2.63	0.86	(1 , 5)	(-1.89 , 2.75)
Negative Self	1058	7.62	6.57	(0 , 31)	(-1.16 , 3.56)
Suicidal Ideation	1141	0.13	0.43	(0 , 3)	(-0.30 , 6.72)
Lability/Negativity	1149	8.48	8.33	(0 , 40)	(-1.02 , 3.78)
(Lack of) Conscientiousness	1137	13.07	3.96	(2 , 21)	(-2.97 , 2.00)
Upsets Others	1147	0.69	0.66	(0 , 2)	(-1.05 , 1.97)
Conflicted Relationship	1015	24.66	12.53	(0 , 50)	(-1.97 , 2.02)
Negative Peer	878	4.63	2.00	(1 , 12)	(-1.81 , 3.67)
Self-Harm	1148	0.03	0.14	(0 , 2)	(-0.19 , 10.54)
Preoccupied	861	0.00	1.44	(-6 , 4)	(-3.92 , 2.98)
BPD Precursors Composite <sup>a</sup>	1281	0.00	0.53	(-1.85 , 2.98)	(-3.56 , 4.83)

*Note.* For the preoccupied dimension subscale raw scores ( $n = 861$ ), quality of relationship ranged from 1 to 4 ( $M = 2.50$ ,  $SD = 0.50$ ), and involvement ranged from 0 to 10 ( $M = 4.60$ ,  $SD = 2.20$ ).

<sup>a</sup> Composite derived after imputation.

that, two linear models were constructed of potential predictors of BPD precursors composite scores. Finally, bivariate logistic regression analyses were run to calculate odds ratios that represent the likelihood of having a high BPD precursors composite score as a function of gender and maltreatment experience.

### **Comparing Maltreated to Nonmaltreated Group Score Means**

To replicate the Rogosch and Cicchetti (2005) methodology and compare findings, maltreated and nonmaltreated groups were examined in SPSS using independent samples *t*-tests. The maltreated and nonmaltreated groups differ significantly on the BPD precursors composite score. The maltreated children had higher mean scores than nonmaltreated children  $t(769) = 5.58, p < .001$  (see Footnote 16). The two groups differed significantly on eight of the 11 precursors dimensions. Table 7 shows the comparison of maltreated and nonmaltreated groups on standardized scores for the dimensions of the BPD precursors composite. Relational aggression, disliked by others, negative self-perception, and suicidal ideation were components that differed most significantly between maltreated and nonmaltreated groups. The dimensions of lability/negativity, (lack of) conscientiousness, upsets others, and conflicted relationships also significantly differed between groups. The scales for negative perception of peers, self-harm, and preoccupation with mother did not differ significantly between maltreated and nonmaltreated groups. Equal between-group variance was assumed for all dimensions except self-harm. On that dimension, Levene's test indicated unequal variances between the two conditions (average *F* across imputations = 8.81, average *p* = .005), so degrees of freedom were adjusted from 488 to 424 for the analysis, using the Welch-Satterthwaite method.

This study replicated many of the findings of Rogosch and Cicchetti (2005). Both found the strongest significant differences between maltreated and nonmaltreated groups on the BPD precursors composite score, and on the relational aggression dimension. Both studies also found significant between-group differences on the dimensions: dislike by others,

Table 7

*Comparison of Wach (2013) t-Tests with Rogosch and Cicchetti (2005) t-Tests*

Dimension	Wach (2013)						Rogosch & Cicchetti (2005)				
	Nonmaltreated ( <i>n</i> = 515)		Maltreated ( <i>n</i> = 766)		<i>t</i>	<i>df</i>	Nonmaltreated ( <i>n</i> = 175)		Maltreated ( <i>n</i> = 185)		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Relational Aggression	-0.15	0.04	0.09	0.04	4.06 ***	893	-0.23	0.81	0.21	1.11	4.36 ***
Disliked	-0.14	0.04	0.08	0.04	3.93 ***	8717	-0.18	0.86	0.13	1.07	3.00 **
Negative Self	-0.14	0.05	0.08	0.04	3.89 ***	2131	-0.05	0.86	0.05	1.11	0.96
Suicidal Ideation	-0.13	0.03	0.08	0.04	3.54 ***	585	-0.07	0.90	0.05	1.08	1.05
Lability/Negativity	-0.11	0.05	0.07	0.04	2.99 **	459	-0.20	0.93	0.14	1.01	3.64 ***
(Lack of) Conscientiousness	-0.11	0.05	0.06	0.04	2.85 **	5610	-0.17	0.95	0.14	1.02	2.99 **
Upsets Others	-0.10	0.05	0.06	0.04	2.75 **	756	-0.19	0.88	0.16	1.05	3.44 ***
Conflicted Relationship	-0.09	0.05	0.06	0.04	2.24 *	48	-0.19	0.92	0.16	1.01	3.44 ***
Negative Peer	-0.06	0.05	0.06	0.05	1.84	55	-0.08	0.96	0.09	1.02	1.16
Self-Harm	-0.06	0.04	0.04	0.04	1.66 <sup>a</sup>	424	-0.13	0.00	0.12	1.39	2.48 **
Preoccupied	-0.06	1.16	0.04	1.27	1.45	74	0.09	0.98	-0.08	1.02	1.15
BPD Precursors Composite	-0.20	0.04	0.13	0.04	5.58 ***	769	-0.22	0.86	0.20	1.08	4.10 ***

*Note.* Wach (2013) maltreatment assessed from ages 0 - 6; dimensions aggregated over ages 6 - 12.

Rogosch and Cicchetti (2005) maltreatment assessed from birth to camp with participants age 6 - 12; dimensions assessed during one week of camp.

*dfs* reflect the difference in between-regression variation relative to the within-regression variation for the MI procedure<sup>16</sup>.

See Allison (2001, pp. 47-50).

<sup>a</sup> Equal variances not assumed.

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

lability/negativity, lack of conscientiousness, upsets others, and conflicted relationships. Table 7 provides Rogosch and Cicchetti's *t*-values for each dimension for comparison with the findings in this study. The findings between studies differ on three dimensions. This study found self-harm and not suicidal ideation differed significantly between groups whereas Rogosch and Cicchetti found the reverse. Rogosch and Cicchetti did not find negative self-perception to differ between groups, whereas this study did. Figure 1 graphically depicts the differences between the maltreated and nonmaltreated groups on each dimension and on the overall BPD precursors composite score, and compares these findings with those of Rogosch and Cicchetti.

