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The role of adverse childhood experiences in vulnerable dark triad
personality traits in adulthood: A systematic review and meta-analysis

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Abstract

Prior research has demonstrated that having experienced adversity as a child can influence the development of specific personality traits. The present study aims to explore the role of Adverse Childhood Experiences in the development of Vulnerable Dark Triad personality traits (factor 2 psychopathy, vulnerable narcissism, borderline personality disorder) through a systematic review and the method of meta-analysis. The systematic-review was conducted by searching the following four databases: PsychArticles, PubMed, Scopus, and Science Direct, and it included handbooks, peer-reviewed journals, reports, conference papers, as well as grey literature published in the English language between January 2010 and November of 2023. In total, six studies met the inclusion criteria, and as a result, they were gathered, synthesized, and analyzed in the systematic review. Then, an exploratory meta-analysis was conducted by using two studies that followed the requirements. Results from the systematic review revealed that ACEs can influence the development of vulnerable dark traits of personality. At the same time, the exploratory meta-analysis indicated that there is a small to moderate effect in the correlation between ACEs and vulnerable narcissism. Furthermore, through the analyses, some mediator factors were spotted that mediated the relationship between ACEs and VDT traits, while VDT traits were also identified as mediators. A gap in the literature in this field of study emerged, highlighting that additional research should be conducted to explore the consequences of ACEs both in the shape of children's personalities and the development of children across their lifespans.

Keywords: adverse childhood experiences, vulnerable dark triad, factor 2 psychopathy, vulnerable narcissism, borderline personality disorder, personality development

Περίληψη

Πλήθος ερευνών έχουν καταδείξει ότι οι Αντίξοες Εμπειρίες της Παιδικής Ηλικίας συμβάλλουν στην ανάπτυξη συγκεκριμένων χαρακτηριστικών προσωπικότητας. Η παρούσα μελέτη στοχεύει να εξετάσει τον ρόλο των εμπειριών αυτών στην ανάπτυξη χαρακτηριστικών Ευάλωτης Σκοτεινής Τριάδας (ψυχοπάθεια - παράγοντας 2, ευάλωτος ναρκισσισμός, οριακή διαταραχή), μέσω μιας συστηματικής ανασκόπησης και της μεθόδου της μετα-ανάλυσης. Για τον σκοπό αυτό, πραγματοποιήθηκε αναζήτηση δημοσιευμένης επιστημονικής και γκρίζας βιβλιογραφίας σε 4 ψηφιακές βάσεις δεδομένων (PsychArticles, PubMed, Scopus, Science Direct) με χρονικό εύρος δημοσίευσης από το 2010 έως το 2023. Από τη διαδικασία αναζήτησης και αξιολόγησης των πηγών, συνολικά έξι μελέτες χαρακτηρίστηκαν ως σχετικές με τον σκοπό της έρευνας, εκ των οποίων οι δύο συμπεριλήφθηκαν στη μετα-ανάλυση. Τα αποτελέσματα ανέδειξαν την ύπαρξη σχέσης ανάμεσα στις Αντίξοες Εμπειρίες της Παιδικής Ηλικίας και τα χαρακτηριστικά Ευάλωτης Σκοτεινής Τριάδας. Παράλληλα, από τη διερευνητικού τύπου μετα-ανάλυση προέκυψε μια μικρή έως μέτρια θετική συσχέτιση μεταξύ των αντίξοων εμπειριών και του ευάλωτου ναρκισσισμού. Τέλος, εντοπίστηκε και αναλύθηκε ο ρόλος συγκεκριμένων διαμεσολαβητικών παραγόντων, υποδεικνύοντας πιθανούς μηχανισμούς που μπορούν να επηρεάσουν τη σχέση αυτή. Ωστόσο, λόγω του περιορισμένου αριθμού των διαθέσιμων μελετών και του σχετικού κενού στη βιβλιογραφία, αναδεικνύεται η ανάγκη για περαιτέρω έρευνα σχετικά με τις επιπτώσεις των εμπειριών αυτών στην ανάπτυξη της προσωπικότητας των παιδιών.

Λέξεις-κλειδιά: αντίξοες εμπειρίες παιδικής ηλικίας, ευάλωτη σκοτεινή τριάδα, ψυχοπάθεια-παράγοντας 2, ευάλωτος ναρκισσισμός, οριακή διαταραχή, ανάπτυξη προσωπικότητας

Introduction

In recent years, there has been a growing interest in raising awareness about Adverse Childhood Experiences (ACEs) and childhood trauma. These experiences can have serious consequences impacting health and development in the present and future (Lynn et al., 2023; Nelson et al., 2020; Rod et al., 2020). Adversity during childhood can variably influence specific personality traits (Leikas & Salmela-Aro, 2015; Paris, 2018; Schouw et al., 2020; Shiner et al., 2017) and is variably linked to adult psychopathology (Björkenstam et al., 2017; Miu et al., 2022). According to Vulnerable Dark Triad (VDT) (Miller et al., 2010), it is the term that encapsulates factor 2 psychopathy, vulnerable narcissism, and borderline personality disorder. It is currently under-researched the link between ACEs and vulnerable dark triad. The relevant literature mentions that ACEs are risk factors for the onset and the expression of a more vulnerable and darker side of a person's personality (Miller et al., 2010). However, to our knowledge, there is a gap in the existing literature regarding which adverse experiences (ACEs) may be linked to specific VDT traits and through which mechanisms of actions ACEs potentially link to increased expression of different personality traits.

This research attempts to shed light on the potential impact of ACEs on the developing child's personality through the systematic review methodology by exploring the role of ACEs on VDT through meta-analysis. Through this approach this study aims to enrich the literature with insightful evidence for researchers, mental health experts, and clinical and child psychologists in the prevention, diagnosis, and intervention process.

1. Literature review

1.1. Adverse childhood experiences

1.1.1. *Definition of adverse childhood experiences*

With the term “Adverse Childhood Experiences” or “ACEs”, researchers refer to a subset of childhood adversities or else negative experiences that may or may not necessarily be experienced by a child as trauma (Bartlett & Sacks, 2019). According to the definition proposed by the World Health Organization (2020), ACEs refer to “*some of the most intensive and frequently occurring sources of stress that children may suffer early in life*”. The age span in which an adverse experience should fall to be considered as ACE is not explicitly defined. However, Felitti et al. (1998), in the seminal ACE study, focused on experiences that occurred from the first day of birth until the 18th year of life, covering in this way the age span from childhood to adolescence.

It is worth mentioning that the motivating power behind a more extensive investigation of ACEs was detected in 1993 when Felitti, during a study for the engagement of obese adult patients to a weight-loss program, found out that some of the risk factors for obesity were tightly connected with adverse experiences of early life. In examining their definition, ACEs have been conceptualized in various ways, such as “traumatic experiences” (Layne et al., 2014), “stressors” (Hammond et al., 2019), “traumatic” (Ballard et al., 2019), or “traumatic stressors” (highly distressing experiences that can lead to trauma) (Anda et al., 2007). The main finding is that there is no universally accepted definition for ACEs (Karatekin et al., 2022).

1.1.2. *Types of adverse childhood experiences*

Understanding the nuanced classification of adverse experiences is pivotal in comprehending their multifaceted impact on individuals’ well-being, developmental trajectories, and public health as well. By identifying specific types of adverse experiences and understanding their unique effects, researchers and clinicians can develop more efficient and targeted prevention and intervention programs. However, researchers have not yet reached a consensus regarding the typology of ACEs. In the first classification, the following four types of ACEs were proposed: (a) childhood sexual abuse, (b) nonsexual childhood abuse, (c) early parental loss, and (d) parental alcoholism (Felitti, 1993). In a subsequent stage, due to a more extensive evaluation of

the imprint of specific experiences in individuals' lives, "childhood neglect", "childhood abuse" and "household dysfunction" were also added as distinct types of ACEs (Felitti et al., 1998) (see Table 1). In a related approach, Finkelhor et al. (2019), classified ACEs into two broad categories. The first category was related to violence and threat exposure (e.g., physical/sexual abuse, domestic violence and crime), and the second one was related to deprivation and loss (e.g., parental death, incapacitation, and absence). Nevertheless, adversity can be detected in various circumstances. For example, a child can face adverse experiences such as poverty (Karatekin & Hill, 2019) and peer, community, and collective violence (WHO, 2020), highlighting that adversity can originate not only within the family context but also in other social contexts. In this line, the concept of "community-level ACEs", including types of adversities such as exposure to community violence, unsafe neighborhoods, foster care, discrimination, and racism, has also been further investigated (Wade et al., 2016; Wolff et al., 2018). From a broader perspective, ACEs can be classified into three dimensions of adversity: maltreatment, household factors, and environmentally based forms of harm (see Table 2) (Robbe et al., 2017).

The classifications of Felitti et al. (1998), Finkelhor et al. (2019), and Robbe et al. (2017) share a core perspective regarding ACEs, as all of them include abuse, neglect, and household factors. However, the first is more specific about the types of neglect and abuse, the second one divides ACEs into two categories, and the third one adopts a broader approach by grouping neglect and abuse under the umbrella of maltreatment. At the same time, in all these classifications, researchers have considered factors of household dysfunction. As a result, the model evaluated as the most suitable in the present study is the one mentioned in Table 1 (Felitti et al., 1998), as it distinctively addresses the psychological dimensions of ACEs. Literature indicates that some constructs of VDT correlate with adversity on an emotional level (Miller et al., 2010), making this model particularly appropriate for this study.

Table 1.

Types and subcategories of ACEs (Felitti et al., 1998)

Types of ACEs	Subcategories of each type
Abuse	Physical

	Psychological
	Sexual
Neglect	Physical
	Psychological
Household dysfunction	Substance abuse
	Mental illness
	Violent treatment of mother or stepmother
	Parental separation or divorce
	Incarceration of a family member

Table 2.

