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# Do Adverse Childhood Experiences Mediate the Relationship Between Autistic Traits and Borderline Personality Traits?

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Abstract

*Background:* Previous studies have found comorbid autism spectrum disorder (ASD) and borderline personality disorder (BPD) diagnoses in clinical samples, higher autistic traits in individuals with BPD compared to control groups, and co-occurrence of autistic traits and BPD traits in community samples. Adverse childhood experiences (ACEs) are highly prevalent among autistic individuals and individuals diagnosed with BPD. However, to date, cumulative ACEs have been neglected as a potential mediator of the association between ASD and BPD. The present preliminary cross-sectional study examined whether retrospective self-reported ACEs, before 18 years of age, explained the relationship between current self-reported autistic traits and current self-reported BPD traits in a community sample.
*Method:* Two hundred and forty-two young adults between the ages of 18 and 30 ($M_{age}$ = 24.60; *[SD = 3.58]*; 52% female) completed the Autism Quotient, the Five Factor Borderline Inventory-Short Form, and the Adverse Childhood Experiences Questionnaire.
*Results:* Results of path analysis showed that retrospective self-reported ACEs, explained 15% of the relationship between autistic traits and BPD traits in this sample. However, after controlling for current self-reported depressive symptoms, the percentage explained by ACEs decreased to 10% and the effect of autistic traits on ACEs were no longer significant.
*Conclusions:* These results extend the literature by demonstrating that a moderate relationship between autistic traits and BPD traits exists beyond clinical populations. Findings can be used to encourage researchers and clinicians to screen for autistic traits and consider ASD as a primary diagnosis when presented with an adult with a history of ACEs, interpersonal problems, emotion dysregulation, unstable self-identity, and self-harm or suicidality rather than solely a diagnosis of BPD. In the present sample, self-reported depressive symptoms were a stronger predictor of ACEs than autistic traits. It is possible that the present study's measure of ACEs may have been too narrow to capture the types of adversities individuals with higher autistic traits are more likely to experience; thus, future studies should consider using a broader measure of ACEs.

*Keywords:* autism spectrum disorder, Asperger's, borderline personality disorder, adverse childhood experiences, trauma, adults

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by

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# Do Adverse Childhood Experiences Mediate the Relationship Between Autistic Traits and Borderline Personality Traits?

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by persistent deficits in social communication and social interaction, and restricted repetitive patterns of behavior, interests, or activities beginning in childhood and continuing into adulthood (American Psychiatric Association [APA], 2013). It is estimated that 1% to 2% of the population in the United States (U.S.) has an autism diagnosis, with similar estimates between children and adults (Maenner et al., 2020). Borderline personality disorder (BPD) is characterized by impaired interpersonal functioning, impulsive behaviors, and variability in mood and self-image with an onset in adolescents or early adulthood (APA, 2013). It is estimated that 1.4% to 2.7% of the population in the U.S. has a BPD diagnosis (Lenzenweger et al., 2007; Morgan & Zimmerman, 2018, p, 173 - 196). Despite differences in conceptualization and developmental considerations between these two disorders, studies reporting similarities in clinical presentations of individuals diagnosed with ASD and BPD date back to over two decades ago (Fitzgerald, 2005; Pelletier, 1998).

Autistic adults and adults with BPD both display a pervasive pattern of interpersonal dysfunction (Domes et al., 2009; Tobin et al., 2014), difficulty regulating emotions (Berkovits et al., 2017; Cai et al., 2018; Samson et al., 2012), deficits accurately perceiving others' intentions (Dziobek et al., 2006; Enticott et al., 2014; Spezio et al., 2007), high prevalence of self-harm and suicidality (Cassidy et al., 2014; Maddox et al., 2017), and a history of traumatic experiences in childhood (Bozzatello et al., 2020; Humphrey & Symes, 2010; Mandell et al., 2005b). More recently, interest in the associations between ASD and BPD has grown with studies finding

comorbid ASD and BPD diagnoses in clinical samples (Rydén et al., 2008), higher autistic traits in individuals with BPD compared to control groups (Dell'Osso et al., 2018; Dudas et al., 2017), and co-occurrence of autistic traits and BPD traits in community samples (Chabrol & Raynal, 2018). Despite known associations between ASD and BPD, potential underlying mechanisms that may explain the relationship between ASD and BPD remain under-researched and present a gap in the literature.

Adverse childhood experiences (ACEs) are highly prevalent among autistic individuals (Berg et al., 2016) and individuals diagnosed with BPD (Porter et al., 2020). ACEs refer to the exposure to traumatic childhood experiences such as emotional, physical, and sexual abuse, neglect, and "household challenges" generally characterized as parental absence or divorce, parental incarceration, and family mental illness (Felitti et al., 1998). Despite the high prevalence of ACEs in ASD and BPD, cumulative ACEs have been neglected as a potential mediator of the association between ASD and BPD. Specifically, it is unclear whether greater cumulative childhood traumatic experiences explain the co-occurrence of ASD and BPD diagnoses (Dudas et al., 2017), symptoms (Rydén et al., 2008), and traits (Chabrol & Raynal, 2018).

The question of this association is important because the ecobiodevelopmental framework illustrates how early adverse experiences and environmental influences, in the absence of protective factors (e.g., positive relationship with caregivers, emotional support, invalidation), can leave a lasting mark on the genetic predispositions that affect emerging brain architecture and long-term physical and emotional health (Shonkoff et al., 2012). The absence of protective factors such as invalidation in childhood has been associated with emotional dysregulation, interpersonal dysfunction, and identity impairment in adulthood (Lambardo et al., 2022; Reeves et al., 2010). Invalidation has often been referred to as experiences that include

emotional, sexual, and physical abuse, extensive criticism, and minimizing the emotional experience of the individual (Crowell et al., 2009). Greater cumulative ACEs have been found to be predictors of interpersonal problems (Poole et al., 2018), emotion dysregulation (Thurston et al., 2018), deficits in perspective-taking (Simon et al., 2019), and greater suicide attempts (Fuller-Thomson et al., 2016). Notably, these characteristics are the core characteristics of BPD, and ACEs have been found to be one of the highest predictors of developing BPD in adulthood (Porter et al., 2020). Previous studies have consistently demonstrated that autistic children have fewer social support compared typically developing children (Billstedt, Gillberg, & Gillberg, 2005).

Thus, the present study contends that autistic children may be less likely to have their emotions and experiences validated by others when faced with childhood adversity, conceivably increasing their risk of developing comorbid BPD in adulthood. The present preliminary study aims to examine whether cumulative ACEs explain the relationship between ASD and BPD by assessing autistic traits, cumulative ACEs, and BPD traits in a community sample as a stepping-stone towards directly examining this relationship in autistic individuals. The present study hypothesizes that higher autistic traits would be associated with higher cumulative ACEs, and higher cumulative ACEs would be associated with higher BPD traits. Additionally, it is hypothesized that higher autistic traits would be associated with higher BPD traits and that this relationship would be mediated by cumulative ACEs. Lastly, the present study contends that the results will be generalizable to an autistic population.