### **Comparing Group Score Means Using Nonparametric Tests**

Several of the *z*-distributions were skewed and did not meet the normality assumptions required for Student's *t*-test. For example, as expected most children responded that they had no suicidal ideation, a few reported ideation sometimes, and fewer still reported frequent suicidal ideation. The dimension was measured through a child rating of one item worded, "wanting to kill yourself", asked at ages 8 and 12, and measured on a four-point Likert scale: 0 (*Never*), 1 (*Sometimes*), 2 (*Lots of time*), and 3 (*Almost all of the time*). Thus, when restandardized to a *z*-score, nearly 75% of the scores have a value of approximately zero. The frequency histogram in Figure 2 depicts the positive skew of this distribution.

Because of the skew of this and several other dimensions, non-parametric tests were employed to compare whether a score drawn randomly from the maltreated group is greater than a score drawn randomly from the nonmaltreated group with a probability of more than .5 for each dimension score and for the BPD precursors composite score (McDonald, 2009). The Kruskal-Wallis (chi-square) test for the Wilcoxin scores (test statistic *H*) was performed using SAS. The one-way analysis of variance NPAR1WAY procedure was run on the multiply imputed dataset. Sample syntax for this procedure can be found in Appendix B. SAS does not at this time have a procedure for combining the results of these analyses across imputations to

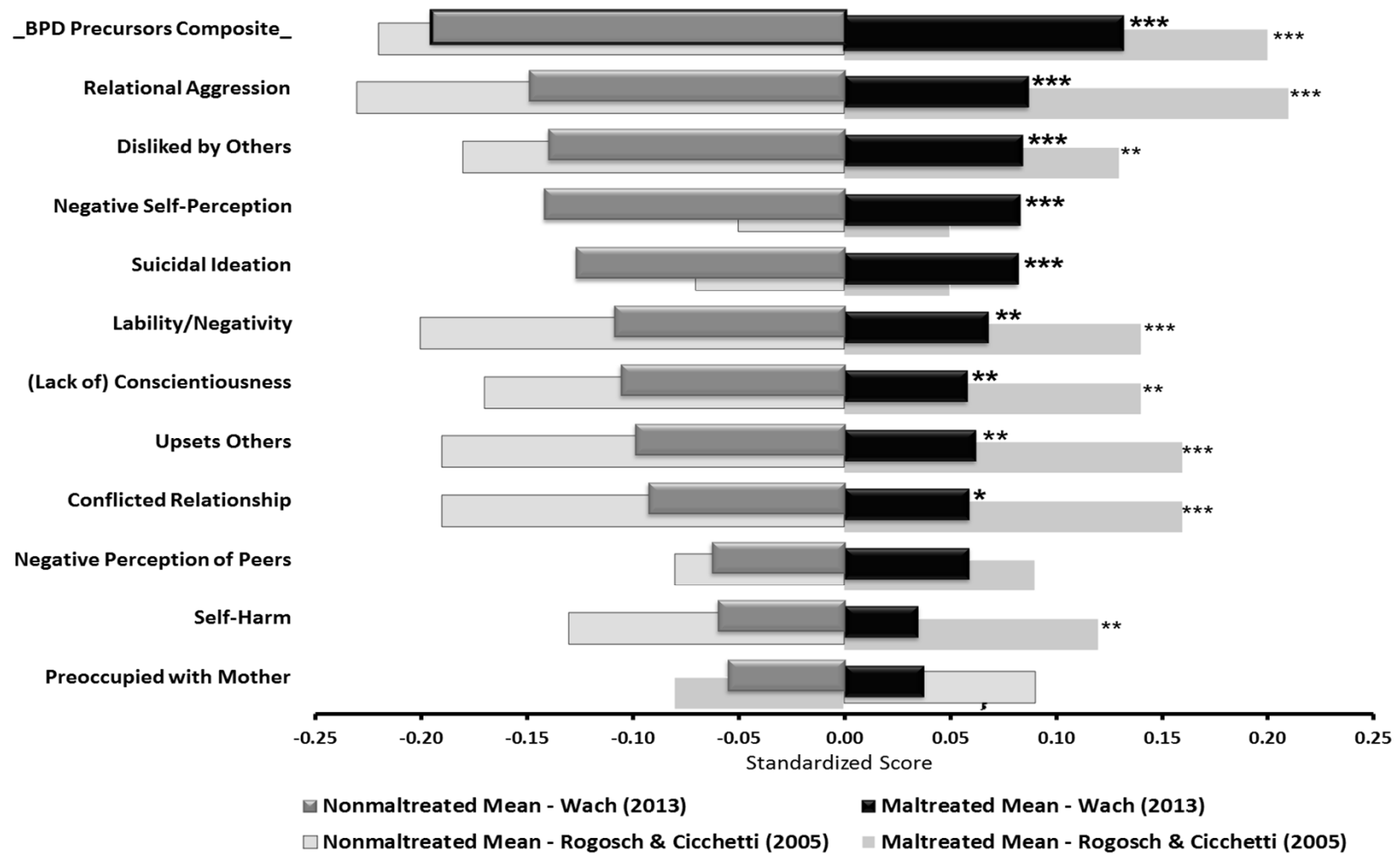
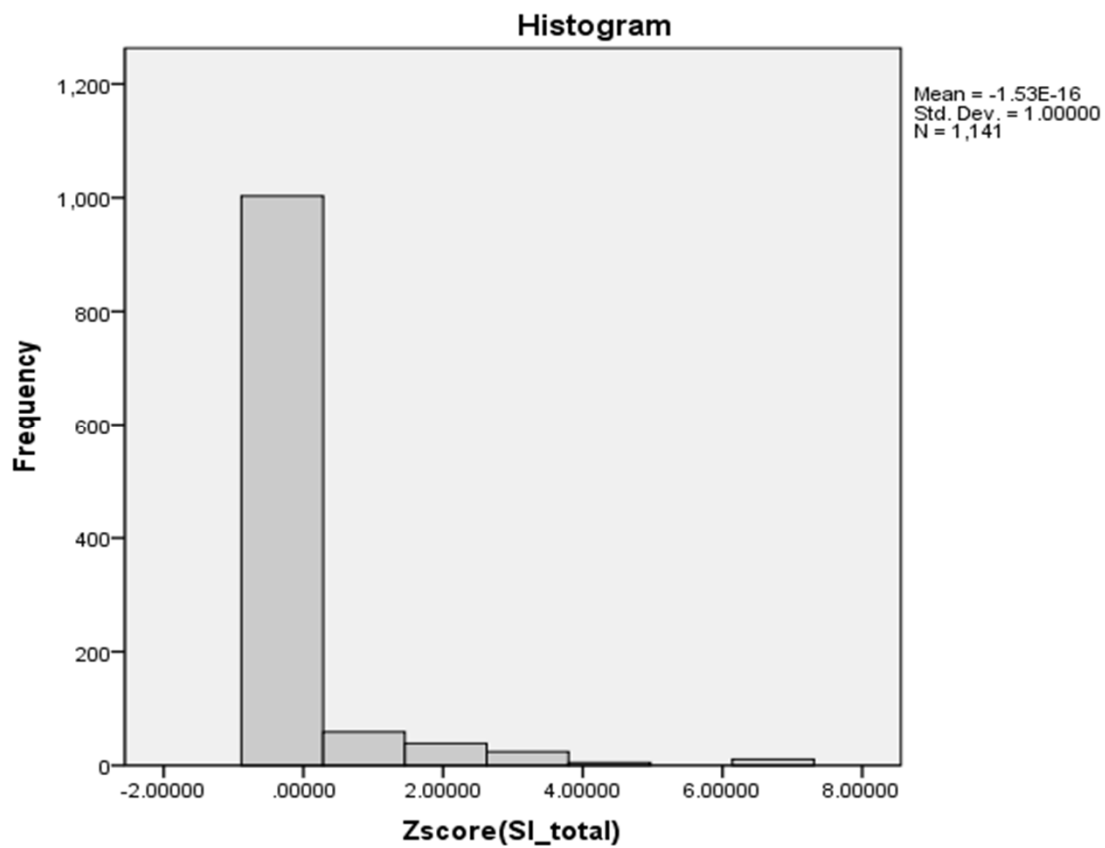