Adverse Childhood Experiences (Rebbe et al., 2017)

Types of ACEs	Subcategories of each type
Maltreatment	Sexual abuse (<i>rape, sexual assault, sexual molestation</i>) Physical abuse (<i>being thrown/pushed, locked in a room or closet, punched/slapped/kicked, beat up, choked/strangled, attacked with a weapon, tied up/held down/blindfolded</i>) Neglect (<i>neglect related to food, grooming, medical care, misappropriation of money, chores, caregiver illness, missing school, insufficient protection</i>) Abandonment
Household factors	Caregiver substance abuse (alcohol or drugs) Caregiver's mental illness Caregiver domestic violence (abused their spouse) Caregiver had a criminal record

	Youth placement in five or more foster homes
	Youth experienced an adoption plan failure
Environmentally based forms of harm	Witnessing others being hurt or killed
	Physical fighting (either direct combat or serious physical assault)
	Natural disaster or fire
	Life-threatening accident
	Sustaining a very serious injury

1.1.3. Impact of adverse childhood experiences on child development

A consistent body of research has demonstrated that ACEs may affect children’s developing neurobiology (Fisher et al., 2016; Hasterman, 2021). The impact of ACEs may differ in terms of various individual (age of exposure, personality traits, resilience) and experience-related or “peritraumatic” factors such as frequency, type, repetitiveness, and variety (Cicchetti & Toth, 1995; Fisher & Gunnar, 2010). Some of the neural systems responsible for threat recognition, behavior, and self-regulation after a stressful situation are also sensitive to early adverse experiences (e.g., hypothalamic-pituitary-adrenal axis) (Fisher et al., 2016; Hasterman, 2021). In early childhood, the feeling of extreme stress or toxic stress as a result of exposure to intense and long-lasting stressful experiences (Shonkoff & Garner, 2012) can further affect the development of brain circuits and elevate stress hormone levels, while the mechanisms for stress response are not yet fully developed (Hasterman, 2021). Such effects may further affect the individual’s functioning across the lifespan. For example, it has been documented that exposure to ACEs has been linked to the onset of psychiatric disorders and other psychological difficulties in adulthood (Björkenstam et al., 2017; Gu et al., 2022; Hasterman, 2021; McLaughlin et al., 2012; Miu et al., 2022). Also, the level of trauma seems to affect the severity of the subsequent mental health disorder (Gu et al., 2022).

Neurological and psychological development of infants are both experience- and relationship-dependent. Infants are influenced by the initial experiences of their lives and the relationships they form. Positive interactions and supportive relationships can reinforce brain development and emotional well-being, while the opposite can hinder the developmental process. Thus, children need to gain specific life experiences to bring out all their genetic

capabilities across different brain functions (Fox et al., 2010; Hambrick et al., 2019). That said, the developing brain is formed under the influence of both a) the early childhood experiences and b) the social interactions that are developed with the significant “others”. Early adverse experiences can negatively affect the range of the individual’s cognitive, socio-emotional, behavioral, and physical development (Cprek et al., 2019; McDermott et al., 2013), the development of linguistic skills, learning and both physical and mental health (Sheridan & McLaughlin, 2020; Shonkoff & Garner, 2012). ACEs have also been associated with an increased overall risk of developmental delay (Blodgett & Lanigan, 2018; Liming & Grube, 2018), including social or behavioral delays in children aged between 1-5 years old (Cprek et al., 2019).

1.1.3.1. Physiological impact of adverse childhood experiences

Both positive and adverse childhood experiences can have a significant influence on long-term health (Shonkoff, 2016). By focusing on the impact of ACEs on an individual’s life, research has demonstrated a strong correlation between ACEs and the development of damaging health outcomes later in life (Almuneef et al., 2016; Cunnigham et al., 2014; Dube et al., 2009; Riedl et al., 2020; Sachs-Ericsson et al., 2017) and increased risky behaviors as well (Chang et al., 2019). Adversity can cause disruptions in physiological levels and biological memories. The brain, the cardiovascular system, the immune and endocrine system, and the metabolic regulation are affected. However, these disruptions might last through adulthood, causing lifelong impairments (Barboza Solís et al., 2015; Danese & McEwen, 2011; Shonkoff et al., 2012).

Individuals who have a history of exposure to childhood adversity are at risk for developing various problems of physical health such as heart disease, stroke (Anda et al., 2006; Gilbert et al., 2010), obesity (Felitti, 1993) and asthma (Wing et al., 2015). Moreover, other health consequences correlated to ACEs are linked to insufficient sleep (Kajeepeta et al., 2015), diabetes (Huang et al., 2015), and chronic diseases (Hughes et al, 2017). Recent studies have demonstrated that experiencing adversities as a child may contribute to unhealthy coping mechanisms in adulthood (Campbell et al., 2016) like smoking, drinking (Chang et al., 2019), using substances, and taking sexual risks (Hughes et al., 2017). Emotional eating has also been identified as a common strategy among sexually abused individuals, which helps them manage their dysphoric feelings (e.g., anxiety, depression) and escape from other’s attention (Felitti, 1993).

Consequently, adolescents or adults prone to risk-taking behaviors are at higher risk of several dangers. They may have difficulty creating and preserving supportive relations, and they may also be at higher risk of displaying delinquent or antisocial behaviors. Furthermore, they are more likely to perform poorly at school, face challenges in finding employment later in life, experience poverty, and have difficulties creating stable and functional romantic relationships (Shonkoff et al., 2012).

ACEs have also been linked to high mortality rates, with some differences based on an individual's sex. For example, men's risk of death is 57% higher among those who have experienced at least 2 ACEs compared to those with no exposure to ACEs. Similarly, women who have experienced one ACE exhibit a 66% increased risk of mortality, while those with two or more ACEs face an 80% higher risk compared to those with no history of ACEs (Kelly-Irving et al., 2013). On the other side of the spectrum, parental ACEs are associated with poor birth outcomes, such as low birth weights and preterm births. Accordingly, these adverse birth outcomes may increase the risk of perinatal and neonatal mortality (Smith et al., 2016). In summary, ACEs can not only affect individuals who have experienced childhood adversity by increasing their vulnerability to adverse health outcomes but also can influence the next generation at its most sensitive period of life.

1.1.3.2. Psychological impact of adverse childhood experiences

Besides the detrimental implications of ACEs on physical health, their harmful effects are expanded at a deeper psychological level for individuals who have experienced adversity in their childhood when they were still emotionally immature and malleable. Advances in the field of psychology have shown that ACEs also constitute risk factors for the development of psychopathology (Cicchetti & Toth, 1995; Green et al., 2010; Herzog & Schmahl, 2018; Lee et al., 2020; McLaughlin et al., 2012; Riedl et al., 2020; Sheridan, 2020). Adversity during childhood can influence specific personality traits differently (Leikas & Salmela-Aro, 2015; Paris, 2018; Schouw et al., 2020; Shiner et al., 2017). For instance, potentially traumatic childhood experiences have been associated with traits such as factor 2 psychopathy, borderline personality disorder, and vulnerable narcissism that together constitute the vulnerable dark triad (Miller et al., 2010). Looking into the critical periods of development, children between ages 3-5 are at a neurodevelopmental stage where their hippocampus is developing (Andersen, 2008), and as a result, they are vulnerable to adversity, which can later contribute to the onset of PTSD and dissociation (Schalinski et al., 2016). Additionally, the pre-adolescent period

seems to be another sensitive period from a developmental point of view (Schalinski et al., 2016).

The imprint of adversity can be expressed through internalizing problems (Edwards et al., 2003) and externalizing problems (Biederman et al., 2011; De Sanctis et al., 2012). It seems that childhood adversities are tightly associated with behavior and substance use disorders, possibly due to the development of brain areas related to impulsivity (McLaughlin et al., 2010; Pollak et al., 2010). High risk for depression (Danese et al., 2009; Felitti et al., 1998), posttraumatic stress disorder (PTSD) (Chang et al., 2019; Green et al., 2010; Tabb et al., 2022), and borderline personality disorder (BPD) (Widom et al., 2009) is reported as well. Nevertheless, ACEs seem to be less associated with fear disorders (especially with specific phobia and social phobia than with panic disorder or agoraphobia) (McLaughlin et al., 2012).

Regarding the diverse relationships that emerge between ACEs, sexual abuse seems to have the strongest association with psychiatric disorders (Kendler et al., 2000; McLaughlin et al., 2012; Mullen et al., 1993). Children younger than 12 years old who had earlier exposure to sexual abuse were in a risk group for developing depressive symptoms, whereas children having experienced this type of abuse at an older age were more likely to deal with PTSD symptoms (Schoedl et al., 2010). An additional interesting finding is that maltreatment has been associated with the development of young adult antisocial behavior and criminality. In contrast, individuals who had experienced moderate to severe maltreatment are at a three-and-a-half riskier level for arrest (De Sanctis et al., 2012). Moreover, it seems that children exposed to emotional neglect at ages between 13 and 14 years old are more likely to express dissociative symptoms like depersonalization and derealization later in life (Schalinski et al., 2016).

1.1.4. The importance of children's age during exposure to adversity

The existing literature indicates that the initial five years of life constitute a crucial phase for brain development with multiple cognitive, emotional, and social effects (Cprek et al., 2019). From a neurobiological point of view, plentiful glucocorticoid receptors found in the brain areas of the amygdala, hippocampus, and prefrontal cortex, and exposure to stressful experiences has been illustrated that it can alter the size and neuronal architecture of these regions along with affecting learning, memory, and executive function (Shonkoff & Garner, 2012). Chronic stress is related to hypertrophy and overactivity in the amygdala and orbitofrontal cortex. At the same time, similar levels of adversity may result in neuronal loss and disruption of neural connections in the hippocampus and medial prefrontal cortex

(Hasterman, 2021). Two types of environmental experiences can be considered adversity: threat and deprivation. Plasticity is indicated in early childhood when the neural systems are involved in understanding threats and safety. If there is frequent exposure to threats, these systems can be altered. This alteration enhances the rapid detection of possible threats and triggers intense emotional and behavioral reactions to threats (Sheridan, 2020). On the other side of the spectrum, in deprivation due to the lack of interactions and stimuli, the neural system may exhibit reduced redundancy, resulting in thinning of the cortex and impaired behavior (Sheridan, 2020).

1.2. Vulnerable dark triad

1.2.1. *Definition*

In the field of personality psychology, research has also focused on investigating the dark traits of personality. Through this examination, a model combining both vulnerable and dark traits, known as the vulnerable dark triad (VDT) model, which constitutes factor 2 psychopathy, vulnerable narcissism, and BPD, has been proposed (Miller et al., 2010). This alternative model differs from Dark Triad (D3) which includes the traits of psychopathy, narcissism, and Machiavellianism (Paulhus & Williams, 2002), Dark Tetrad (D4) which constitutes from the previous traits of Dark Triad with the addition of sadism (Paulhus et al., 2020) and the Dark Core which introduces that there is a common fluid dark fundamental element the “Dark Factor of Personality” (*D*) which seems to be the root of all dark traits (McLarnon & Tarraf, 2017; Moshagen et al., 2018). Looking at a deeper level of analysis, VDT is characterized by an antagonistic interpersonal style, including features of hostility, aggression, defensiveness, and conflict interactions with others, as well as by vulnerability in emotional level concerning emotional dysregulation and negative emotionality (Curtis & Jones, 2020). In general, VDT combines socially undesirable or otherwise “dark” behaviors with emotionally vulnerable traits (Miller et al., 2010). Behaviors characterized by vulnerability can induce complex patterns of emotional instability, a very vulnerable self-perception, challenges in relationships, and the implementation of manipulative strategies toward other people (Gamache et al., 2023). Among them, emotional instability seems to be at the core of the vulnerable triad (Bonfá-Araujo & Schermer, 2024). Finally, recent studies have also demonstrated that all the VDT components may share a general underlying factor that can lead to the expression of these traits (Gamache et al., 2023).