**Autistic Traits**

A broader spectrum conceptualization of autism was adopted in the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (5th ed.; DSM-5; APA, 2013) which

combined four diagnoses into a single label of ASD, making it a heterogeneous disorder with many clinical presentations. Meeting criteria for an ASD diagnosis requires that three symptoms of social communication deficits be present *and* that at least two of four symptoms of restricted or repetitive patterns of behaviors be present. Specifically, social communication symptoms include deficits in social-emotional reciprocity; nonverbal communicative behaviors; and in developing, maintaining, and understanding relationships. Restricted or repetitive symptoms include stereotyped or repetitive motor movements, use of objects, or speech; insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior; highly restricted, fixated interest that are abnormal in intensity; and hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of environment. In addition to the various combinations of symptoms that can make up an ASD diagnosis, ASD may also be present in individuals with and without intellectual disabilities (intelligence quotient [IQ] < 70) and in individuals whom are both verbal and non-speaking, further making it a complex disorder (see Fakhoury, 2015 for full review of the clinical features of ASD). Compared to typically developing adults, autistic adults report lower quality of life and well-being on average (Bishop-Fitzpatrick et al., 2018; Dijkhuis et al., 2017). Considering this, a diagnosis of ASD in adults is highly comorbid with major depressive disorder (Joshi et al., 2013), with a lifetime prevalence of 42% (Hollocks et al., 2019).

While ASD is fairly rare in the general population, there is considerable evidence that a milder phenotype of ASD (hereafter termed *autistic traits*), referred to as "Broad Autism Phenotype" (BAP), is normally distributed within the general population (Constantino & Todd, 2005; Happé et al., 2006; Robinson et al., 2011). BAP refers to the presence of milder autistic traits that are qualitatively similar to the core characteristics of ASD: social deficits,

communication deficits, and repetitive interests or behaviors, but do not produce high enough levels of functional impairment to warrant a diagnosis of ASD (Losh & Piven, 2007). The BAP was initially discovered and termed when researchers found that first-degree relatives (i.e., biological parents and siblings) of autistic individuals had higher autistic traits than first-degree relatives of typically developing individuals (Bailey et al., 1995; Piven et al., 1994; Piven et al., 1997). While studies have found that autistic traits are most prevalent in first-degree relatives of individuals diagnosed with ASD (Pisula & Ziegart-Sadowska, 2015; Rubenstein & Chawla, 2018), autistic traits extend beyond first-degree relatives and present continuously in the general population (Constantino & Todd, 2005). This observation has allowed researchers to explore associations of autistic traits through nonclinical community samples indirectly. In other words, the fact that autistic traits are normally distributed in the population has been one way that autism research has continued to evolve, despite autism being a low prevalence disorder.

One of the most commonly used measures to assess autistic traits is the Autism Quotient (AQ; Simon Baron-Cohen et al., 2001). The AQ is a 50-item self-report questionnaire designed to measure the severity of autistic traits among adults of at least average intelligence across the lifespan. The AQ is frequently administered to clinical and non-clinical samples, and a systematic review (Ruzich et al., 2015a) detailing 6,934 nonclinical participants and 1,963 matched autistic participants, all presumed to be in the average intelligence range, provides mean AQ score norms for both groups. While the AQ's focus on individuals of at least average intelligence may raise questions regarding the generalizability of findings to the broad range of abilities noted in autistic individuals, recent data from the CDC suggests that only 35.2% of autistic children in the U.S. had an intellectual disability (IQ < 70), while the majority were in the borderline (23.1 %; IQ = 71 – 85) and average to above average ranges (41.7%; IQ > 85;

CDC; Maenner et al., 2021). This data demonstrates that autistic individuals are more likely to be within the borderline to average range of intellectual functioning. Therefore, the generalizability between nonclinical populations and autistic populations becomes less of a limitation than previously thought.

Though assessing normally distributed autistic traits in nonclinical populations is not equivalent to directly assessing autistic populations from across the spectrum, studying autistic traits in community samples as an indirect measure of autism has served as an alternative to directly assessing autistic populations and has aided in evolving the conceptual understanding of ASD. For instance, early observations of milder autistic characteristics in mothers of autistic children (i.e., limited interest in social relationships and rigid behaviors; Kanner, 1949), were mistaken as an indication that autism was caused by the environment, and consequently contributed to the "refrigerator mother" theory of autism (Kanner, 1949). Within this interpretation, autism was thought to be caused by a lack of adequate mother-child attachment due to the mother's limited interest in forming a relationship and engaging with the child. However, studies assessing autistic traits in nonclinical populations found higher concordance rates of autistic traits in monozygotic twins (60% to 96%; Bailey et al., 1995; Steffenburge et al., 1989) compared to dizygotic twins and other first-degree family members (0% to 50%; Bolton et al., 1994; Dawson et al., 2007), informing the prominent role of genetics, rather than environment, on autism.

The role of genetics is just one example, among many, of how assessing autistic traits in the general population as an indirect measure of autism has contributed to researchers' and clinicians' understanding of autism over time. More recent examples include findings on sexual identity (Jones et al., 2012; Kallitsounaki & Williams, 2022), sexual orientation (Byers et al.,

2013; Weir et al., 2021), and sensory processing (Kaplan-Kahn et al., 2021; Robertson & Simmons, 2013) among autistic individuals, which were examined in nonclinical samples through the assessment of autistic traits, Similar to previous research, the present preliminary study aims to assess the role of ACEs on the relationship between autism and BPD by assessing autistic traits in a community sample as an indirect measure of autism. The present study contends that the results could further increase researchers' and clinicians' understanding of autism, a disorder that has evolved overtime.