Figure 1. *t*-tests of maltreated and nonmaltreated groups BPD dimension and composite scores compared with the findings of Rogosch and Cicchetti (2005).

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



*Figure 2.* Positively skewed distribution of suicidal ideation scores. SI\_total is the restandardized average of the suicidal ideation scores, assessed at ages 8 and 12 (before imputation of data).

generate inferential statistics with proper standard errors (in the way MIANALYZE does for other procedures such as regression) (SAS Institute Inc., 2011). Therefore, results from the chi-square for each score were combined over imputations using the SAS %COMBCHI macro procedure created by Paul D. Allison (Allison, 2010). This procedure was appropriate because the test statistic for the Wilcoxon scores follows a chi-square distribution, and the procedure was designed to conduct an  $F$ -test on chi-square values. The syntax for the procedure can be found in Appendix B.

The results of the nonparametric tests are more suitable than those of the parametric  $t$ -tests given the distribution of some of the scores. Using the nonparametric tests, most dimension findings and their levels of significance are preserved. The BPD precursors composite mean Kruskal-Wallis (chi-square) test for the Wilcoxin Scores over (10) imputations is  $H(1, N = 1281) = 34.84$ , range (28.25, 41.81). Combining these over imputations with an  $F$  test, Pooled  $F(1, 986) = 31.43$ ,  $p < .0001$ .

Table 8 provides chi-square and  $F$  tests results on each dimension in comparison to the  $t$ -test results.<sup>24</sup> The dimensions of suicidal ideation and self-harm proved the most vulnerable to this problem given the means of assessment. The one reduction in significance level is that the  $p$ -value for suicidal ideation changed from  $p < .001$  to  $p = .030$ . The suicidal ideation dimension mean Kruskal-Wallis (chi-square) test for the Wilcoxon Scores over (10) imputations is  $H(1, N =$

---

<sup>24</sup> A table is the best way to report these data. Because the Kruskal-Wallis test is not a test of difference between means or medians it would be inappropriate to graphically depict the findings (McDonald, 2009). Additionally, the denominator degrees of freedom ( $ddf$ ) listed for the nonparametric tests appear large due to the MI procedure. For a more in-depth explanation, see Allison (2001, pp. 47-50).

Table 8

*Comparison of Nonparametric and Parametric Results for Tests of BPD Dimension Score Differences Between Maltreated and Nonmaltreated Groups*

Dimension	Parametric <i>t</i> -test Pooled over imputations	Non-Parametric Kruskal-Wallis Chi-square for the Wilcoxon scores Combined over imputations with an <i>F</i> test				
	<i>t</i>	$\chi^2$ Mean	$\chi^2$ Range	<i>F</i> ( <i>df</i> , <i>ddf</i> )	Pooled <i>F</i>	<i>p</i>
Relational Aggression	4.06 ***	18.46	(15.70 , 20.68)	<i>F</i> (1, 4227)	16.77 ***	<.001
Disliked	3.93 ***	17.32	(14.46 , 19.20)	<i>F</i> (1, 9810)	17.57 ***	<.001
Negative Self	3.89 ***	18.11	(15.25 , 19.97)	<i>F</i> (1, 11446)	17.58 ***	<.001
Suicidal Ideation	3.54 ***	10.06	(3.34 , 16.08)	<i>F</i> (1,43)	5.07 *	.030
Lability/Negativity	2.99 ***	13.24	(10.59 , 15.47)	<i>F</i> (1, 3544)	12.53 ***	<.001
(Lack of) Conscientiousness	2.85 **	7.12	(6.05 , 8.42)	<i>F</i> (1, 19016)	6.95 **	.008
Upsets Others	2.75 **	10.10	(6.94 , 12.40)	<i>F</i> (1, 2228)	9.41 **	.002
Conflicted Relationship	2.24 *	6.51	(2.21 , 12.13)	<i>F</i> (1, 118)	4.49 *	.036
Negative Peer	1.84	4.07	(0.96 , 10.17)	<i>F</i> (1,92)	2.54	.114
Self-Harm	1.60	3.58	(0.90 , 6.98)	<i>F</i> (1, 120)	2.37	.126
Preoccupied	1.45	4.07	(1.25 , 7.40)	<i>F</i> (1, 196)	3.02	.084
BPD Precursors Composite	5.58 ***	34.84	(28.25 , 41.81)	<i>F</i> (1, 986)	31.44 ***	<.001

Note.  $\chi^2$  (1, *N* = 1281).