1.2.2. *Vulnerable dark triad traits*

Factor 2 psychopathy. The first trait of VDT is factor 2 psychopathy (Miller et al., 2010). Psychopathy has been described as the first personality disorder that was documented in psychiatry, and it is characterized by deduced characteristics of personality and behaviors that are outside of the social norms (Hare & Neumann, 2005). A more thorough examination of the structural models of psychopathy has shown that factor 1, or “primary psychopathy” incorporates some “interpersonal and affective” items, while factor 2 (or “secondary psychopathy) includes mostly “socially deviant items” (see Table 3) (Hare & Neumann, 2005; Harpur et al., 1989; Skeem et al., 2007). Factor 2 psychopathy has been described as followed by a more impulsive and antisocial lifestyle (Maheux-Caron et al., 2024), which may further be associated with the behavioral aspect of psychopathy (Gamache et al., 2023). In addition, it is positively associated with the expression of anger (Morrison & Gilbert, 2001), antisocial behavior, and Neuroticism (Jakobwitz & Egan, 2006) and negatively with Conscientiousness, Agreeableness, and Extraversion (Miller et al., 2010). Individuals who score higher in factor 2 psychopathy confront challenges as regards their social networks and employment while also being at risk of substance abuse and encountering legal issues (Patrick, 2006). Illuminating the underlying path of their behavior, one can consider that the absence of long-term goals and their focus solely on the present can drive them to adopt more impulsive and detrimental behaviors (Yildirim & Derksen, 2015).

Table 3.

Psychopathy-Checklist-Revised (Hare & Neumann, 2005)

Factor 1	Factor 2
1. Glibness and/or superficial charm	1. Needs stimulation/ proneness to boredom
2. Grandiose sense of self-worth	2. Parasitic lifestyle
3. Pathological lying	3. Poor behavioral controls
4. Conning and/or manipulative	4. Early behavior problems
5. Lack of remorse or guilt	5. Lack of realistic, long-term goals
6. Shallow affect	6. Impulsivity
7. Callous and/or lack of empathy	7. Irresponsibility
8. Failure to accept responsibility	8. Juvenile delinquency
	9. Revocation of conditional release

Vulnerable narcissism. The second trait of VDT is vulnerable narcissism. The initial unidimensional model of narcissism or narcissistic personality disorder (NPD) was updated to a two-dimensional model including both grandiose and vulnerable narcissism (Miller et al., 2021). Nevertheless, many studies have mentioned two or more types of narcissism (Crowe et al., 2019; Krizan & Herlache, 2018; Miller & Campbell, 2008; Russ & Shedler, 2013). An exploration of the essential characteristics of this trait reveals that people with this trait (a) behave in an antagonistic way (hostile attribution bias), (b) seek entitlement and believe that people around them should specially treat them due to their vulnerability, (c) usually express anger and aggression, (d) have low levels of self-esteem (e) and experience depression, anxiety, hostility, paranoia, and interpersonal sensitivity (Miller et al., 2011). Further, vulnerable narcissism has also been correlated to egocentrism, lack of trust in other people, social withdrawal, and intense negative affectivity (Miller et al., 2021). On the contrary, this trait is associated with low levels of Agreeableness and Extraversion (Hendin & Cheek, 1997; Miller et al., 2017) and high levels of Neuroticism/ negative emotionality, an essential characteristic that is encountered in many personality disorders (Saulsman & Page, 2004). Finally, an exciting finding indicates that this trait is closer to BPD than to NPD (Miller et al., 2011), due to overlapping characteristics and underlying emotional dynamics.

Borderline personality disorder. The last construct of VDT is the BPD (Miller et al., 2010). In general, BPD can lead to intense changeability in the individual's emotional state, sense of self, and relationships (Gunderson et al., 2018). By focusing on the borderline personality disorder, the low level of Agreeableness (Miller et al., 2010) and high levels of Neuroticism, interpersonal antagonism, as well as impulsivity (Hilbig et al., 2020; Samuel & Widiger, 2008), are enlisted as the most outstanding. Researchers in their effort to uncover the dimensional structure of BPD within a non-clinical sample, they determined the following second-order components: Emptiness/Identity, Impulsiveness/Instability, Intense Anger, Suicide, and Quasi-Psychotic Experiences (Fonseca-Pedrero et al., 2011). Besides, this trait often leads individuals to experience anger (Gardner et al., 1991) and anticipate hostility from others (Critchfield et al., 2008). Moreover, individuals with this trait usually suffer from depression, anxiety, stress, paranoid ideation, and hallucinatory predisposition (Fonseca-Pedrero et al., 2011). Except for the difficulties mentioned above, these people are at high risk for developing distress, emotional dysregulation, and symptoms of psychopathology, as well as BPD (Gardner & Qualter, 2009; Leung & Leung, 2009). Finally, there is a claim that the

unique features of BPD may constitute the key elements of the personality disorders (Gamache et al., 2023).

1.2.3. Similarities among the traits of the vulnerable dark triad

A statement has been made supporting that all these traits: factor 2 psychopathy, vulnerable narcissism, and borderline personality disorder share some common characteristics (Bonfá-Araujo & Schermer, 2024; Curtis & Jones, 2020; Miller et al., 2010). The result obtained from the above analysis of each trait is that high levels of neuroticism and low levels of agreeableness are detected in all of them. Also, they show low levels of Conscientiousness (Miller et al., 2010). According to previous studies, the core element of VDT is emotional instability (Bonfá-Araujo & Schermer, 2024; Gamache et al., 2023; Miller et al., 2010). Concerning the similarities among specific traits, it seems that vulnerable narcissism and borderline personality disorder are closer, and together, they constitute the most dominant traits of the VDT (Gamache et al., 2023; Miller et al., 2011), while factor 2 psychopathy indicates the slightest similarity with the other traits (minor association with negative affectivity and psychopathology and higher with externalizing behaviors) (Gamache et al., 2023).

Individuals with vulnerable narcissism or borderline personality traits usually have a more fragile perception of themselves are more sensitive to criticism; and therefore, they indicate intense and broad emotional reactions (Gunderson et al., 2018; Miller et al., 2021). Borderline personality shares some characteristics with factor 2 psychopathy regarding impulsive behavior. However, there is a meaningful difference as in borderline personality the impulsivity is expressed because of the deeper emotional dysregulation, while in factor 2 psychopathy, the more profound need for satisfaction drives the impulsive behavior (Leichsenring et al., 2011; Yildirim & Derksen, 2015). Ultimately, vulnerable narcissism and factor 2 psychopathy meet at two points: individuals with this trait manipulate other people, and they want to have an advantage. Nevertheless, the core factors leading to these characteristics are not similar. For example, in factor 2 psychopathy, there is a lack of self-control concerning manipulation, while in vulnerable narcissism, there is a fragile self that leads to the search for validation (Miller et al., 2021; Yildirim & Derksen, 2015).

Furthermore, it seems that all these traits that constitute the VDT are connected to emotional reactivity, while individuals having these characteristics seem to be more interpersonal reactive (Curtis & Jones, 2020), express hostility (Curtis & Jones, 2020; Gamache et al., 2023) and negative emotionality, and feel jealousy (Maheux-Caron et al., 2024). They

have internal drives for proximity and intimacy and want connections and relationships with other people (Miller et al., 2010). Additionally, while they are capable of understanding and sharing the emotions of others, they show “affective dissonance” (envious and vengeful feelings) (Gamache et al., 2023; Maheux-Caron et al., 2024). Upon deeper investigation, it becomes evident that their primary difficulty in emotional regulation can result in the expression of aversive and arbitrary behaviors (Bonfá-Araujo & Schermer, 2024).

1.3. Adverse childhood experiences and development of vulnerable dark triad traits

1.3.1. The role of ACEs in the development of VDT traits

The section addressing the impact of ACEs on various psychological dimensions, mentioned that ACEs may influence the development of specific personality traits. By shedding some light on the shared etiological pathway for the development of the VDT’s traits, it was revealed that there are significant correlations with some specific types of adverse early experiences, such as childhood abuse, neglect, and parenting profiles, including cold and invalidating parents (Miller et al., 2010). Further research has indicated that borderline personality and vulnerable narcissism mediate the relationship between ACEs and the risk of suicide (Wilson et al., 2023). In addition, previous studies have shown that factor 2 psychopathy was strongly related to childhood sexual and physical abuse. At the same time, the linked impulsive antisocial behavior seems to be associated with exposure to childhood abuse, the experience of traumatic events, as well as with poor socioeconomic conditions (Yildirim & Derksen, 2015; Zarse et al., 2019). Moreover, it seems that the experience of domestic or family violence can lead to the manifestation of factor 2 psychopathy traits (Moreira et al., 2020).

In terms of the second trait of vulnerable narcissism, emotional abuse and neglect, physical neglect, and the existence of a family member-patient of mental illness have positively correlated with this personality trait (Nguyen & Shaw, 2020). Their tendency to interpret situations as hostile has also been associated with childhood abuse and maltreatment (Dodge et al., 1990). Another finding of great importance is that individuals with the trait of vulnerable narcissism have (a) difficulties in regulating emotions and (b) negative core beliefs about interpersonal relationships that are related to traumatic childhood experiences. As a result, they exhibit behaviors characterized by hostility and lack of trust (Rogosch & Cicchetti, 2004), while parental coldness (cold and rejecting parents) has also been related to this trait (Otway & Vignoles, 2006).

That said, being subjected to adverse experiences during childhood, including emotional, sexual, and physical maltreatment, can be associated with BPD (Battle et al., 2004). Furthermore, individuals with BPD are more likely to have experienced ACEs (Porter et al., 2020). Finally, McDaniel (2022) underlines through research that ACEs and parental invalidation can predict BPD.

Overall, the main conclusion is that in many research investigations, ACEs have been related to the emergence of specific personality traits falling into the VDT, indicating a correlation between early life adversity and the development of these traits.

1.4. Aim and research questions

In recent years, there has been a growing interest in raising awareness about ACEs and childhood trauma. These experiences can have serious consequences impacting health and development in the present but also in the future (Lynn et al., 2023; Nelson et al., 2020; Rod et al., 2020) and they may affect certain personality traits (Leikas & Salmela-Aro, 2015; Paris, 2018; Schouw et al., 2020; Shiner et al., 2017).

It is currently under-researched how ACEs may be linked to the vulnerable dark triad. The relevant literature mentions that ACEs are risk factors for the onset and the expression of that vulnerable and darker side of a person's personality (Miller et al., 2010). However, to our knowledge, there is a gap in the existing literature as to which ACEs may be linked to specific VDT traits and through which mechanisms of actions ACEs potentially link to increased expression of different personality traits.