Autism is a relatively new disorder, and the understanding of autism has drastically changed from when it was first officially recognized as a disorder in 1980 with the publication of DSM-III (APA, 1980). While autism is typically diagnosed in childhood, there has been a recent increase in individuals first being diagnosed with autism in adulthood (Happé et al., 2016; Lai & Baron-Cohen, 2015) and studies have found that individuals with less severe forms of autism who lack noticeable symptoms such as obvious language deficits, are often undiagnosed, misdiagnosed, or diagnosed later in adulthood (Bargiela et al., 2016; Tebartz van Elst et al., 2013). Lai & Baron-Cohen (2015) suggest that the growth of community awareness of autism and expanded diagnostic criteria and conceptualization of autism over the past three decades have resulted in the development of a "lost generation" whose autism went undiagnosed until adulthood (Lai & Baron-Cohen, 2015, p. 1013). For instance, the adults who now meet DSM-5 criteria for autism would likely not have been identified as autistic by their parents, teachers, or mental health professionals in the 1990s when they were school-aged children. Thus, there is a possibility that many autistic school-aged children in the 1990s may have been unrecognized to have a neurodevelopmental disability and, consequently, did not receive appropriate support and services. This is a problem because being diagnosed with autism in adulthood has been

associated with increased mental health problems related to experiencing life-long stress in various domains of functioning (Magiati et al., 2014). In a qualitative study by Bargiela et al. (2016), late-diagnosed autistic individuals reported that they often engaged in passive behavior in their interpersonal interactions that led to unhealthy relationships and potentially dangerous situations. Due to a desire to feel accepted, participants acknowledged attempting to avoid conflict, sometimes resulting in unwanted sexual interactions and advances by others. These findings were supported by Roberts and colleagues (2015), who found that individuals with higher autistic traits were more likely to have been sexually, emotionally, or physically abused in childhood, increasing the likelihood of comorbid psychopathology.

**Autism and Adverse Childhood Experiences**

Previous research suggests that autistic individuals are at increased risk of ACEs compared to typically developing peers (Berg et al., 2016; Kerns et al., 2015; Mandell et al., 2005). In the present study, ACEs refers to the exposure of emotional, physical, and sexual abuse, neglect, or household challenges ( i.e., family mental illness, parental loss or divorce, parental incarceration; Felitti et al., 1998) prior to the age of eighteen. It has been hypothesized that the core characteristics of autism (e.g., social deficits, communication deficits, and repetitive interests or behaviors) may predispose autistic children to trauma exposure (Kerns et al., 2015). For instance, an autistic child's decreased ability to accurately perceive the intentions of others (e.g., Theory of Mind; Baron-Cohen et al., 2001) may impact their ability to detect unsafe individuals or unsafe environments (Zeitlin et al., 1993; DePrince, 2005), increasing their risk for physical and sexual abuse (Mandell et al., 2005). Further, it is possible that parents of autistic children may misperceive the differences in their child's social communication (e.g., lack of

reciprocity in social interactions, limited eye-contact; APA, 2013) and their child's resistance to changes in routines as oppositional, consequently increasing parenting stress.

Parenting stress in autistic parents have been associated with increased use of harsh and punitive discipline strategies (Shawler & Sullivan, 2015), potentially increasing autistic children's vulnerability to physical and emotional abuse. Previous studies have found that parents of autistic children experience higher levels of parenting stress (Hayes & Watson, 2013), greater mental health problems (Benson, 2006; Ingersoll et al., 2011), and higher rates of divorce (Hartley et al., 2011) compared to parents of typically developing children and children with other developmental disabilities. Data from the 2011 – 2012 U.S. National Survey of Children's Health (NSCH), a nationwide, population-based, cross-sectional survey emailed or paper mailed to parents, revealed that children of parents who reported that their child had ever received a diagnosis of autism, endorsed a greater number of household ACEs (e.g., parental absence, parental incarceration, family mental illness, domestic violence, and social factors such as poverty, community violence, or homelessness) compared to general population of children whose parents reported that their child had never received an autism diagnosis (Berg et al., 2016; Kerns et al., 2015). Specifically, they found that an autism diagnosis was associated with higher prevalence of exposure to parental mental illness, parental divorce, parental substance use, neighborhood violence, and higher overall cumulative ACE scores. Similarly, Zarei et al (2021) analyzed the 2016 – 2019 U.S. NSCH data to examine the associations between household ACEs and common childhood neurodevelopmental and behavioral health conditions and found a significant association between autism diagnosis and greater cumulative ACEs.

Consistent with research in the field of typically developing individuals, among autistic children, an increased number of cumulative ACEs have been found to be associated with an

elevated risk for depression and several medical health problems (Rigles, 2017). Specifically, one study found that 90% of autistic children with clinically significant levels of mood symptoms reported at least one ACE, compared to 40% of autistic children without clinically significant levels of mood symptoms. These findings suggest strong associations between exposure to adverse events and trauma and the presence of depressive symptoms; thus, the present study aims to control for depressive symptoms by adding depression severity as a covariate. Prolonged exposure to ACEs have been found to alter neural structures and sensory systems that are fundamental to the regulation of emotions and behaviors and executive functioning (e.g., inhibitory control, working memory, flexibility), contributing to the development of psychopathology and somatic illness in adulthood (Ford & Courtois, 2009; van der Kolk et al., 2005). Furthermore, greater cumulative ACEs have been found to be predictors of interpersonal problems (Poole et al., 2018), emotion dysregulation (Thurston et al., 2018), deficits in perspective-taking (Shamay-Tsoory, 2011), and greater suicide attempts (Fuller-Thomson et al., 2016). Notably, these characteristics are also commonly observed in individuals diagnosed with BPD.

**Borderline Personality Disorder and Adverse Childhood Experiences**

ACEs have been identified as risk factors for the development of personality disorders (PDs) in adulthood (Battle et al., 2004; Johnson et al., 1999). Battle et al (2004) found that in a study of 600 patients diagnosed with various PDs, 73% of individuals reported experiencing childhood abuse (e.g., emotional, verbal, physical, sexual) and 82% reported experiencing childhood neglect (e.g., physical, emotional withdrawal, inconsistent treatment, denial of feelings, failure to protect). Consistent with previous findings (Zanarini et al., 1997), they also found that individuals diagnosed with BPD routinely reported higher rates of both childhood

abuse and neglect compared to other PD diagnoses. BPD is characterized by impaired interpersonal functioning, impulsive behaviors, and variability in mood and self-image with an onset in adolescence or early adulthood (APA, 2013). Similar to an autism diagnosis, a BPD diagnosis has various clinical presentations also making it a complex and heterogeneous disorder (APA, 2013). BPD has an estimated prevalence of 1.4 % to 2.7% in the U.S. general population (Lenzenweger et al., 2007; Morgan & Zimmerman, 2018, p, 173 - 196); nonetheless, BPD is estimated to be present in 6.4% of primary care clinics (Gross et al., 2002), 9.3% of psychiatric outpatient clinics (Zimmerman et al., 2005), and 20% of psychiatric inpatient clinics (APA, 2013).

Individuals diagnosed with BPD are thirteen times more likely to report ACEs than nonclinical controls and three times more likely to report ACEs than other psychiatric groups (Porter et al., 2020). Studies have found that ACEs were retrospectively reported by between 30% to 90% of individuals diagnosed with BPD (Battle et al., 2004; Zimmerman et al., 2005) and longitudinal studies of children have found that greater ACEs (e.g., physical abuse, sexual abuse, and neglect) were associated with greater BPD traits and BPD diagnoses in adolescence and adulthood (Alberdi-Paramo et al., 2020a; Bozzatello et al., 2020; Widom et al., 2009). While deficits in interpersonal relationships, perspective-taking, and emotion regulation often experienced by autistic individuals are a result of the core characteristics of autism (APA, 2013), it is hypothesized that these same deficits in individuals with BPD are, in part, a result of ACEs and the caretakers' role in ACEs.