Suicidal Ideation is highlighted as the one dimension with a change in significance level between the two tests.

*ddf* appear large due to the MI procedure. For a more in-depth explanation, see Allison (2001, pp. 47-50).

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



1281) = 10.06, range (3.34, 16.08). Combining these over imputations with an  $F$  test, Pooled  $F(1, 42) = 5.07, p = .030$ . This value is more appropriate given the distribution of the scores. The normality assumption was violated for several of the dimensions, but most deviations were mild and the  $t$ -test proved robust to correctly detect between-group differences. This is demonstrated by the minimal difference in findings between the two methods. The parametric test (Student's  $t$ ) results were reported for comparison with the Rogosch and Cicchetti (2005) results. Given the skewed distributions of the dimension scores, use of the nonparametric tests is appropriate and these are the accepted results.

### **Predictors of the BPD Precursors Composite Score**

Maltreatment and maltreatment subtype along with numerous control variables were investigated as potential predictors of the BPD precursors composite score through regression analysis. Regression was deemed an appropriate method after adherence to assumptions of the linear model was established. The standardized residuals were normally distributed when frequencies were plotted for each imputation. The regression residual plots were examined and did not demonstrate any systematic patterns. The normal P-P plots of the regression standardized residual for each imputation were examined and were nearly linear. Thus, linearity, homoscedasticity, and normal distribution of errors are assumed. Durbin-Watson tests were conducted to assess for independence of errors and  $d \sim 2$  for tests across all imputations ( $M = 1.98$ ), range (1.94, 2.01). The errors are assumed to be independent.

Two linear models of predictors associated with the BPD precursors composite score were constructed using (block, forced entry) multiple linear regression in SPSS. They are summarized in Table 9. Model 1 demonstrates the influence of any maltreatment on the score:

$$\text{BPD Precursors Composite Score} = -0.42 + (0.45 * \text{Gender}) + (.34 * \text{Any Maltreatment})$$

Table 9

*Predictors of BPD Precursors Composite Score*

Variable	BPD Precursors Score	
	Model 1 $\beta$	Model 2 $\beta$
Constant	-0.42 ***	-0.40 ***
Gender	0.45 ***	0.44 ***
Any Maltreatment	0.34 ***	
Physical Maltreatment		0.27 ***
Sexual Maltreatment		0.09
Neglect		0.21 **
Emotional Maltreatment		0.03
$R^2$ Mean	.08	.08

Note.  $N = 1281$ .

$R^2$  Mean is the nonadjusted  $R^2$ , averaged across imputations.

For Gender 0=female, 1=male.

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

Being male and maltreated significantly contribute to higher scores. The model accounts for 8% of the variance between groups.

If we include maltreatment subtypes, the selected model is:

$$\text{BPD Precursors Composite Score} = -0.40 + (0.44 * \text{Gender}) + (.27 * \text{Physical Abuse}) + (.09 * \text{Sexual Abuse}) + (.21 * \text{Neglect}) + (.03 * \text{Emotional Abuse})$$

Model 2 also explains 8% of the variance, and from the inclusion of subtypes we learn that physical abuse and neglect are significantly associated with higher BPD precursors composite scores. See Table 9 for the model summaries with *p*-value ranges. For parsimony, several potential predictors that did not significantly contribute to the model were removed. These included: child race, frequency/duration of abuse, developmental stage during onset of abuse, severity of abuse, caregiver depression, household income, and caregiver education. Also, some variables used in the Rogosch and Cicchetti model could not be explored in this dataset due to lack of proxy variables or missing data. For instance, depression was the only thorough psychological assessment given to caregivers in LONGSCAN so other parent mental illness could not be included. Additionally, the Temporary Aid to Needy Families (TANF) data and other approximations of welfare data averaged 63% missing in the dataset, and so could not be used.

The potential confound of study site (East, Midwest, Northwest, South and Southwest; see the *LONGSCAN Sample* section of this paper for a description of each) with regard to sampling strategy and geographic location was investigated in greater depth. In an attempt to control for the influence of site, it was included in the model:

$$\text{BPD Precursors Composite Score} = -0.38 + (0.45 * \text{Gender}) + (.36 * \text{Any Maltreatment}) (-.02 * \text{Site}).$$

This model explains 8% of the variance, and the effect of site is not significant ( $p > .05$ ).

If we include maltreatment subtypes and site, the selected model is:

$$\text{BPD Precursors Composite Score} = -0.35 + (0.44 * \text{Gender}) + (.28 * \text{Physical Abuse}) + (.09 * \text{Sexual Abuse}) + (.22 * \text{Neglect}) + (.04 * \text{Emotional Abuse}) + (-.02 * \text{Site}).$$

This model explains 9% of the variance, and site is again insignificant ( $p > .05$ ). Also, the physical abuse and neglect subtypes remain the significantly associated with higher BPD precursors composite scores. Therefore, site was removed from the model for parsimony<sup>25</sup>.

### **Likelihood of High BPD Precursors Composite Score**

In parallel to Rogosch and Cicchetti's (2005) methodology, a high BPD precursors composite score group was identified and defined as children with a BPD precursors composite score greater than one standard deviation above the mean. 15.4% of the sample ( $n = 197$ ) made up the high score group. Table 10 provides the frequencies of each maltreatment type in the high and lower BPD precursors composite score groups.

Logistic regression was conducted in SAS using PROC LOGISTIC and PROC MIANALYZE to evaluate the probability of being in the high BPD precursors score group by maltreatment, maltreatment subtype, and gender. Sample SAS code for these procedures is in Appendix B. By raising  $e$  to the power of the resultant logistic coefficient, the odds ratio was computed for the likelihood of having a high BPD precursors composite score. An odds ratio (OR) is a measure of relative risk. An OR value of one would indicate no increased likelihood, whereas a value of two would indicate twice the likelihood.