This research attempts to shed light on the potential impact of ACEs on the developing child's personality through the systematic review methodology and by exploring the role of ACEs on VDT through meta-analysis. This study aims, through this approach to enrich the literature with insightful evidence for researchers, mental health experts, and clinical and child psychologists and promote prevention, diagnosis, and intervention initiatives. In line with these points, the main objective of the systematic review study and meta-analysis was to map, synthesize, and analyze the existing evidence regarding the impact of ACEs on the development of VDT personality traits during adulthood. As a result, a main review question was formulated to guide the mapping of the existing evidence as follows:

1. *What is the role of ACEs on the development of VDT in adulthood?*

Furthermore, the following specific research questions were applied to guide the analyses of the existing data:

- 2. Is there a difference in the relationship between adverse childhood experiences and some of the traits falling into the vulnerable dark triad?*
- 3. Are adverse childhood experiences mentioned as moderators or mediators in the relationship with the vulnerable dark triad?*
- 4. Are there other moderating or mediating factors in the relationship between adverse childhood experiences and the vulnerable dark triad?*

2. Methods

2.1. Eligibility criteria

In this study, ACEs including *abuse* (psychological, sexual, physical), *neglect* (physical, psychological), *household dysfunction* (substance abuse, mental illness, domestic violence, parental divorce, member in prison) (Felitti et al., 1998; Felitti et al., 2019; Finkelhor, 2020), and *children's exposure to violent, fearful, and stressful* events such as witnessing a crime (Javier et al., 2019) were explored. VDT was investigated as a term referring to (a) *vulnerable narcissism*, (b) *borderline personality disorder* (BPD), and (c) *factor 2 psychopathy* (Miller et al., 2010).

Based on the inclusion criteria of this study, the studies had to be:

- focused on adult participants
- focused on participants with VDT personality traits exposed to at least one adverse childhood experience
- providing quantitative data or using a mixed-methods design
- published in the English language between January 1, 2010 and November 5, 2023 (covering the period from the publication of Miller et al.'s seminal 2010 paper on VDT to the latest search date)

By contrast, the exclusion criteria of this study led to the removal of studies that:

- focused on different age groups than the target one
- focused only on ACEs or VDT without exploring their potential association
- relied solely on qualitative data or a simple literature review
- published in other languages except for English and outside the specified time range

2.2. Types of studies

Considering the types of studies reviewed, this study examined published research containing original quantitative data, including handbooks, peer-reviewed journals, reports, and conference papers. Furthermore, in the context of a more extensive evaluation, further search was conducted for potentially relevant grey literature. However, grey literature was not detected. All types of reports and dissertations with original data were evaluated as well.

2.3. Data sources

To identify potentially relevant research, an extensive search was conducted using the following databases: PsychArticles, PubMed, Scopus, and Science Direct. The reference list of each study included was also screened for potentially relevant data sources. Furthermore, this study included research published within the specific date range that was mentioned above.

The results examined the role of ACEs on the development of personality traits related to VDT in adulthood. All the relevant data were extracted, synthesized, collated, statistically analyzed, and reported.

2.4. Search strategy

The framework of this systematic review and meta-analysis was based on the updated guidelines of the PRISMA2020 statement for systematic reviews and meta-analyses (Page et al., 2021) and on Hansen et al.'s (2022) methodological model for meta-analyses respectively. This model is structured into eight steps:

(1) *Defining the research questions*

The first step concerns the clarification of the research question. This guides the design of the whole study. Aligning with the goals of the examination, the formulation of the core research question of the study was based on the following model: population, exposure, and outcome (PEO). The PEO model is a modified model of population, intervention, control, and outcome (PICO) used for the creation of clear, focused, and strong research questions (Lisik et al., 2021).

P: Young adults 18-39 years old,

E: Adverse childhood experiences (ACEs),

O: Vulnerable dark triad (VDT) personality traits.

(2) *Literature search*

To address phenomena such as publication and selection biases, all relevant published studies that were detected, were screened for this meta-analysis. Moreover, the literature search process was conducted based on (a) the removal of duplicate citations, (b) title and abstract screening for the exclusion of inappropriate studies, and (c) full-text screening of the selected studies (Pigott & Polanin, 2020). The two researchers reviewed each document by assessing the relevance of their title, abstract, and full text using a 3-point scale (0 = “no relevance”, 1 =

“dubious/limited relevance” or 2 = “high relevance”). A comprehensive overview of the sources’ evaluation matrices is provided in Appendix B. The search was applied to the following databases for the published studies: PsychArticles, PubMed, Science Direct, and Scopus (Appendix A). Using the Endnote v20 software, the screening was conducted independently by two researchers based on the inclusion and exclusion criteria. The disagreements arose were resolved through discussion. As a result, the third researcher did not need to be consulted to reach any consensus.

(3) Choice of the effect size measure

The suitable measure for the effect size was chosen according to the available data. In cases where the findings were reported in varied measures, they were converted to a common measure as needed.

(4) Choice of the analytical method

According to the research question of the present study, the most suitable analytical method was the random effects model, as the goal was to manage the variability among studies.

(5) Choice of software

To effectively meet our research requirements, we relied on the utilization of the Metacor and Metafor Packages for conducting meta-analyses with the R Software (Viechtbauer, 2010). This tool fulfilled all the necessary criteria for effectively achieving the research goals.

(6) Coding of the effect sizes

The next step in the process involved the creation of a coding sheet. This meta-analysis focused on examining the relationship between ACEs and VDT personality traits. To ensure efficient data organization, the sheet contained columns for the study's name or identifier, the effect size coded from the primary study, and the study sample size. When mediators were involved, additional columns were included. All the studies included in the meta-analysis had one similar metric Pearson’s r .

(7) Analysis

Before the main analysis, a quality assessment of each study was conducted using the JBI (Joanna Briggs Institute, 2020) tool (Appendix C). The choice of this tool can be justified

by the fact that it is appropriate for the assessment of different study designs covering both studies included (cross-sectional study and correlational study). This tool was selected because it is robust and covers domains such as the study design, variables and measurements, statistical analysis, confounding etc. In addition, although the number of studies is limited, a random effects model was applied, as it was deemed preferable given the differences in measurement and analysis methods among the studies. Then, assessments for heterogeneity and publication bias were performed.

(8) Reporting the results

To complete the process, the Page et al. (2021) checklist for reporting the results was followed. The findings were described in detail, and a discussion concerning their intricacy, potential variations, underlying factors, and suggestions for future research was followed.

3. Results

3.1. Identification of relevant studies

After the initial search, a total number of 236 studies were collected from the databases. These studies were screened by two reviewers in three distinct stages, a) by title, b) by abstract, and c) by full text. At the first level of screening 95 duplicate entries were removed and 141 of 236 studies were found to meet the inclusion criteria. Following the review of the titles, 81 studies fulfilled the requirements, and their relevance to the research questions was further assessed by abstract that led to the inclusion of 56 studies. At the next stage of full-text assessment, while only 6 of the studies were found to be highly relevant.

As a result, the final sample consisted of 6 studies that were article journals. No other publication types or records of grey literature studies met the inclusion criteria. Table 4 offers a basic overview of these 6 studies.

Figure 1 illustrates the detailed progression of studies through each stage of the review. For transparency and in line with open science principles, a comprehensive description of the source evaluation process was uploaded prior to the study to Open Science Framework (Dima et al., 2023).

Table 4.

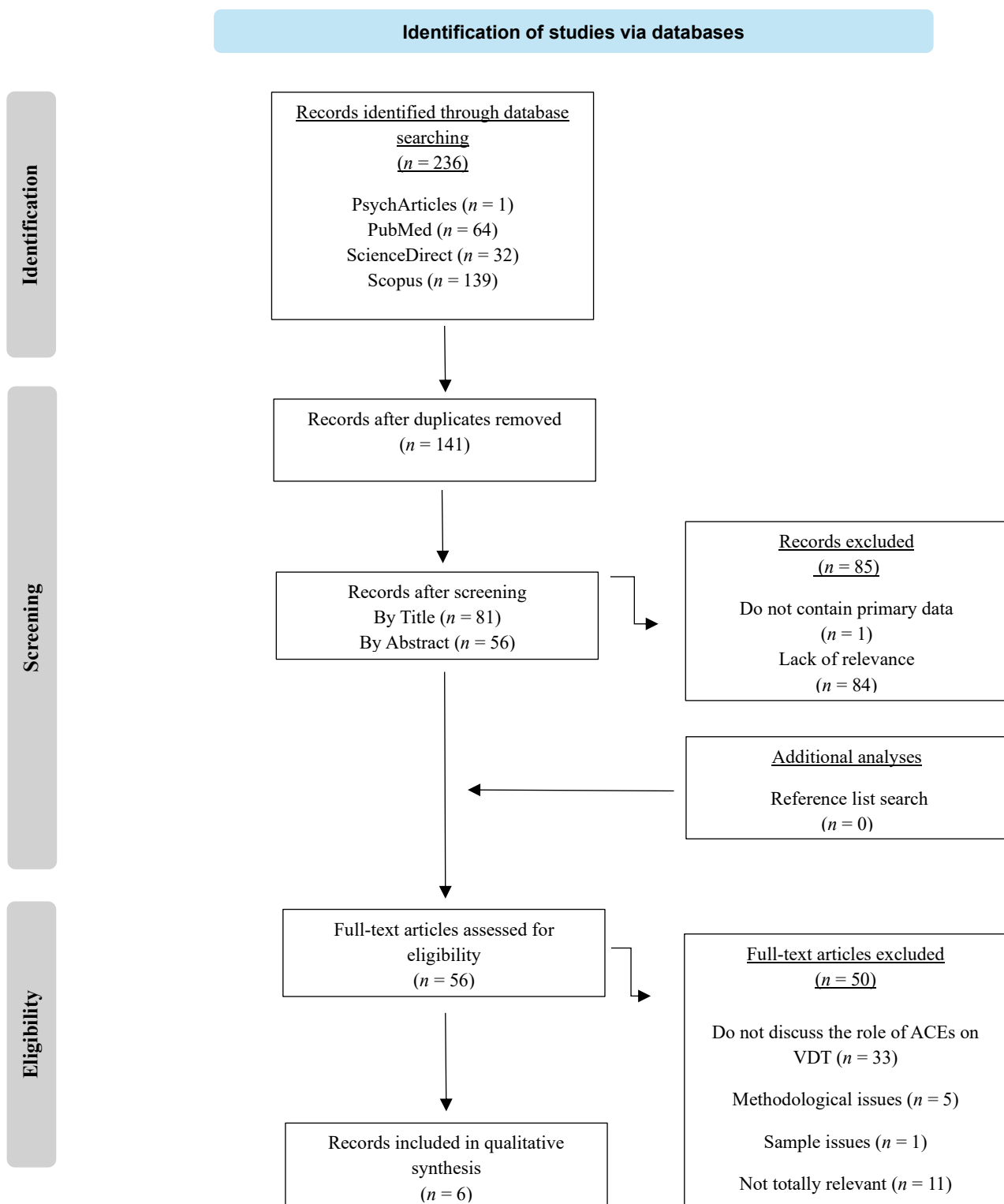
Final sample of studies included for a systematic review