Psychodynamic theories hypothesize that the deficits in interpersonal relationships, perspective-taking, and emotion regulation often experienced by individuals with BPD result, in part, from caretakers' inability to meet their child's needs in moments of threat, resulting in the

child perceiving others and the world around them as unsafe and invalidating (Kernberg, 1967). Moreover invalidating or unsafe environments likely result in intolerance toward the child's expressions of emotions; thus, not allowing the child the opportunity to practice recognizing, tolerating, and regulating emotional experiences (Lynch et al., 2007). As such, individuals diagnosed with BPD have commonly reported that their perpetrators were primarily caretakers, close relatives, or close acquaintances (Ludolph et al., 1990; Menon et al., 2016; Zanarini et al., 2005).

**Autism Spectrum Disorder and Borderline Personality Disorder**

Despite ASD and BPD having relatively low prevalence rates in the general population and being very distinct disorders, the most apparent distinction being that ASD is a neurodevelopmental disorder diagnosed in childhood; it is clear from the literature reviewed that there are similarities in clinical presentations of individuals diagnosed with ASD and BPD. Only a small number of studies have examined the co-occurrence of ASD and BPD diagnoses and traits, but most converge on similar findings: there is a co-occurrence. In a study of 41 female participants with BPD that were recruited from an outpatient clinic in Sweden, Rydén et al. (2008) found that 15% of patients also met criteria for ASD. In this study, a BPD diagnosis was confirmed using the Structured Clinical Interview for DSM-IV (SCID-II) and the Zanarini Borderline Interview (ZAN-BPD; Zanarini et al., 2003), which assess for the severity of DSM-criteria for BPD during the past two weeks. An ASD diagnosis was determined by using a combination of the Asperger Syndrome Diagnostic Interview (ASDI; Gillberg et al., 2001) and unstructured clinical interviews considering the diagnostic criteria for autism disorder, Asperger's syndrome, and pervasive developmental disorder not otherwise specified (NOS). This study found that individuals with comorbid BPD *and* ASD had significantly more suicide

attempts, significantly lower global functioning, and more negative self-image than individuals with BPD who did not meet criteria for ASD. These findings suggest that individuals with comorbid ASD and BPD may be at higher risk of death by suicide; however, their small sample size raises concerns regarding the generalizability of their results.

A study conducted by Dudas et al. (2017) in the United Kingdom (U.K.) also examined clinical samples of individuals diagnosed with ASD and BPD and found that autistic individuals had higher self-reported autistic traits than individuals with BPD and that individuals with BPD had higher self-reported autistic traits than typically developing individuals. Notably, while autistic individuals reported greater autistic traits than individuals with BPD, they did not find a statistically significant difference in autistic traits between the two groups, suggesting that individuals with BPD may have higher autistic traits than the general population. However, due to several limitations, these findings should be interpreted with caution. First, the samples consisted of an uneven number of participants in each group with 624 autistic individuals, 23 individuals with BPD, and 2,081 control individuals. Second, formal clinical diagnoses of ASD and BPD were self-reported and information regarding the procedures given to participants about what constituted a formal diagnosis was not included in the manuscript. Third, they noted that they used the AQ to assess autistic traits but did not provide the mean or standard deviation of total AQ scores or demographic information of their participants. Dell'Osso (2018) found that in a sample of individuals with a formal diagnosis of BPD, participants reported higher autistic traits than healthy controls. The sample consisted of 50 BPD patients affiliated with one of three Italian University Departments of Psychology that were predominantly female (70%). Results showed that individuals with BPD reported higher autistic traits than healthy controls and that higher autistic traits among individuals with BPD was associated with higher reports of

suicidality throughout their lives and a history of sexual or physical abuse. This finding supports previous findings of the association between higher autistic traits and increased risk of victimization (Bargiela et al., 2016; Roberts et al., 2015).

Further, in a study of a large college sample (N = 474) of students residing in France, Charbrol and Raynal (2018) found a correlation between autistic traits and BPD traits overall. A cluster analysis revealed that 17% of the sample consisted of those with both high autistic traits and high BPD traits. Given that the base rate of ASD and BPD in the U.S. general population is 1% to 2% (Maenner et al., 2020) and 1.4% to 2.7% (Lenzenweger et al., 2007; Morgan & Zimmerman, 2018, p, 173 - 196) respectively, a 17% overlap in high ASD and BPD traits in a college sample is significant. Similar to Dell'Osso et al. (2018), this study's sample consisted of predominately females (i.e., 95 males; 379 females), which led Rodrigues (2019) to question whether the strength of the relationship between autistic traits and BPD traits were modified by sex. In a community sample in the U.S., Rodrigues (2019) found a significant association between autistic traits and BPD traits except for the BPD traits. While the hypothesized mediation effect of sex was not found, this study nonetheless added to the literature by finding associations between autistic traits and BPD traits in a nonclinical general population.

**Present Study**

Results from previous studies demonstrate that a significant association exists between autistic traits and BPD traits in both clinical and nonclinical populations (Chabrol & Raynal, 2018; Dell'Osso et al., 2018; Dudas et al., 2017; Rydén et al., 2008); however, few studies have examined underlying mechanisms that may explain the relationship between autistic traits and BPD traits. ACEs are highly prevalent among autistic adults (Berg et al., 2016) and adults with BPD (Porter et al., 2020), and cumulative ACEs has been found to be associated with

interpersonal problems (Poole et al., 2018a), emotion dysregulation (Thurston et al., 2018), deficits in perspective-taking (Shamay-Tsoory, 2011), and higher suicide attempts (Fuller-Thomson et al., 2016). Remarkedly, these characteristics are the core characteristics of BPD and ACEs are one of the highest predictors of developing BPD in adulthood (Porter et al., 2020). Furthermore, given the drastic changes in the conceptual understanding of autism over the past two decades researchers hypothesize a population of undiagnosed autistic adults exists (Lai & Baron-Cohen, 2015). Thus, the present study contends that the similarities observed in autistic individuals and individuals with BPD (e.g., pervasive pattern of interpersonal problems, deficits in perspective-taking, difficulty regulating emotions) may, in part, be explained by ACEs. Specifically, consistent with the ecobiodevelopmental framework, the present study contends that the core characteristics of autism are risk factors for trauma exposure and that autistic children are more likely to experience trauma exposure in the absence of protective factors, resulting in the development of comorbid BPD in adulthood.