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<sup>25</sup> Additionally, for the three sites with a control group (East, Midwest, and South), the regression analysis was conducted within each site and in one analysis including only those three sites. The results of the three-site analysis were similar to those of the five-site analysis. The results of the single-site analyses indicate there may be some site by maltreatment interaction. The results can be found in Appendix E.

Table 10

*Counts of Maltreatment Subtype by BPD Precursors Score Groups*

	High BPD ( <i>n</i> = 197)				Low BPD ( <i>n</i> = 1084)			
	Maltreated	%	Nonmaltreated	%	Maltreated	%	Nonmaltreated	%
Any Maltreatment	138	70.0	59	29.9	628	57.9	456	42.1
Sexual	24	12.2	173	87.8	110	10.1	974	89.9
Physical	71	36.0	126	64.0	232	21.4	852	78.6
Neglect	123	62.4	74	37.6	540	49.8	544	50.2
Emotional	63	32.0	134	68.0	255	23.5	829	76.5

*Note.* *N* = 1281.

Child may be categorized into zero to four subtype indicators.

Children experiencing any maltreatment were 1.7 times as likely to be in the high BPD precursors composite score group 95% CI [1.2, 2.4],  $p = .003$ . Physical abuse demonstrated the greatest impact with children experiencing this abuse more than twice as likely to have a high BPD precursors composite score, OR = 2.1, 95% CI [1.4, 2.9],  $p < .0001$ . Neglect also had a significant impact: OR = 1.7, 95% CI [1.2, 2.4],  $p = .003$ . Given the association of sexual abuse with BPD, the impact of a sexual abuse history was less than would be expected with the findings not statistically significant at the 5% level, OR = 1.2, 95% CI [0.8, 2.0],  $p = .426$ . Emotional abuse slightly increased the likelihood of being in the high BPD precursors composite score group (OR = 1.5, 95% CI [1.0, 2.2],  $p = .026$ ). These results are depicted in Figure 3.

Rogosch and Cicchetti (2005) did not find significant gender differences in likelihood to be in the high BPD precursors composite group. This study found males were more than twice as likely as females to have high BPD precursors composite scores OR = 2.3, 95% CI [1.6, 3.2],  $p < .0001$ . This ratio was driven by the gender by maltreatment interaction as demonstrated within the maltreated group: OR = 2.8, 95% CI [2.0, 3.8],  $p < .0001$  while in the nonmaltreated group, being male did not significantly impact the BPD precursor composite score, OR = 0.8, 95% CI [0.5, 1.2],  $p = .326$ . Maltreated females were nearly half as likely to have high BPD precursors composite scores OR = 0.6, 95% CI [0.4, 0.9],  $p < .001$ , and in the nonmaltreated group, being female significantly impacted the BPD precursor composite score, OR = 0.5, 95% CI [0.3, 0.8],  $p < .001$ .

## DISCUSSION

This study examined the potential precursors to borderline personality disorder in a sample of latency age (6 to 12 year-old) maltreated and nonmaltreated children. Several of the hypotheses were supported. First, children with maltreatment histories (age 0 to 6) had significantly higher BPD precursors composite scores (age 6 to 12) than children without. The two groups differed significantly on eight of the 11 precursors dimensions. In order of impact

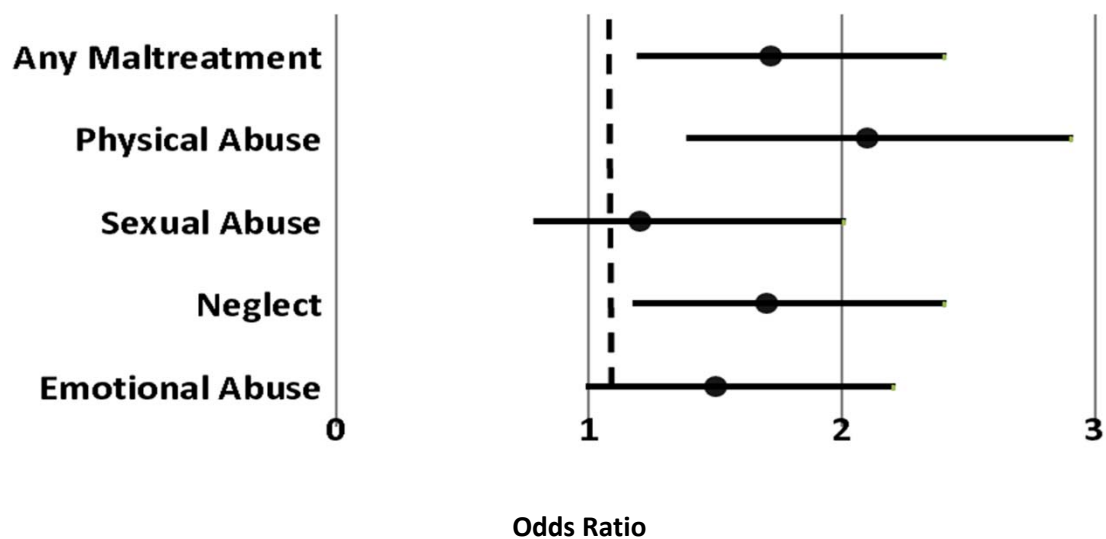


Figure 3. Likelihood of a high BPD precursors Composite score: Odds ratio by maltreatment type. BPD Precursors Composite Score is greater than one *SD* above the mean for 15.4% of sample ( $n = 197$ ). Squares represent odds ratio values. Bars show 95% confidence interval.

they are: negative self-perception, disliked by others, relational aggression, lability/negativity, upsets others, lack of conscientiousness, suicidal ideation, and conflicted relationships. We can explain 8% of the BPD precursors score variation using maltreatment history and gender. Second, maltreated children were 1.7 times more likely than nonmaltreated children to have a high BPD precursors composite score. And third, many of the findings of Rogosch and Cicchetti (2005) were replicated in this larger, multisite sample. However, the fourth hypothesis was not supported. Children who experienced neglect or emotional abuse were not as likely to have a high BPD precursors score as those with sexual or physical abuse histories. Instead physical abuse and neglect were associated with higher BPD precursors composite scores, while sexual and emotional abuse were not. The nuances of these findings are discussed below.