Citation	Full reference
Baptista et al. (2023)	Baptista, A., Chambon, V., Hoertel, N., Olfson, M., Blanco, C., Cohen, D., & Jacquet, P. O. (2023). Associations between early life adversity, reproduction-oriented life strategy, and borderline personality disorder. <i>JAMA Psychiatry</i> , 80(6), 558-566. doi: 10.1001/jamapsychiatry.2023.0694
Bozzatello et al. (2020)	Bozzatello, P., Rocca, P., & Bellino, S. (2020). Trauma and psychopathology associated with early onset BPD: an empirical contribution. <i>Journal of Psychiatric Research</i> , 131, 54-59. doi: 10.1016/j.jpsychires.2020.08.038
Merza et al. (2015)	Merza, K., Papp, G., & Kuritárné Szabó, I. (2015). The role of childhood traumatization in the development of borderline personality disorder in Hungary. <i>The European Journal of Psychiatry</i> , 29(2), 105-118. doi: 10.4321/S0213-61632015000200002
Nguyen & Shaw (2020)	Nguyen, K. T., & Shaw, L. (2020). The aetiology of non-clinical narcissism: Clarifying the role of adverse childhood experiences and parental overvaluation. <i>Personality and Individual Differences</i> , 154, 109615. doi: https://doi.org/10.1016/j.paid.2019.109615

Talmon & Ginzburg (2019)	Talmon, A., & Ginzburg, K. (2019). The intricate role of dissociation in the relations between childhood maltreatment, self-objectification, and narcissism. <i>Psychological Trauma: Theory, Research, Practice, and Policy</i> , 11(8), 909. doi: 10.1037/tra0000452
Wilson et al. (2023)	Wilson, K., Van Doorn, G., & Dye, J. (2023). Vulnerable dark traits mediate the association between childhood adversity and suicidal ideation. <i>Personality and Individual Differences</i> , 202, 111959. doi: https://doi.org/10.1016/j.paid.2022.111959

Figure 1.

Flow diagram for the systematic review regarding ACEs and VDT traits as adapted by the PRISMA Statement (Page et al., 2021)



3.2. Characteristics of included studies

According to the PRISMA 2020 statement (Page et al., 2021), which includes guidelines for reporting systematic reviews, each study's characteristics should be extracted and cited. To achieve better insight, the key characteristics of each study were structured and classified around the following five categories: a) Author(s)' s name(s), b) Study design, c) Participants, d) Measures, and e) Outcomes. The main researcher extracted the data and organized them into a Microsoft Excel spreadsheet, while the second one further investigated and assessed the relevance of the data extracted at a different time point. For more information, table 5 summarizes the key characteristics of the included studies.

Table 5.

Key characteristics of the included studies

Author	Study design	Participants	Measures	Outcomes
Baptista et al. (2023)	Cross-sectional study	30.149 (from 34.653) 892 participants with BPD 29.257 participants without BPD	<ul style="list-style-type: none"> - Early life adversity model - NESARC wave 2 interview (National Institute on Alcoholism and Alcohol Abuse Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV, <i>DSM-IV</i> version). - Reproduction/maintenance trade-off latent factor 	<ul style="list-style-type: none"> - Demographics (gender) - People with BPD scored higher in ACEs, metabolic disorders, body mass index - People with BPD had more children - Bigger exposure to ACEs increased the risk of BPD - People who prioritized short-term reproduction were at higher risk for BPD - Similar results between male and female participants
Bozzatello et al. (2020)	Correlational study	68 (from 70) patients of BPD	<ul style="list-style-type: none"> - SCID-5-CV/PD - SOFAS - SAT-P - BPDSI semi-structured interview - BIS-11 - DES - CTQ-SF retrospective instrument - ACE-IQ 	<ul style="list-style-type: none"> - Traumatic events (abuse, neglect, household dysfunction, bullying) are related to earlier onset of BPD - Non-planning impulsivity is related to earlier onset of BPD - More traumatic events and impulsive dyscontrol hasten psychiatric observation
Merza et al. (2015)	Correlational study	204 153 (from 171) inpatients (80 with BPD, 73 depressed inpatients) 51 healthy controls (from 62)	<ul style="list-style-type: none"> - TAQ - Sexual Abuse Scale of ETI 	<ul style="list-style-type: none"> - Demographics (age, sex, marital status, education, employment) - Emotional and physical neglect experiences and BPD - Prolonged separation and BPD - Emotional and sexual abuse experiences and BPD - Prevalence of ACEs (neglect, emotional, physical, and sexual abuse, witnessing trauma) in BPD patients than depressed and healthy people in three developmental periods - Experiences of severe sexual abuse (incest, penetration, repetitive) in BPD patients - Borderline sexually abused patients were coming from more chaotic family environments than non-sexually abused

Nguyen & Shaw (2020)	Correlational study	263 participants	<ul style="list-style-type: none"> - NPI-40 - HSNS - ACE (questionnaire) - OS of CRS 	<ul style="list-style-type: none"> - The strongest predictors for BPD were sexual abuse, intrafamilial physical abuse, and neglect by caregivers - Descriptive statistics and Pearson's correlation (HSNS, NPI-40, ACE, OS) - ACEs predicted vulnerable narcissism (beyond the impact of past mental health disorders) - ACEs (emotional abuse and neglect, physical neglect, and having a mentally ill member in the household associated with vulnerable narcissism)
Talmon & Ginzburg (2019)	Cross-sectional study	766 participants	<ul style="list-style-type: none"> - CTQ - SOS - B-PNI 	<ul style="list-style-type: none"> - Vulnerable narcissism was correlated with childhood maltreatment (mediator: self-objectification) - The interaction between self-objectification and dissociation predicted both types of narcissism - The correlation between self-objectification and types of narcissism is stronger when their levels of dissociation are lower
Wilson et al. (2023)	Cross-sectional study	1064 participants	<ul style="list-style-type: none"> - ASQ - CES-17 - SRP-III - HSNS - MSI-BPD 	<ul style="list-style-type: none"> - Association between ACEs and risk of suicide - The relationship of ACEs and RoS was mediated by BPD and vulnerable narcissism

3.2.1. Key details

The studies that met all the inclusion criteria are mainly very recent. The publication year ranges from 2020 until 2023 for most of them, while one of them has been published in 2015. Regarding the rationale of the studies included, all investigating the role of ACEs or specific types of ACEs in the development of VDT or in some of the model's traits (e.g. vulnerable narcissism). Specifically, in two (Merza et al., 2015; Talmon & Ginzburg, 2019) of the total studies ($k = 6$), researchers emphasized in specific types of ACEs (namely, in the first study: genital fondling, penetration, neglect, physical abuse and in the second study: maltreatment). Accordingly, in one study (Wilson et al., 2023), all the traits of the uniform model of VDT were explored, while in the following five studies, the focus was on a specific trait of the model (namely in the study of Baptista et al., (2023), Merza et al., (2015) on BPD, and in the studies of: Nguyen & Shaw (2020) and Talmon & Ginzburg (2019) on VN). Finally, as concerns Bozzatello et al. (2020) study, even though the researchers were investigating the ACEs and how they were associated with BPD, their scientific interest was focused on the age of onset of the BPD.

3.2.2. Study design and participants

As it is depicted in Table 2, most of the studies followed a correlational study design (Bozzatello et al., 2020; Merza et al., 2015; Nguyen & Shaw, 2020) and a cross-sectional design (Baptista et al., 2023; Talmon & Ginzburg, 2019; Wilson et al., 2023). The study of Baptista et al. (2023), differentiates from the other studies with a cross-sectional design, as cross-sectional data from the second wave of the National Epidemiologic Survey on Alcohol and Related Conditions in 2004-2005 was used.

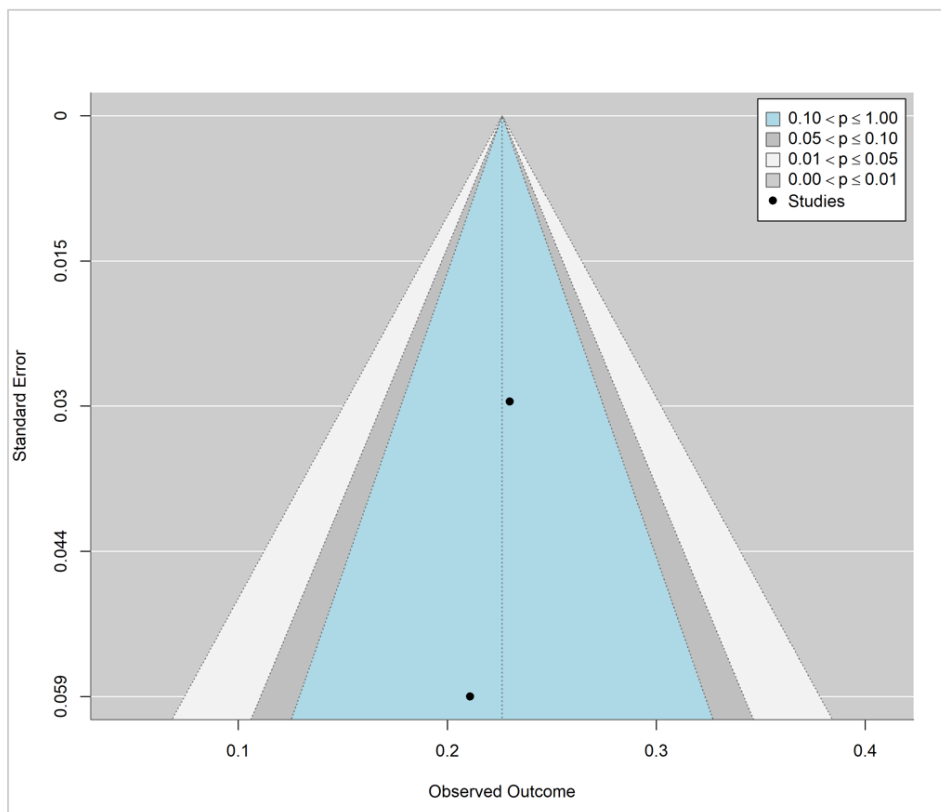
Concerning the characteristics of the studies, in all studies there was information as regards the age of the participants. In some cases (Baptista et al., 2023; Merza et al., 2015; Porter et al., 2020), there is a grouping of the participants according to a specific personality trait (e.g. participants with BPD), while at the same time there is also a group of healthy control participants. Additionally, in two of these three studies (Merza et al., 2015; Porter et al., 2020) there is also a third group including other controls (e.g. depressed inpatients and psychiatric controls accordingly). The remaining studies included only a group of participants with traits of VDT.