The aim of the present study is thus to investigate the role of self-reported cumulative ACEs on the association between self-reported autistic traits and BPD traits in a nonclinical population. It was hypothesized that greater autistic traits would be associated with greater adverse childhood experiences, which in turn would be associated with greater BPD traits. Additionally, it is hypothesized that higher autistic traits would be associated with higher BPD traits and that this relationship would be explained by cumulative ACEs. Additionally, given the high prevalence of major depressive disorder among autistic individuals (Hollocks et al., 2019), individuals with BPD (Rao & Broadbear, 2019), and individuals with a history of ACEs (Rigles, 2017), depressive symptoms will be controlled for to reduce the impact of depressive symptoms on autistic traits, ACEs, and BPD traits.

# Method

## Participants

Two hundred and forty-two young adults between the ages of 18 and 30 ($M_{age}$ = 24.60 [*SD* = 3.58]; 48% male) participated in this study. The sample consisted of 60% White, 13% Black or African American, 15% Asian, 10% Other, and 2% American Indian or Alaska Native. Overall 17% of this sample identified as Hispanic/Latinx ethnicity (regardless of race) and the mean number of years of education was 14.31 (*SD* = 2.48). Participant characteristics are displayed in Table 1.

Participants were recruited via Prolific (www.prolific.ac), a crowdsourcing platform specifically designed to cater to the recruitment of scientific research. Prolific has demonstrated superior data quality and diversity among participants when compared to other crowdsourcing platforms (Peer et al., 2017). Eligible participants met the following inclusion criteria: 1) were between the age of 18 to 30, to avoid confounding effects of the natural decrease in both pathological personality traits and autistic traits in later life; 2) resided in the United States, to examine whether previous findings on ASD and BPD generalize to the U.S population; and 3) had a Prolific acceptance rating of 95% or higher for quality data.

## Procedures

Individuals with a registered Prolific profile, who met the above inclusion criteria, were presented with the option to participate in the current study entitled "Characteristic Patterns of Thoughts, Feelings, and Behaviors." The following description was provided: “This research study involves a web-based survey designed to understand how people's characteristic patterns of thoughts, feelings, and behaviors are impacted by their mood, gender, and adverse life events. You will be asked questions about your age, gender identity, race/ethnicity, personality traits,

adverse life events, emotions, and behaviors." Given that Prolific is solely designed to recruit participants for studies, it is intended to be used in integration with a separate survey software. For this reason, eligible and consenting participants were provided with an anonymous link and completed questionnaires via Qualtrics. Question items were forced choice and presented in the following order: consent, demographics, depression questionnaire, autistic traits questionnaire, BPD traits questionnaire, and cumulative ACEs questionnaire. Prolific requires that the researcher either "approve" or "reject" each participant's submission; thus, only participants with approved submissions received payment for their participation. The current study approved submissions in which participants correctly answered all five attention check questions. Approved participants were paid US$6.50 per hour, and payments were prorated to reflect the amount of time it took each participant to complete the questionnaires. On average, it took participants 19 minutes (range = 5 minutes – 65 minutes) to complete the questionnaires. Of the 256 participants who consented to participate in the study, 12 participants withdrew prior to completing the questionnaires and two participants were rejected by the researcher due to incorrectly answering one or more attention check questions. All study procedures and measures were approved by the Syracuse University Institutional Review Board.

**Power Analysis**

Guidance regarding the necessary sample sizes for common mediation models with 0.8 power can be understood by examining the effect sizes within the literature of both the 'a' path (relationship between autistic traits and ACEs) and the 'b' path (relationship between ACEs and BPD traits) in a hypothesized mediation model and then comparing the combination of the two effect sizes to empirical estimates provided by Fritz and MacKinnon (2007). Dell'Osso et al. (2018) examined the association between autistic traits and ACEs in a nonclinical college

sample and found a medium effect size ($r$ = .53). Kuo et al. (2015) examined the association between ACEs and BPD traits in a nonclinical college sample and also found a medium effects size ($r$ = .41). Based on a comparison of medium effect sizes for both the 'a' path and the 'b' path, the necessary sample size for a mediation model with 0.8 power is 71 via bias-corrected bootstrap confidence intervals. Therefore, the obtained sample size in the current study (N=242) is adequately powered and sufficient to detect statistical significance for a mediation effect using bias-corrected bootstrap confidence intervals in the hypothesized model.

## Measures

### *Demographic Variables*

Demographic variables including age, sex, race, ethnicity, and years of education were collected at the beginning of the online questionnaire.

### *Autism Quotient*

Autistic traits were measured using the Autism Spectrum Quotient (AQ; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001). The AQ is a 50-item self-report questionnaire that assesses autistic traits in five different domains: social skills (e.g., "I find it hard to make new friends"), attention switching (e.g., "I find it easy to do more than one thing at once"), attention to detail (e.g., "I tend to notice details that others do not"), communication (e.g., "I am good at social chit-chat"), and imagination (e.g., "I find making up stories easy"). Participants report how much they agree or disagree with each item with one of four responses: definitely agree, slightly agree, slightly disagree, and definitively disagree. Using a binary scoring system, slightly or definitely responses were scored as 1 point, while all other responses were scored as a 0. Given that the sample consisted of a community population and the autistic traits are normally distributed in the population, a sum score (Cronbach's $\alpha$ = .80) was used for the current analysis

as a predictor variable to account for a continuum of autistic traits ranging from low to high. The AQ has a "clinical" threshold of 32 and a "screening" cut-off of 26 (Baron-Cohen et al., 2001). A systematic review conducted by Ruzich et al. (2015) reported mean AQ of 16.94 (range = 11.6 – 20.0; *SD* range = 0.8 – 9.7) in nonclinical populations.

***Five Factor Borderline Inventory-Short Form***

Borderline Personality Traits were measured by the Five Factor Borderline Inventory-Short Form (FFBI-SF; DeShong et al., 2015). The FFBI-SF, which is a 48-item dimensional self-report questionnaire that assesses BPD from the perspective of the Five-Factor Model of personality. The FFBI-SF includes a total score and twelve subscale scores that correspond with DSM-5 criteria: anxious uncertainty, dysregulated anger, despondence (e.g., low mood), self-disturbance, behavioral dysregulation (e.g., impulsive behaviors), affective dysregulation, fragility (e.g., self-mutilation), dissociative tendencies, distrust, manipulativeness, oppositional, and rashness (e.g., risk-taking behaviors). Using a 5-point Likert scale (0 = disagree strongly to 4 = agree strongly) participants were instructed to report how much they agreed or disagreed with each statement. A sum score (Cronbach's $\alpha = .96$) was used for the current study as an outcome variable which is consistent with the dimensional approach diagnosing and assessing personality disorders proposed in DSM-5 (APA, 2013). A mean FFBI-SF score of 105.85 (SD = 38.02) with a range of 48 to 236 has been found in a non-clinical college sample (Titus & DeShong, 2020).