Although the majority of dimension scores were significantly higher among maltreated children, scores for preoccupation with mother, negative perception of peers, and self-harm were not. Impairment in each of these dimensions is theorized to precede BPD. It was particularly surprising that preoccupation with mother was not significantly different between groups given the influence the clinical literature ascribes to attachment disruption for BPD development. Carlson et al. (2009) found that self-representation in childhood may have a mediating effect between attachment disorganization and BPD symptomatology. Perhaps the findings would be different in an identified subgroup with self-representation disturbance. Many early interview studies suggested a relationship between preoccupied attachment and BPD, but later research suggests BPD is not related to one particular attachment style. However, self-report studies consistently have found a correlation between BPD and fearful avoidant or preoccupied attachment (Levy, 2005). Other research has found contradictory results with regard to attachment style leading to conclusions that the variation in empirical results may be attributable to differences in operationalization of the construct or use of an inadequate measure (Bender & Skodol, 2007; Fonagy & Bateman, 2005). In this study, there were few available



attachment-related variables and the measure chosen was a distant proxy (at the construct, not item level) for the measure in the original study. Additionally, Rogosch and Cicchetti (2005) found the between-groups differences on this dimension insignificant. Thus the unexpected results may be due to use of an inadequate instrument.

Although the majority of the findings of Rogosch and Cicchetti (2005) were replicated in this study, results differed on three dimensions: negative self-perception, self-harm, and suicidal ideation. Rogosch and Cicchetti did not find negative self-perception to significantly differ between groups, whereas this study did. The two studies used similar instruments to assess this construct, and both measures ask about self-competencies (e.g. “Are you good at working with other kids at school?” or “I am good at helping other kids to feel better when they are upset”). In this study the instrument referenced the school setting, while the original study assessed the self in a more general social context. It is possible that the between-study differences are attributable to differences between self-perceptions in different contexts with distinct expectations. Consistent with this theory, Harter, Waters, and Whitesell (1998) found that adolescents’ evaluation of their own self-worth is context-dependent: differences can be found based on the presence of teachers, parents, and peers by gender.

This study found suicidal ideation and not self-harm differed significantly between groups whereas Rogosch and Cicchetti (2005) found the reverse. The single suicidal ideation question was similar between studies and the child was the respondent. Children may have been more reluctant to reveal suicidal ideation in a novel environment, or may have experienced less transient suicidal ideation due to an amusing camp environment. For the self-harm dimension, the exact same question was used in both studies. Teachers responded to the item in this study, while camp counselors did so in the original. Unfortunately, the self-harm item, “Deliberately harms self or attempts suicide,” was confounded with the separate dimension of

suicidal ideation. Perhaps there was an aspect of the camp environment that made self-harm more plain to the counselors than it would be to a teacher (e.g. summer clothing).

For the BPD precursors composite score and all dimensions except negative self-perception and suicidal ideation, the effect sizes were smaller in this study than for Rogosch and Cicchetti (2005). This may be due to the averaging of dimension scores over time, rather than assessing the child at only one point. Overall however, the pattern of findings is consistent with the original study.

Physically abused children in this sample were 2.1 times as likely to have a high BPD precursors score, and neglected children 1.7 times as likely. The significance of physical abuse and neglect, and lack of significance of sexual abuse are contrary to the clinical literature. The low impact of sexual abuse is surprising given the high report rates of CSA in BPD populations. Additionally, emotional abuse was expected to have an impact based on clinical theory and prior research linking verbal abuse to BPD (Johnson et al., 2001), and it did not. These distinctive findings parallel the results of Widom et al. (2009). See the section entitled *Prospective Research on Maltreatment and BPD* for a description of the study. Widom et al. (2009) found more abused and neglected children met the criteria for BPD diagnosis, and among them physical abuse and neglect were the strongest predictors. The samples for both the current study and the Widom et al. (2009) study differ from traditional clinical and retrospective research samples in that they are comprised of children for whom an allegation of sexual abuse was made to officials at a young age. In many (if not most) such cases the sexual abuse should cease following CPS and/or criminal justice intervention. Many people in clinical samples or retrospective studies first disclose child maltreatment as an adult, and for these individuals CSA may have longer duration and impact more developmental stages. Another possible explanation for the lack of significance of sexual abuse is that retrospective research and clinical work are contaminated by inaccuracy due to memory problems, distortion, and exaggeration or

confabulation of CSA history. Finally, it is possible the BPD precursors composite is not actually measuring precursors to BPD. The validity of the BPD precursors composite score needs to be assessed through longitudinal research to determine whether children who have high composite scores are more likely to develop BPD in adulthood.

Despite the 3:1 female to male incidence of BPD in clinical samples, in this study males had higher BPD precursor scores than females<sup>26</sup>. Many of the dimensions were made up of externalizing symptoms. Given that boys typically display more externalizing symptoms than girls, this could explain the higher scores. Rogosch and Cicchetti (2005) found that the BPD precursors composite correlates significantly with both internalizing ( $r = .25, p < .001$ ) and externalizing ( $r = .71, p < .001$ ) problems subscales on the Achenbach TRF, but the stronger association of the score with the externalizing symptoms may be influencing the findings. The interaction between maltreatment and gender also supports this hypothesis. Maltreated males were 2.8 times as likely to have a high BPD precursors score, while nonmaltreated males were not more likely to have a high score. Among a sample of adolescents, Bradley, Conklin, and Westen (2005) found the expression of BPD to be clearly gendered with internalizing and dramatic symptoms among girls and externalizing and angry expressions among boys. Additionally, aggression begins earlier in boys, while girls may not demonstrate impulsivity until adolescence (Paris, 2005). Finally, the overrepresentation of BPD among females has not always been supported in child manifestations of symptomatology (Paris, 2003; Sharp & Romero, 2007).

There have been calls to do BPD research that prospectively investigate the etiology, the role of maltreatment, gender differences, precursors, and trajectory (Carlson, Egeland, & Sroufe, 2009; Chanen et al., 2008; Lenzenweger & Cicchetti, 2005). This study will contribute to

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<sup>26</sup> Widom et al. (2009) found this as well.

the fields of psychology and child maltreatment is its response to these solicitations. Other strengths include the large sample of maltreated children, and the close-matched proxy variables replicating the Rogosch and Cicchetti (2005) study model.