3.3. Exploratory meta-analysis

In an attempt to synthesize the existing data and generate new insights concerning this under-investigated field, an exploratory meta-analysis to examine the correlation between ACEs and VDT was conducted. Especially, the studies that were included in this meta-analysis explored the role of ACEs in the expression of the personality trait of vulnerable narcissism. A total of $k = 2$ studies were included in the analysis, with a total of 1,327 observations. The total number of individuals was $N = 1.327$, while the majority of them were female (female: $N = 1.068$, male: $N = 196$, non-binary: $N = 63$). Regarding their geographical location, most of them were from America, and fewer were from Australia, the United Kingdom, and other countries. All participants were adults of approximately 38.39 y.o.a ($SD = 6.605$). Details for individual studies are presented in Table 5 above. The first study by Nguyen and Shaw (2020) described a correlation of $r = 0.21$ with a 95% confidence interval (CI) of [0.0924, 0.3237], contributing 19.7% to the overall analysis. While the second study by Wilson et al (2023) provided a correlation of $r = 0.23$ with a 95% CI of [0.1723, 0.2861], contributing 80.3% to the overall analysis. To visualize the effect sizes and the CI of each study included in the meta-analysis and to obtain a better insight of the results a drapery plot was created (Figure 2).

Figure 2.

Drapery plot

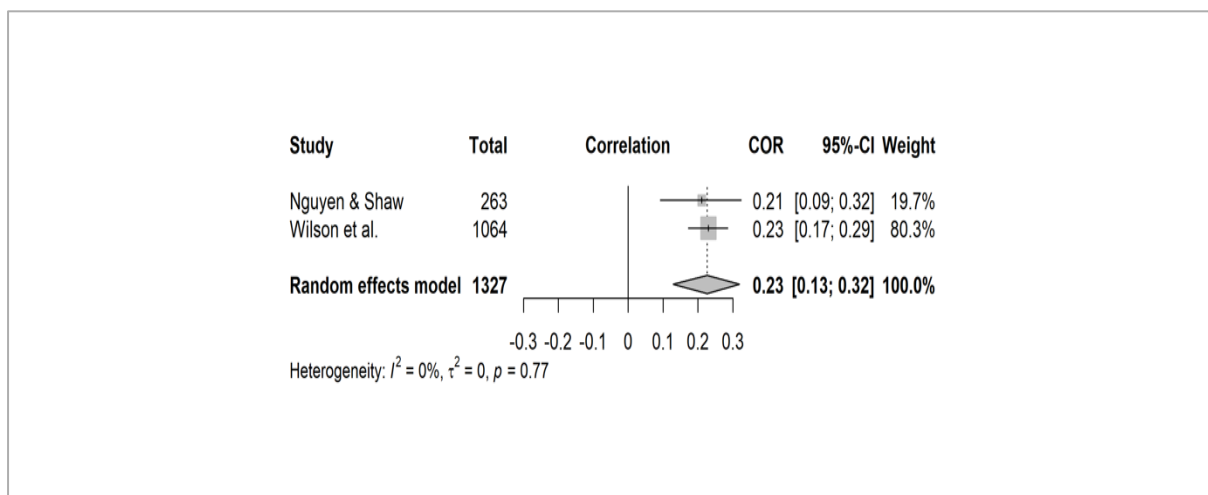


3.3.1. Overall effect estimates

The random effects model that was applied showed an overall correlation of $r = 0.23$, with a 95% CI of [0.1286, 0.3196], a $t = 29.00$, and a $p = 0.02$. A comprehensive display of the overall correlation can be provided by the following forest plot (Figure 3). Quantifying heterogeneity indicated $\text{Tau}^2 = 0$, $\text{Tau} = 0$, and $H = 1.00$. The tests of heterogeneity showed no significant variability among the studies, $Q(1) = 0.08$, $p = 0.77$, $I^2 = 0.0\%$. The meta-analytical method that was employed was the inverse variance method with the restricted maximum-likelihood estimator for Tau^2 . A Hartung-Knapp adjustment for the random effects model ($df = 1$) was applied, and Fisher's z transformation of correlations was used. The results derived indicated a small but significant positive correlation between ACEs and the trait of vulnerable narcissism.

Figure 3.

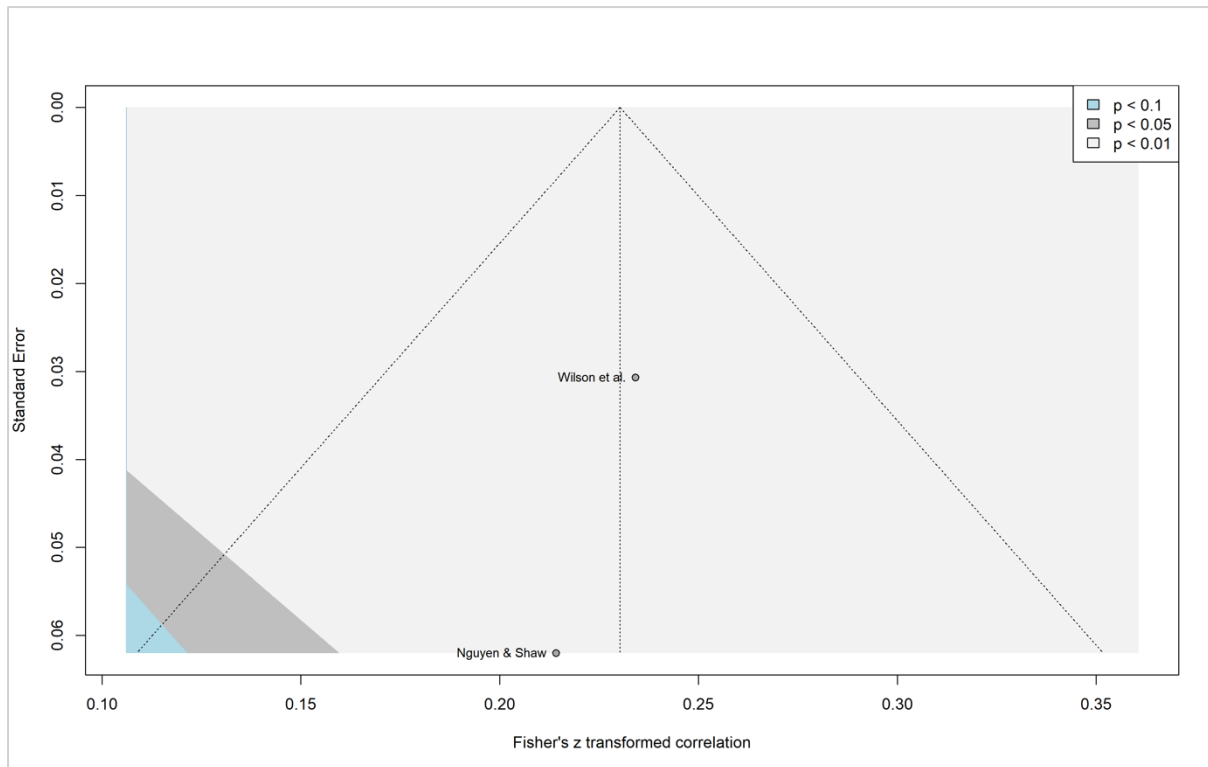
Forest plot



Finally, to assess the presence of publication bias a funnel plot was used (Figure 4). Because this meta-analysis included a very small number of studies and was exploratory, the results should be interpreted with caution. Based on these two studies it is difficult to draw conclusions about publication bias. Notwithstanding these limitations, the results of these studies can provide some information. As can be depicted in the following plot, both studies seem to be close to the overall effect size and they seem to have narrow CI, suggesting that there is possibly a consistency between these studies.

Figure 4.

Funnel plot



3.3.2. Mediating variables: qualitative analysis

In none of the studies included in the systematic review, ACEs were mentioned as mediating or moderating factors. However, in the cross-sectional study of Wilson et al. (2023), vulnerable dark traits, namely vulnerable narcissism and borderline personality disorder mediated the relationship between ACEs and risk of suicide (Figure 5) indicating that people who have experienced adversity in childhood and have developed these personality traits may be due to their instability (borderline personality disorder) and vulnerability (vulnerable narcissism) had increased possibility to commit suicide.

Due to the small number of studies, moderator or mediator analyses could not be implemented. However, in some studies, some variables that seem to have a moderating or mediating role in the relationship between ACEs and VDT personality traits are mentioned. In detail, in the study of Baptista et al. (2023), it was revealed that the latent reproductive-maintenance trade-off factor was mediating the relationship between ACEs and VDT. For example, the risk of the development of BPD in people who have experienced high levels of adversity in childhood was increased by 56.5% when the people had as a strategy the immediate reproduction as distinct from somatic maintenance. There were also no differences mentioned according to the sex group of the participants in this study (Figure 6). Furthermore, in the study of Talmon and Ginzburg (2019), the researchers tried to identify potential factors mediating

or/and moderating the relationship between maltreatment and vulnerable narcissism. It was unveiled that the variable of “self-objectification” is relevant and constitutes a mediator, since as it is cited, the indirect effect of maltreatment on this type of narcissism through self-objectification was significant, while the direct effect was not significant (Figure 7).

Figure 5.

Illustration of mediation analysis conducted by Wilson et al. (2023)

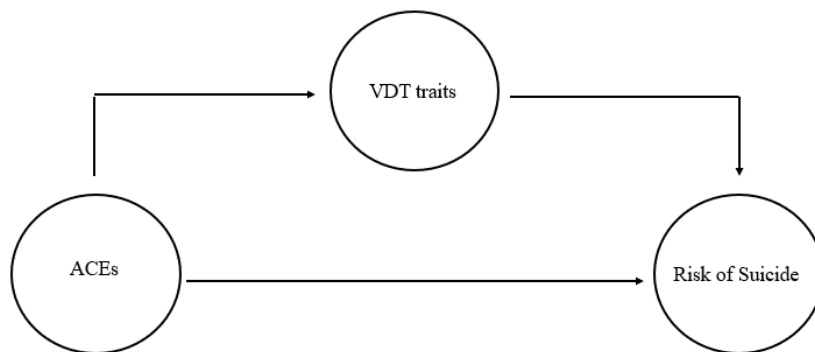


Figure 6.