***Adverse Childhood Experiences***

Adverse childhood experiences were measured by the Adverse Childhood Experiences Questionnaire (ACE; Felitti et al., 1998), a measure created by the World Health Organization (WHO) and Disease Control and Preventions (CDC). The ACE is a 10-item self-report designed to assess whether individuals have experienced adverse childhood experiences prior to the age of

eighteen. Participants were asked to identify (yes or no) whether they had ever experienced: emotional, physical, or sexual abuse; emotional or physical neglect; witnessed violence against mother; lived with household members who were substance abusers, mentally ill or suicidal, or ever imprisoned. A sum score (Cronbach's α = .75) was used for the current study as a mediating variable. Data collected from the 2011 – 2014 Risk Factor Surveillance System (BRFSS) an annual, nationally representative telephone survey on health-related behaviors, health conditions, and use of preventive services, found that 61.55% of adults in the general population had at least one ACE and 24.64 of adults in the general population reported three or more ACEs (Merrick et al., 2018).

### *Depressive Symptoms*

Depressive symptoms were measured by the Patient Health Questionnaire-8 (PHQ-8; Kroenke et al., 2009), an adaptation of the Patient Health Questionnaire-9 (Kroenke et al., 2001). The PHQ-8 is an 8-item self-report questionnaire designed to assess depressive symptoms in the past two weeks. Using a 4-point Likert scale (0 = not at all to 3 = nearly every day), participants were instructed to report how often they experienced the following problems in the past two weeks. A sum score (Cronbach's α = .86) was used in the current study as a covariate to allow for individual severity of symptomatology to be detected. Scores ranging from 5 – 9, 10 – 15, and 15 – 22 indicate mild, moderate and depressive symptoms, respectively.

## Data Analytic Strategy

Descriptive statistics including distribution characteristics and correlation coefficients were computed using SPSS, version 28.0.1.0 (IBM, Armonk, New York). Path analysis was conducted using M*plus*, version 8.7, a structural equation modeling software package (Muthén & Muthén, 1998; Muthén & Muthén, 2021). Path analysis is an extension of multiple regression,

and path analysis results can be interpreted in a similar way as results from multiple regression. However, path analysis provides an advantage in that it can estimate complex causal relationships among multiple predictors, mediators, and outcomes simultaneously in one model. Thus, it is a more efficient way of testing the hypothesized mediating relationship. Maximum likelihood parameter was used to deal with the non-normality of the age variable (skewness = 0.162; kurtosis = -1.102), which is defined as skewness and kurtosis values more than 1. There was no missing data in any of the predictor, covariates, mediating, or outcome variables.

The purpose of the analysis was to determine whether total ACEs mediated the relationship between total autistic traits and total BPD traits. Two separate models were estimated. The first model included only the primary variables of interest (i.e., total autistic traits, total ACEs, and total BPD traits). The second model included total autistic traits, age, and total depressive symptoms as predictor variables, total ACEs were included as the mediating variable, and total BPD traits were included as the outcome variable. The effects of sex, race, ethnicity, and years of education were also tested on the mediator and outcome variables, but did not show significant effects on any of the variables and were therefore dropped from the model. Significance testing for a mediation effect was examined using 95% confidence interval (CI; Preacher & Hayes, 2008) based on 10,000 boot-strapped CIs. A 95% CI of the indirect effect that did not include zero indicated a significant mediation effect.

## Results

### Descriptive Statistics

Descriptive statistics and bivariate Pearson correlation coefficients of study variables are presented in Table 2. Overall, participants had a mean total AQ score of 22.61 (*SD* = 7.05; range = 4 – 46) which is approximately six points above mean that is typically reported in nonclinical

populations. Participants had a mean total FFBI-SF score of 127.35 (*SD* = 38.55; range = 48 – 238), which is similar to what has been reported in a nonclinical sample. Participants had a mean total ACEs score of 2.31 (*SD* = 2.23; range = 0 – 8) which is consistent with was has been reported in the general population. Participants had a mean depression score of 9.02 (*SD* = 5.36; range = 0 – 22), indicating mild depressive symptoms on average.

**Mediating Role of Adverse Childhood Experiences**

In the mediation model including only the primary variables of interest (without covariates included in the model), based on bootstrapped 95% CI, total ACEs significantly, albeit partially, mediated the association between total autistic traits and total BPD traits ($b$ = 0.35 [95% CI = .028, .110], $\beta$ = .06). Specifically, as shown in panel A of Figure 1, total autistic traits were positively associated with total ACEs ($b$ = .06, $p$ = .001, $\beta$ = .20) and total ACEs, in turn, were positively associated with total BPD traits ($b$ = 5.52, $p$ = <.001, $\beta$ = .31) . In this model, 15% of the total effect of autistic traits on BPD traits were mediated by ACEs. Finally, total autistic traits were positively associated with total BPD traits ($b$ = 1.83, $p$ = < .001, $\beta$ = .33) . Therefore, the association between greater self-reported autistic traits and greater self-reported BPD traits were partially explained through the total number of ACEs.

In the second mediation model, age and total depression scores were included as covariates. Based on bootstrapped 95% CI, total ACEs continued to significantly mediate the association between total autistic traits and total BPD traits ($b$ = 0.12 [95% CI = .002, .052], $\beta$ = .02), with 10% of the total effect of autistic traits on BPD traits explained by adverse childhood experiences. In this model, including depression and age as covariates, as shown in panel B of Figure 1, total autistic traits were no longer associated with ACEs ($b$ = .04, $p$ = .06, $\beta$ = .12); however, depression was significantly associated with ACEs ($b$ = .29, $p$ < .001, $\beta$ = .05).

Conversely, total ACEs continued to be positively associated with total BPD traits ($b$ = 3.05, $p$ = <.001, $\beta$ = .18). Finally, total autistic traits were positively associated with total BPD traits ($b$ = .55, $p$ < .001, $\beta$ = .10). Therefore, the association between greater self-reported autistic traits and greater self-reported BPD traits were partially explained through the total number of ACEs.

## Discussion

This study explored a potential underlying mechanism for the established relationship between autistic traits and BPD traits. Specifically, this study examined whether cumulative ACEs explained the relationship between autistic traits and BPD traits among a community sample of young adults. Results provided partial support of the hypothesis that adverse childhood experiences play a significant role in the association between autistic traits and BPD traits. Specifically, retrospective self-reports of ACEs, before 18 years of age, explained 15% of the relationship between autistic traits and BPD traits in this sample. However, the percentage explained by ACEs decreased to 10% after controlling for age and depressive symptoms. Overall, the current findings indicate that adverse childhood experiences may be one contributing factor to the co-occurrence of ASD and BPD traits, symptoms, and diagnoses, though longitudinal replication in an autistic population is needed.