### **Limitations**

Use of proxy variables can be a limitation in secondary analysis. This study did not assess child BPD symptoms or features although measures of them do exist<sup>27</sup>, nor did it address biological or genetic influences, because these variables were not present in the data set. Data on welfare and on parent mental illness were incomplete and also could not be analyzed. A thorough review of the literature demonstrated that other pertinent variables to explore include separation from caregiver (Bandelow et al., 2005; Bradley, Jenei, & Westen, 2005; Crawford, Cohen, Chen, Anglin, & Ehrensaft, 2009; Guzder, Paris, Zerkowicz, & Feldman, 1999; Levy, 2005), suboptimal parenting (Winsper, Zannarini, & Wolke, 2012), BPD features of parents (Johnson, Cohen, Chen, Kasen, & Brook 2006), and parental overcontrol (Levy, 2005).

The study sample included children at elevated risk for maltreatment, but the subjects were not chosen from a representative probability sample. The benefit of choosing the pooled LONGSCAN high-risk sample was in obtaining higher rates of potential BPD, given that the population prevalence is less than two percent. The limitation was the potential introduction of confounding variables related to region and sampling strategy by site. It is imperative to be cautious in interpreting the findings from this study. The results cannot be generalized to the US population. For example, the odds ratio findings do not mean that physically abused children are twice as likely as nonmaltreated peers to have a high BPD precursors composite score; only that they are twice as likely as the at-risk children in this sample who did not have allegations of maltreatment.

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<sup>27</sup> e.g. the Borderline Personality Features Scale for Children (BPFS-C) (Crick et al., 2005).

Diagnosis of PDs will likely employ a hybrid categorical-dimensional model in the near future, with release of the *DSM-5*. At the time of this research, the *DSM-IV-TR* was employed because use of a modified diagnostic system would have been speculative. The impact the impending change in BPD symptom criteria will have on diagnosed persons, clinicians, researchers, and past research is uncertain.

## CONCLUSIONS

The results replicated many of the Rogosch and Cicchetti (2005) findings in a sample three times larger, suggesting that maltreated children bear greater vulnerability to BPD development. The ability to identify the precursors to BPD could inform research on personality, developmental psychopathology, child maltreatment, stress, and attachment, and may lay the groundwork for identification of ages where clinical researchers could investigate employing intervention strategies. BPD is notoriously treatment resistant, and the symptomatology does not present until adolescence. Early markers may facilitate early interventions that could be tailored to meet developmental stage needs with regard to cognitive level, inclusion of family in treatment, and other factors (Crick et al., 2007).

### **Implications for Future Research**

Future research should address which children at risk for BPD actually develop the disorder in adolescence and adulthood. The LONGSCAN dataset includes data for ages 14, 16, and 18 that was not yet available at the time of this study. Although no personality assessments were conducted at these ages, this researcher intends to use the data from the Diagnostic Interview Schedule for Children to seek personality disorder traits at age 18 using in the method developed by Swartz, Blazer, George, and Winfield (1989). This research will assess the construct validity of the BPD precursors composite thereby providing insight into the etiology of BPD.

## APPENDIX A

### **DSM-IV-TR Diagnostic Criteria for Borderline Personality Disorder**

Text taken directly from the manual (APA, 2000).

*A pervasive pattern of instability of interpersonal relationships, self-image and affects, and marked impulsivity beginning by early adulthood and present in a variety of contexts, as indicated by five (or more) of the following:*

- (1) Frantic efforts to avoid real or imagined abandonment. **Note:** Do not include suicidal or self-mutilating behavior covered in Criterion 5*
- (2) A pattern of unstable and intense interpersonal relationships characterized by alternating between extremes of idealization and devaluation*
- (3) Identity disturbance: markedly and persistently unstable self-image or sense of self*
- (4) Impulsivity in at least two areas that are potentially self-damaging (e.g., spending, sex, substance abuse, reckless driving, binge eating). **Note:** Do not include suicidal or self-mutilating behavior covered in Criterion 5*
- (5) Recurrent suicidal behavior, gestures, or threats, or self-mutilating behavior.*
- (6) Affective instability due to a marked reactivity of mood (e.g., intense episodic dysphoria, irritability, or anxiety usually lasting a few hours and only rarely more than a few days)*
- (7) Chronic feelings of emptiness*
- (8) Inappropriate, intense anger or difficulty controlling anger (e.g., frequent displays of temper, constant anger, recurrent physical fights)*
- (9) Transient, stress-related paranoid ideation or severe dissociative symptoms*

## APPENDIX B

### **SAS Syntax for Multiple Imputation**

```
proc mi data=Bpd_long.BPD_LONGSCANtemp nimpute=10
out=Bpd_long.Imputed_bpd_longTemp seed=306075001;
var z_AGG z_LAB z_CON z_UpO z_Dis z_CNS z_SH z_NEP z_ATT z_SI z_NES;
run;
```

### **Sample SAS Syntax for Nonparametric Tests**

```
proc npar1way data=bpd_long.imputed_bpd_ls_f11 wilcoxon;
class m012ia;
var z_agg;
by _Imputation_;
run;
```

### **Paul Allison's (2010) MACRO COMBCHI SAS Syntax**

```
%macro combchi(df=,chi=);
proc iml;
  df=&df;
  g2={&chi};
  m=ncol(g2);
  g=sqrt(g2);
  mg2=sum(g2)/m;
  r=(1+1/m)*(ssq(g)-(sum(g)**2)/m)/(m-1);
  f=(mg2/df - r*(m-1)/(m+1))/(1+r);
  ddf=(m-1)*(1+1/r)**2/df**(3/m);
  p=1-probf(f,df,ddf);
  print f df ddf;
  print p;
run;
%mend combchi;
```

### **Sample SAS Syntax for Logistic Regression**

```
proc logistic data=Temp_bpd.bpd_1281;
model high_composite_sd1(event='1') = M06IA/ covb;
by _Imputation_;
ods output ParameterEstimates=model_anymaltx
      covb=anymaltxcov;
run;
proc mianalyze parms=model_anymaltx
      covb(effectvar=stacking)=anymaltxcov;
modeleffects Intercept M06IA;
run;
```