Illustration of mediation analysis conducted by Baptista et al. (2023)

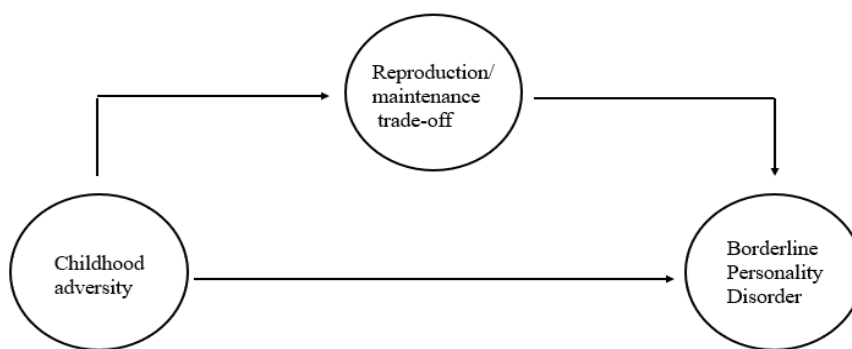
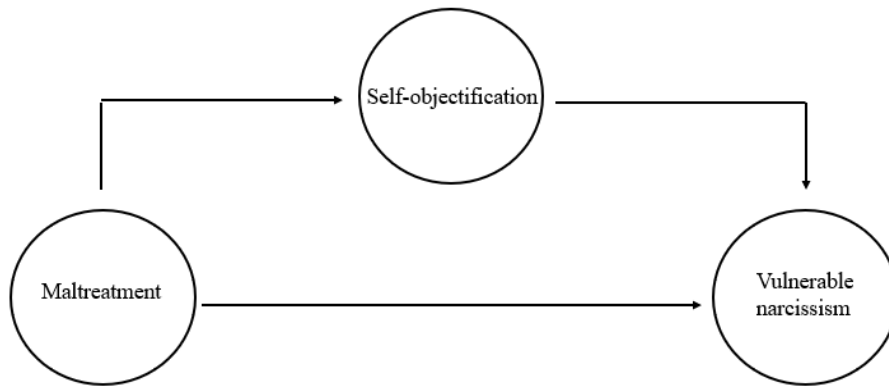


Figure 7.

Illustration of mediation analysis conducted by Talmon & Ginzburg (2019)



Discussion

Common findings

The present study aimed to investigate the role of ACEs in the expression of the personality traits of VDT, namely factor 2 psychopathy, vulnerable narcissism and borderline personality disorder. To fulfill the goals of this study, a systematic review and an exploratory meta-analysis were conducted. From an extensive search in the selected databases, six relevant studies investigating the role of adverse childhood experiences on the development of these specific personality traits were identified. The data extracted by the studies included in the present systematic review were in line with findings reported in the literature regarding the effect of ACEs on the shape of dark and vulnerable personality traits (McDaniel, 2022; Moreira et al., 2020; Miller et al., 2010; Nguyen & Shaw, 2020; Porter, 2020; Yildirim & Derksen, 2015; Zarse et al., 2019).

Although ACEs have been already linked to these traits in single studies, the unit model of VDT has not been extensively investigated. Therefore, this systematic review gathers all the information that there was in the literature for each trait and extends the seminal work of Miller et al. (2010) regarding the model of VDT. Specifically, the present systematic review demonstrated that ACEs generally exist in the personal history of people who develop factor 2 psychopathy, vulnerable narcissism, and borderline personality. To proceed with stronger evidence an exploratory meta-analysis was conducted.

However, due to the permitted number of studies, the meta-analysis included only $k = 2$ studies investigating the trait of vulnerable narcissism. Findings indicated that there is a small but significant correlation between ACEs and the trait of vulnerable narcissism, which confirms the evidence from the existing literature enhancing that people with this personality trait had experienced negative childhood experiences and/or that they had authoritarian parents (Dodge et al., 1990; Ewing, 2020). Moreover, the present study extends the existing literature as, to our knowledge, is the first one investigating the role of ACEs in the development of this personality trait through an exploratory meta-analysis. Even though analysis between ACEs and the model of VDT could not be conducted due to the nature and the diversity of the data; from the analysis completed it can be supported that ACEs may contribute to the development of emotional and psychological vulnerabilities that may enhance the trait of vulnerable narcissism and lead to the development of a more fragile side of personality. In other words, it seems that adversity

in childhood can shape a vulnerable dark personality style characterized by defensive and insecure grandiosity covering deep-seated feelings of inadequacy, incompetence, and negative emotions (Miller et al., 2011). At this point, it has also to be mentioned that because of the data provided from each study and the inability to conduct more analyses concerning the other traits of the model, we cannot spot whether there are differences in the relationship between adverse childhood experiences and each trait falling into the VDT.

Mediating factors

None of the studies mentioned ACEs as mediators. However, VDT traits were identified as mediators. Notably, the traits of vulnerable narcissism and borderline personality disorder were identified as mediators in the relationship between ACEs and the risk of suicide. In line with the findings of the present study, high exposure to adversity in childhood is associated with greater experience of factor 2 psychopathy, vulnerable narcissism, and BPD. However, only vulnerable narcissism and BPD have been linked to risk of suicide (Wilson et al., 2023). The impulsivity and instability of people with BPD can be enhanced by ACEs and can constitute, among other factors, risk factors for suicide (Harrop et al., 2017; Wilson et al., 2023). At the same time, ACEs can contribute to vulnerable narcissism, and people with this trait to avoid negative feelings, distance themselves and lose their hope. As a result, this strategy and feelings may increase the risk of suicide (Zajenkowski et al., 2021). On the other side, the unique characteristics of factor 2 psychopathy such as aggression and antisocial behavior (Maheux-Caron et al., 2024), do not seem to be correlated with an increased risk of suicide (Angelakis, 2019).

Furthermore, in this study, some mediating factors in the relationship between ACEs and VDT have been further examined. Specifically, the latent reproduction/maintenance trade-off factor mediates the relationship between ACEs and BPD (Baptista et al., 2023). The results of the present study are in accordance with Baptista et al. (2023), mentioning that the appearance of BPD is a developmental reaction to early adverse life conditions. They additionally highlight that these people with BPD, based on this latent reproduction/maintenance trade-off factor possibly put first the immediate reproductive efforts over long-term health and stability. This coping strategy includes impulsivity, risk-taking, and negative emotionality, which promote earlier sexual activity, promiscuity, and competition for status and partners. These behaviors serve as coping mechanisms to counterbalance the challenges that have been created by adverse experiences (Otto et al., 2021). Another mediator

factor is the self-objectification which mediates the relationship between maltreatment and vulnerable narcissism (Talmon & Ginzburg, 2019). This factor has its roots in the violation or neglect of children's needs, while the expression of narcissism somehow reflects children's attempts to make up for these unmet needs (Talmon & Ginzburg, 2017). Namely, children are treated as invisible or used by their caregivers, while they are growing up their sense of self can be disrupted and this may contribute to the excessive pursuit of acknowledgment and recognition by others, which potentially can lead to the development of the core characteristics of vulnerable narcissism (Talmon & Ginzburg, 2019). Moreover, the factor of self-objectification might intensify feelings of inadequacy and insecurity that characterize people with this specific personality trait.

In summary, the findings that were revealed may demonstrate that both mediators likely share a common root concerning self-image. Specifically, the reproduction/maintenance trade-off strategy, may be influenced by a fragile sense of self, and self-objectification can be rooted in a distorted self-image shaped by the unmet emotional needs. Both mediators can be seen as attempts to counterbalance for the emotional deficits created by ACEs. Also, it can be claimed that people who put immediate reproduction over health maintenance might turn to self-objectification as part of their strategy. In detail, self-objectification can lead people to perceive themselves as objects and to focus only on the surface, on things such as appearance. In both cases, it seems that these people may capitalize on more surface-level characteristics and short-term situations over deeper qualities due to their fragility.

Gaps in the literature

Most of the studies have investigated the relationship between ACEs and specific traits of the model. The majority of them focused on BPD (Baptista et al. 2023; Bozzatello et al., 2020; Merza et al., 2015), few on vulnerable narcissism (Nguyen & Shaw, 2020; Talmon & Ginzburg, 2019), while only one study has investigated the unit model of VDT (Wilson et al., 2023). These results reveal a gap in the existing literature regarding this model of personality traits. Moreover, from the total number of studies collected through this search, it can be concluded that there is a lack of empirical evidence concerning the association between ACEs and VDT personality traits overall. However, as it was mentioned before, there are indications in the literature that adversity in childhood can have implications for the development of VDT personality traits (McDaniel, 2022; Moreira et al., 2020; Miller et al., 2010; Nguyen & Shaw, 2020; Porter, 2020; Yildirim & Derksen, 2015; Zarse et al., 2019). The present study aimed to

gather all the relevant information in the literature from 2010, when a seminal paper on VDT was published (Miller et al., 2010), until 2023, in order to provide a comprehensive account of this subject since this time.

Through this study, it was stressed that this field is still under-investigated despite its great importance. Researchers in the fields of personality development, developmental psychology, and clinical psychology as well as clinicians, parents, and teachers need to have access to evidence on the development of these vulnerable and dark traits of personality in combination with the mediator factors, in order to develop efficient prevention and intervention approaches. At the same time, in this way, appropriate practices concerning the breeding of children can be adopted. Moreover, the spread of scientific knowledge in this field will raise acknowledgment regarding the consequences of ACEs.

Limitations and future directions

It is important to consider the limited number of studies retrieved from the search in the databases. The qualitative synthesis of these studies poses some limitations in the extraction of conclusions regarding the association between ACEs and VDT traits. Furthermore, due to the high level of heterogeneity between studies only one meta-analysis with two was studies conducted. As a consequence, the results from this meta-analysis highlighting that ACEs are correlated with vulnerable narcissism should be interpreted cautiously. Additional assessments for publication bias and other evaluations, were included within an exploratory framework to approach this under-investigated field of study. Moreover, in the present systematic review, since this field of study is under investigated, no records of grey literature were identified and included. The inclusion only of published studies in known academic databases may pose a limitation, as known journals tend to mainly publish studies with statistical significance and, as a result, the objectivity is decreased.

Future studies can emphasize the impact of time exposure to ACEs on personality development, investigating whether the age at which children are exposed to them can elbow in the development of specific personality traits. In addition, studies can explore whether particular types of ACEs are more likely to influence the emergence of specific personality traits. Through the examination of these factors, we can gain an insight into how ACEs affect mental health across the lifespan. Although these relationships are not simple and discrete, research in this field is important for raising awareness about the long-lasting footprint of early

negative experiences and for developing interventions that are effective in confining these effects.

Conclusion

The findings of this study provided a complete and structured review of the role of ACEs on the development of VDT personality traits: factor 2 psychopathy, vulnerable narcissism, and borderline personality disorder. Through a systematic review and an exploratory meta-analysis, it was revealed that there is indeed an effect of ACEs in the shape of these vulnerable and dark personality traits. Furthermore, from an additional qualitative analysis that was conducted, it was found that there are also some mediator factors: the latent reproductive/maintenance trade-off factor in the relationship between ACEs and BPD, self-objectification in the relationship between maltreatment and vulnerable narcissism, while the traits of vulnerable narcissism and BPD mediated the relationship between ACEs and risk of suicide. An important take-away message from this work is the limited number of published studies concerning this subject. Due to this all evidence should be interpreted cautiously, while more research is needed to shed light on this field.