### Autistic Traits and Borderline Personality Traits

Results showed that autistic traits were positively and directly associated with BPD traits, even after controlling for age and depressive symptoms. This finding is consistent with previous findings on the co-occurrence of autism and BPD diagnoses (Dudas et al., 2017; Rydén et al., 2008) and of higher autistic traits in individuals diagnosed with BPD compared to healthy controls (Dell'Osso et al., 2018; Dudas et al., 2017). This finding extends the literature by demonstrating that a moderate relationship between autistic traits and BPD traits exists beyond

clinical populations, even after controlling for potential confounds such as age and depressive symptoms. The present study's finding of a significant association between autistic traits and BPD traits is inconsistent with Chabrol and Raynal's (2018) finding that there was a weak association between autistic traits and BPD traits in a nonclinical college sample. This discrepancy could potentially be explained by considering methodological differences. For instance, Chabrol and Raynal (2018) did not report the descriptive statistics of their measures. Thus, it is unclear whether the distribution of autistic traits and BPD traits found in their sample are consistent with what is typically found in nonclinical populations, decreasing the generalizability of their findings. In other words, it is possible that their weak association may have been a result of using measures with low internal consistency or to their nonclinical college sample not representing the general population.

**Adverse Childhood Experiences and Borderline Personality Traits**

Results showed that greater cumulative ACEs were positively associated with greater BPD traits. Though the present study used a cross-section design and results cannot be interpreted as causal, this result appears to be consistent with previous longitudinal research on how children with greater ACEs endorsed greater BPD traits in adulthood (Bozzatello et al., 2020; Franssens et al., 2022). This finding aligns with the larger literature regarding the association between ACEs and various types of interpersonal problems (Dagnino et al., 2020; Wojcik et al., 2019), emotion dysregulation (Poole et al., 2018b), and suicidal behaviors (Rajalin et al., 2020; Serafini et al., 2015) in adulthood, which are characteristics and behaviors often observed in BPD.

**Autistic Traits and Adverse Childhood Experiences**

Consistent with the present study's hypothesis and with previous findings of the association between autistic traits and ACEs (Berg et al., 2016; Mandell et al., 2005), results demonstrated a positive association between autistic traits and ACEs. Specifically, greater self-reported autistic traits were associated with greater self-reported ACEs. A notable and unexpected finding was that the association between autistic traits and ACEs were no longer significant after controlling for age and depressive symptoms.

**Depressive Symptoms**

Results showed that age was not associated with ACEs, but depressive symptoms were, revealing that depressive symptoms were a stronger predictor of ACEs than autistic traits. This finding was unexpected and inconsistent with the current study's hypotheses and with previous findings on autistic traits and ACEs (Kerns et al., 2015). One potential explanation for the null effect of autistic traits on ACEs after controlling for depression may be that the present study's measure of ACEs may not have been broad enough to capture the types of adversities individuals with higher autistic traits are more likely to experience. For instance, bully victimization in childhood is highly prevalent among autistic individuals (Park et al., 2020) and individuals with BPD (Alberdi-Paramo et al., 2020) and researchers have recommended that bullying be included within measures of ACEs (Mersky et al., 2017). However, the current study's measure of ACEs did not include items assessing for bullying.

With regard to autism, a recent meta-analysis found that the prevalence estimates of bully victimization in autistic students in the U.S. in grades sixth through twelfth were 67%, compared to 20% in typically developing peers (Park et al., 2020). They also found that greater interpersonal dysfunction and emotion dysregulation (both internalizing and externalizing emotional problems) were related to greater bully victimization. While interpersonal dysfunction

has been shown to increase the risk of bully victimization, a longitudinal study found that bully victims reported more conduct problems and emotional problems as a result of being bullied, further increasing their risk of victimization, creating a cyclical pattern (Busch et al., 2015). Considering individuals with BPD, recent studies have found associations between BPD and childhood experiences of bully victimization in both longitudinal studies (Antila et al., 2017; Franssens et al., 2022; Widom et al., 2009) and retrospective studies (Alberdi-Paramo et al., 2020; Bozzatello et al., 2020). For instance, longitudinal studies have found that greater bully victimization in childhood is associated with greater BPD traits in adulthood (Antila et al., 2017; Franssens et al., 2022). Consistent with these findings, adults with BPD have retrospectively reported a history of bully victimization (Alberdi-Paramo et al., 2020; Bozzatello et al., 2020) and bully victimization has been associated with increased frequency of suicidal behaviors in adults with BPD (Alberdi-Paramo et al., 2020). Bully victimization in childhood, among other adverse childhood experiences, has been found to play a significant role in earlier onset of BPD (Bozzatello et al., 2020).

**Clinical Implications**

Given how the expanded diagnostic criteria and conceptualization of autism over the past three decades have resulted in the development of a "lost generation" whose autism went undiagnosed until adulthood (Lai & Baron-Cohen, 2015, p. 1013), the current findings should be used to inform clinicians of the association between autistic traits and BPD traits in nonclinical samples. Specifically, the current findings should also be used to encourage clinicians to consider the co-occurrence of ASD and BPD when presented with an adult with a history of ACES, interpersonal problems, emotion dysregulation, unstable self-identity, and self-harm or suicidality. Furthermore, though longitudinal replication in an autistic population is needed, if

ACEs were to explain the association between autism and BPD in autistic populations, then findings could encourage the growth of effective interventions for individuals with childhood trauma or BPD to autistic individuals. For instance, Huntjens et al. (2020) recently published a protocol for a trial of Dialectical Behavioral Therapy (an evidence-based intervention for individuals with BPD; Linehan, 1993) in autistic individuals. Other forms of therapy that have been found to be efficacious for individuals with BPD include schema therapy (Kellogg & Young, 2006) and mentalization based therapy (Bateman & Fonagy, 2004).

**Limitations and Future Directions**

Current findings should be interpreted within the context of some limitations. First, due to the cross-sectional nature of the present study, is not possible to infer causal relationships among study variables. Second, mediation analyses are most accurate when utilizing temporal data (Gunzler et al., 2013); thus, the present study's measure of current autistic traits postdates retrospective self-reported ACEs. While autistic traits have been found to be stable throughout the lifetime (Ruzich et al., 2015), this is nonetheless a methodological limitation in the present study. Thus, future longitudinal research with appropriate temporal ordering of the variables is needed. Third, the present study analyzed ACEs as a mediator variable and hypothesized that ACEs would explain the mechanism through which autistic traits influence BPD traits. However, given how studies have found that the core characteristics of autism predispose autistic children to trauma exposure (Kerns et al., 2015), future research is needed to explore the moderating role of ACEs on the association between autistic traits and BPD traits. Fourth, all study variables were analyzed as a total score; however, given that the present study consisted of a nonclinical sample, analyzing a total score rather than subgroups of high scores may have decreased the sensitivity in finding stronger statistical significance. Thus, future research on autistic traits and

BPD traits in nonclinical samples should an analyze high scores rather than total scores as it would increased the generalizability of the results to autistic individuals.