## APPENDIX C

### *Proxy Variable Map of Lability/Negativity Dimension*

Study	Rogosch & Cicchetti (2005)	Wach (2013): LONGSCAN Data
Measure	Lability/negativity subscale of the Emotion Regulation Checklist (ERC)	Achenbach Teacher's Report Form (TRF)
Type	15 items (of 24)	11 items (of 118)
Respondent	Counselors	Teacher(s)
Age	Between ages 6 and 12	6, 8, 10 (optional by site), and 12
Score	Items aggregated to compute scores. Scores of respondent counselors averaged.	Items summed to compute score. Score averaged over time.
Scale	4 point Likert ( <i>rarely, sometimes, often, almost always</i> )	3 point Likert ( <i>not true as far as you know, somewhat or sometimes true, very true or often true</i> )
Psychometrics	inter-rater reliability 0.84	-
Questions	Transitions well from one activity to another; doesn't become angry anxious, distressed or overly excited when moving from one activity to another.	-
	Can recover quickly from upset or distress (for example, doesn't pout or remain sullen, anxious, or sad after emotionally distressing events.)	Sulks a lot.
	Is easily frustrated.	Demands must be met immediately, easily frustrated.
	Is prone to angry outbursts.	3 items: Temper tantrums or hot temper. Screams a lot. Argues a lot.
	Is able to delay gratification.	-
	Takes pleasure in the distress of others (for example, laughs when another person gets hurt or punished; seems to enjoy teasing others).	2 items: Teases a lot. Cruelty, bullying or meanness to others.



(Questions Continued)	Can modulate excitement (for example doesn't get "carried away" in high energy play situations or overly excited in inappropriate contexts).	-
	Is prone to disruptive outbursts of energy and exuberance.	5 items: Gets in many fights. Talks out of turn. Explosive and unpredictable behavior. Talks too much. Unusually loud.
	Responds angrily to limit-setting by adults.	Defiant, talks back to staff.
	Is overly exuberant when attempting to engage others in play.	2 items: Can't sit still, restless or hyperactive. Showing off or clowning. [Explosive and unpredictable behavior. Talks too much. Unusually loud.]
	Responds negatively to neutral or friendly overtures by peers (for example, may speak in an angry tone of voice or respond fearfully).	-
	Is impulsive.	Impulsive, acts without thinking.
	Displays exuberance that others find intrusive or disruptive.	Disrupts class discipline. [Disturbs other pupils. <sup>a</sup> ]
	Displays negative emotions when attempting to engage others in play.	2 items: Stubborn, sullen, or irritable. Unhappy, sad depressed. [Argues a lot.]

*Note.* Four constructs were not included in the Wach (2013) measure because no viable proxy variable was identified in the LONGSCAN dataset.

Items in brackets are matched to another item, but also relate to this item construct.

<sup>a</sup> This item was used in the upsets others dimension and so was not used for this measure.

## APPENDIX D

### *Proxy Variable Map of (Lack of) Conscientiousness Dimension*

Study	Rogosch & Cicchetti (2005)	Wach (2013): LONGSCAN Data
Measure	California Child Q-Set (CCQ) to obtain Five Factor Model Conscientiousness Scale Score	Achenbach Teacher's Report Form (TRF)
Type	9 item subscale (100 items in sort, 48 used in FFM)	3 items (of 118) selected for this study
Respondent	2 counselors per subject	Teacher(s)
Age	Between ages 6 and 12	6, 8, 10 (optional by site), and 12
Score	Items reversed and aggregated to compute scores. Scores of respondent counselors averaged.	Items reversed and summed to compute score. Score averaged over time.
Scale	9 point Likert from 1 ( <i>extremely uncharacteristic or negatively salient</i> ) to 9 ( <i>extremely uncharacteristic or salient</i> )	7 point Likert: 1 ( <i>Much Less</i> ), 2 ( <i>Somewhat less</i> ), 3 ( <i>Slightly less</i> ), 4 ( <i>About average</i> ), 5 ( <i>Slightly more</i> ), 6 ( <i>Somewhat more</i> ), 7 ( <i>Much more</i> )
Psychometrics	$\alpha$ .73 to .78 Inter-rater reliability .82	-
Questions	He finds ways to make things happen and get things done.	-
	He is determined in what he does; he does not give up easily.	Compared to Typical Pupils of the Same Age... How hard is he/she working?
	He has high standards for himself. He needs to do very well in the things he does.	-
	He is neat and orderly in the way he dresses and acts.	Compared to Typical Pupils of the Same Age... How appropriately is he/she behaving?
	He pays attention well and can concentrate on things.	Compared to Typical Pupils of the Same Age... How much is he/she learning?
	He plans things ahead; he thinks before he does something. He "looks before he leaps."	-
	He can be trusted; he's reliable and dependable.	-

(Questions Continued)	He's able to do many things well; he is skillful.	[Compared to Typical Pupils of the Same Age... How much is he/she learning?]
	He thinks about his actions and behaviors; he uses his head before doing or saying something.	[Compared to Typical Pupils of the Same Age... How appropriately is he/she behaving?]

*Note.* Three constructs were not included in the Wach (2013) measure because no viable proxy variable was identified in the LONGSCAN dataset.

Items in brackets are matched to another item, but also relate to this item construct.

# APPENDIX E

Table E

## *Predictors of BPD Precursors Composite Score within Sites*

		BPD Precursors Score			
	Variable	3 Site $\beta$	East Cohort $\beta$	Midwest Cohort $\beta$	South Cohort $\beta$
Model 1	Constant	-0.42 ***	-0.35 ***	-0.36 **	-0.49 ***
	Gender	0.45 ***	0.46 ***	0.42 **	0.23 *
	Any Maltreatment	0.34 ***	0.21	0.19	0.53 ***
	$R^2$ Mean	.08	.07	.05	.08
Model 2	Constant	-0.40 ***	-0.35 ***	-0.38 **	-0.47 ***
	Gender	0.44 ***	0.47 ***	0.44 **	0.24
	Physical Maltreatment	0.27 **	0.29	0.14	-0.06
	Sexual Maltreatment	0.09	0.07	0.47	0.18
	Neglect	0.21 **	0.17	0.15 **	0.47 *
	Emotional Maltreatment	0.03	-0.12	-0.02	0.09
	$R^2$ Mean	.08	.07	.07	.07

*Note.*  $N = 1281$ .

The 3 site analysis includes the East, Midwest, and South cohort samples.

For Gender 0=female, 1=male.

$R^2$  Mean is the nonadjusted  $R^2$  averaged across imputations.

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

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