Fifth, while the present study controlled for the confounding effects of depressive symptoms, it did not assess for anxiety symptoms. Given the comorbidity of major depressive disorder and anxiety disorders (Hirschfeld, 2001), future research is needed to explore the role of anxiety in the association between autistic traits and ACEs. Sixth, current sample consisted of nonclinical community participants; therefore, a replication in an autistic population is needed. Though the study recruited participants from the general population, participants were recruited from crowdsourcing platform and were given the opportunity to enroll in studies after reading the titles and summary of each study which raises concerns of self-selection bias. For that reason, replications in other nonclinical samples are needed. Lastly, although the Adverse Childhood Experience Questionnaire (ACE; Felitti et al., 1998) is a highly used measure that has shown significant associations among autistic children (Berg et al., 2016; Kerns et al., 2015), this 10-item measure may have been too narrow to capture the types of adversities individuals with higher autistic traits are more likely to experience; thus, future studies should consider using a broader measure of ACEs.

**Conclusion**

This cross-sectional study fills a gap in the literature by examining ACEs as a potential underlying mechanism for the established relationship between autistic traits and BPD traits. Although longitudinal replication is needed, current preliminary findings can inform researchers and clinicians of the association between autistic traits and BPD traits in the general population. Additionally, study findings can be used to encourage clinicians to consider screening for autistic

traits in adults presenting with trauma, interpersonal problems, emotion dysregulation, and suicidality.

**Table 1**

*Participant Demographic Characteristics*

| | M (%) | SD |
|---|---|---|
| Age (18 – 30) | 24.60 | 3.58 |
| Years of Education | 14.31 | 2.48 |
| Sex (0 = female; 1 = male) | 48% | |
| Race | | |
| White | 60% | |
| Black/African American | 13% | |
| American Indian/Alaska Native | 2% | |
| Asian | 15% | |
| Other | 10% | |
| Ethnicity | | |
| Hispanic/Latinx | 17% | |

*Note.* N = 242.

**Table 2**

*Means (and Standard Deviations) of All Study Variables and Their Bivariate Correlation Coefficients*

| Variable (possible range; $\alpha$ if applicable) | M (%) | SD | $r$ | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1. | 2. | 3. | 4. | 5. |
| 1. Age (18 – 30) | 24.60 | 3.58 | – | | | | |
| 2. Depressive Symptoms (0 – 22; ; $\alpha$ = .86) | 9.02 | 5.36 | -.207** | – | | | |
| 3. Autistic Traits (4 – 46; $\alpha$ = .80) | 22.61 | 7.05 | -.092 | .319*** | – | | |
| 4. Adverse Childhood Experiences (0 – 8; $\alpha$ = .75) | 2.31 | 2.23 | .001 | .309*** | .204** | – | |
| 5. Borderline Personality Traits (48 – 238; $\alpha$ = .96) | 127.35 | 38.55 | -.233*** | .680*** | .396*** | .381*** | – |

*Note.* N = 242.
* $p < .05$. ** $p < .01$. ** $p < .001$.

**Table 3**

*Direct and Indirect Effects of Autistic Traits on Borderline Personality Traits Through Adverse Childhood Experiences*

| Predictor | Mediator | Outcome | Indirect Effect b ($\beta$) | 95% CI of Indirect Effect b ($\beta$) | Direct Effect b ($\beta$) | Total Effect b ($\beta$) | Proportion Mediated |
|---|---|---|---|---|---|---|---|
| Autistic Traits | Adverse Childhood Experiences | BPD Traits | 0.35 (0.06) | 0.152, 0.618 (0.028, 0.110) | 1.813*** (0.332***) | 2.162 (0.396) | 15% |

*Note*. N = 242. Unstandardized (and standardized) coefficients are shown. Confidence intervals (CIs) resulted from 10,000 bootstrap draws. *$p < .05$. **$p < .01$. **$p < .001$.

**Table 4**

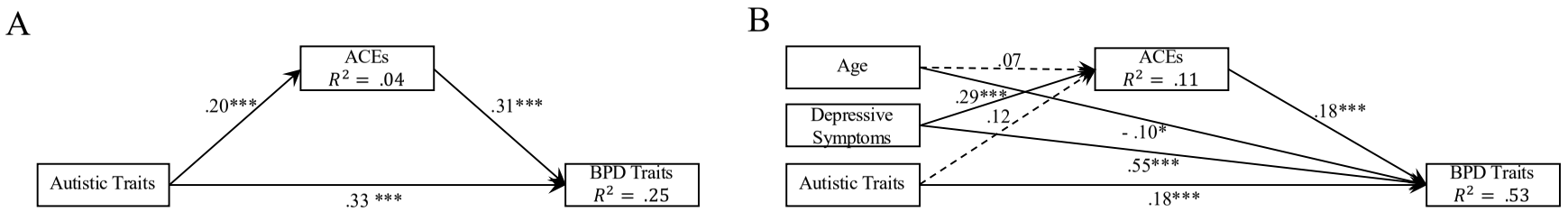
*Direct and Indirect Effects of Autistic Traits on Borderline Personality Traits Through Adverse Childhood Experiences After Controlling for Age and Depressive Symptoms*

| Predictor | Mediator | Outcome | Indirect Effect b ($\beta$) | 95% CI of Indirect Effect b ($\beta$) | Direct Effect b ($\beta$) | Total Effect b ($\beta$) | Proportion Mediated |
|---|---|---|---|---|---|---|---|
| Autistic Traits | Adverse Childhood Experiences | BPD Traits | 0.12 (0.02) | 0.009, 0.290 (0.002, 0.052) | .96*** (0.176***) | 1.074 (0.197) | 10% |

*Note*. N = 242. Unstandardized (and standardized) coefficients are shown. Confidence intervals (CIs) resulted from 10,000 bootstrap draws. Age and depressive symptoms were entered as covariates. *$p < .05$. **$p < .01$. **$p < .001$.

**Figure 1**

*Path Models of the Mediation of the Relationship Between Autistic Traits and Borderline Personality Traits Through Adverse Childhood Experiences*




*Note.* $N = 242$. (A) Standardized coefficients obtained from a path model of the association of autistic traits and BPD traits through ACEs. (B) Standardized coefficients obtained from a path model of the association of autistic traits and BPD traits through ACEs, while controlling for the effects of age and depressive symptoms on ACEs and BPD traits. Dotted paths indicate nonsignificant paths. *$p < .05$. **$p < .01$. **$p < .001$.

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