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Appendix A – Systematic Review Search Strategy

Systematic Review Search Strategy

Database: ScienceDirect <January 1, 2010 to November 5, 2023>

Search Strategy:

("vulnerable dark triad") AND ("adverse childhood experiences") (1)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood experiences" OR "childhood trauma" OR maltreatment AND child) (21)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood events" OR "childhood trauma" OR maltreatment OR neglect) (167)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood events" OR "childhood trauma" OR neglect AND child) (18)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood events" OR "traumatic event" OR neglect AND child) (18)

(psychopathy OR narcissism OR "borderline personality disorder" OR BTD OR "vulnerable dark triad") AND ("adverse childhood experiences" OR ACEs OR "traumatic event" AND child) (2)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR ACEs OR "childhood maltreatment") (64)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR ACEs) (32)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood experiences") (29)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood experiences" OR abuse AND child) (43)

(factor two psychopathy OR vulnerable narcissism OR "borderline personality disorder") AND ("adverse childhood experiences" OR "negative childhood experiences") (24)

Database: PsychArticles <January 1, 2010 to November 5, 2023>

Search Strategy:

("vulnerable dark triad") AND ("adverse childhood experiences") (0)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood experiences" OR "childhood trauma" OR maltreatment AND child*) (24)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood events" OR "childhood trauma" OR maltreatment OR neglect) (31)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood events" OR "childhood trauma" OR neglect AND child*) (20)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood events" OR "traumatic event" OR neglect AND child*) (9)

(psychopathy OR narcissism OR "borderline personality disorder" OR BTM OR "vulnerable dark triad") AND ("adverse childhood experiences" OR ACEs OR "traumatic event" AND child*) (1)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR ACEs OR "childhood maltreatment") (9)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR ACEs) (1)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood experiences") (1)

(psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood experiences" OR abuse AND child) (9)

(factor two psychopathy OR vulnerable narcissism OR "borderline personality disorder") AND ("adverse childhood experiences" OR "negative childhood experiences") (1)

Database: PubMed <January 1, 2010 to November 5, 2023> AND <Language, English>

Search Strategy:

("vulnerable dark triad"[Title/Abstract]) AND ("adverse childhood experiences"[Title/Abstract]) (0)

(psychopathy[Title/Abstract] OR narcissism[Title/Abstract] OR "borderline personality disorder"[Title/Abstract] OR "vulnerable dark triad"[Title/Abstract]) AND ("adverse childhood experiences"[Title/Abstract] OR "negative childhood experiences"[Title/Abstract] OR "childhood trauma"[Title/Abstract] OR maltreatment[Title/Abstract] AND child*[Title/Abstract]) (374)

(psychopathy[Title/Abstract] OR narcissism[Title/Abstract] OR "borderline personality disorder"[Title/Abstract] OR "vulnerable dark triad"[Title/Abstract]) AND ("adverse childhood experiences"[Title/Abstract] OR "negative childhood events"[Title/Abstract] OR "childhood trauma"[Title/Abstract] OR maltreatment[Title/Abstract] OR neglect[Title/Abstract]) (445)

(psychopathy[Title/Abstract] OR narcissism[Title/Abstract] OR "borderline personality disorder"[Title/Abstract] OR "vulnerable dark triad"[Title/Abstract]) AND ("adverse childhood experiences"[Title/Abstract] OR "negative childhood events"[Title/Abstract] OR "childhood trauma"[Title/Abstract] OR neglect[Title/Abstract] AND child*[Title/Abstract]) (328)

(psychopathy[Title/Abstract] OR narcissism[Title/Abstract] OR "borderline personality disorder"[Title/Abstract] OR "vulnerable dark triad"[Title/Abstract]) AND ("adverse childhood experiences"[Title/Abstract] OR "negative childhood events"[Title/Abstract] OR "traumatic event"[Title/Abstract] OR neglect[Title/Abstract] AND child*[Title/Abstract]) (172)

(psychopathy[Title/Abstract] OR narcissism[Title/Abstract] OR "borderline personality disorder"[Title/Abstract] OR BTD[Title/Abstract] OR "vulnerable dark triad"[Title/Abstract]) AND ("adverse childhood experiences"[Title/Abstract] OR ACEs[Title/Abstract] OR "traumatic event"[Title/Abstract] AND child[Title/Abstract]) (65)

(psychopathy[Title/Abstract] OR narcissism[Title/Abstract] OR "borderline personality disorder"[Title/Abstract] OR "vulnerable dark triad"[Title/Abstract]) AND ("adverse childhood experiences"[Title/Abstract] OR ACEs[Title/Abstract] OR "childhood maltreatment"[Title/Abstract]) (162)

(psychopathy[Title/Abstract] OR narcissism[Title/Abstract] OR "borderline personality disorder"[Title/Abstract] OR "vulnerable dark triad"[Title/Abstract]) AND ("adverse childhood experiences"[Title/Abstract] OR ACEs[Title/Abstract]) (64)

(psychopathy[Title/Abstract] OR narcissism[Title/Abstract] OR "borderline personality disorder"[Title/Abstract] OR "vulnerable dark triad"[Title/Abstract]) AND ("adverse childhood experiences"[Title/Abstract] OR "negative childhood experiences"[Title/Abstract]) (66)

(psychopathy[Title/Abstract] OR narcissism[Title/Abstract] OR "borderline personality disorder"[Title/Abstract] OR "vulnerable dark triad"[Title/Abstract]) AND ("adverse childhood experiences"[Title/Abstract] OR "negative childhood experiences"[Title/Abstract] OR abuse[Title/Abstract] AND child[Title/Abstract]) (136)

(factor two psychopathy[Title/Abstract] OR vulnerable narcissism[Title/Abstract] OR "borderline personality disorder"[Title/Abstract]) AND ("adverse childhood experiences"[Title/Abstract] OR "negative childhood experiences"[Title/Abstract]) (54)

Database: Scopus <January 1, 2010 to November 5, 2023> AND <Language, English>

Search Strategy:

TITLE-ABS-KEY (("vulnerable dark triad") AND ("adverse childhood experiences")) AND PUBYEAR > 2009 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , "English")) (1)

TITLE-ABS-KEY ((psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood experiences" OR "childhood trauma" OR maltreatment AND child*)) AND PUBYEAR > 2009 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , "English")) (584)

TITLE-ABS-KEY ((psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood events" OR "childhood trauma" OR maltreatment OR neglect)) AND PUBYEAR > 2009 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , "English")) (719)

TITLE-ABS-KEY ((psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood events" OR "childhood trauma" OR neglect AND child*)) AND PUBYEAR > 2009 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , "English")) (560)

TITLE-ABS-KEY ((psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood events" OR

"traumatic event" OR neglect AND child*)) AND PUBYEAR > 2009 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , "English")) (371)

TITLE-ABS-KEY ((psychopathy OR narcissism OR "borderline personality disorder" OR btd OR "vulnerable dark triad") AND ("adverse childhood experiences" OR aces OR "traumatic event" AND child*)) AND PUBYEAR > 2009 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , "English")) (167)

TITLE-ABS-KEY ((psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR aces OR "childhood maltreatment")) AND PUBYEAR > 2009 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , "English")) (270)

TITLE-ABS-KEY (psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR aces) AND PUBYEAR > 2009 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , "English")) (139)

TITLE-ABS-KEY ((psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood experiences")) AND PUBYEAR > 2009 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , "English")) (135)

TITLE-ABS-KEY ((psychopathy OR narcissism OR "borderline personality disorder" OR "vulnerable dark triad") AND ("adverse childhood experiences" OR "negative childhood experiences" OR abuse AND child)) AND PUBYEAR > 2009 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , "English")) (766)

TITLE-ABS-KEY ((factor AND two AND psychopathy OR vulnerable AND narcissism OR "borderline personality disorder") AND ("adverse childhood experiences" OR "negative childhood experiences")) AND PUBYEAR > 2009 AND PUBYEAR < 2024 AND (LIMIT-TO (LANGUAGE , "English")) (3)

APPENDIX B – Data Selection and Evaluation Criteria

Level 1: Title evaluation

Point 0:

- The title does not refer to VDT nor to any of its traits (factor 2 psychopathy, vulnerable narcissism, borderline personality disorder).
- The title does not refer to ACEs or any type of ACE.
- The title refers explicitly to a qualitative study or a literature review.
- The title focuses on the role of ACEs in developing VDT in age groups other than adults.
- The title is written in a language other than English.

Point 1:

- The title refers to Adverse Childhood Experiences (ACEs) but it is not clear whether their relationship is explored.
- The title refers to a category of mental health issues that might contain the Vulnerable Dark Triad's constructs with or without a clear reference to the factors contributing to the development of these characteristics.
- The title refers to Adverse Childhood Experiences or ACEs and their impact on mental health or psychopathology without specifying disorders.
- The title refers to Adverse Childhood Experiences or ACEs and their role in other developmental areas (social, emotional, behavioral functioning) with no clear reference to the Vulnerable Dark Triad or VDT.
- The title refers to the role of adversities in the development of VDT without specifying whether these adversities are detected in childhood.

Point 2:

- The title refers to Adverse Childhood Experiences or ACEs and their role in the development of the Vulnerable Dark Triad or any VDT personality traits in adults.

- The title refers to a specific Adverse Childhood Experience (e.g. emotional maltreatment or neglect) and its role in the development of the Vulnerable Dark Triad.
- The title refers to Adverse Childhood Experiences or ACEs and their impact on the development of factor 2 psychopathy or vulnerable narcissism or borderline personality disorder.

Level 2: Abstract evaluation

Point 0:

- The abstract refers to Dark Triad or specific DT traits instead of Vulnerable Dark Triad traits.
- The abstract does not refer to any Adverse Childhood Experiences or Vulnerable Dark Triad traits.
- The abstract refers to the development of Vulnerable Dark Triad's personality traits in adults but focuses on the role of factors other than ACEs on its development.
- The abstract refers to Adverse Childhood Experiences or ACEs but focuses on their impact on areas other than psychopathology containing VDT traits.
- The abstract refers to the role of ACEs in the development of VDT but it is clarified that the article is based on a simple literature review or qualitative research.
- The abstract is written in a language other than English.

Point 1:

- The abstract refers to the association of ACEs (cumulative or by a specific type) with psychopathology in adulthood that may include VDT traits.
- The abstract refers to factors that are associated with the development of VDT (cumulative or some of these traits) in adulthood without being clearly identified or to factors that may include experiences related to ACEs.
- The abstract refers to the role of childhood experiences in the development of VDT without explicitly specifying whether these experiences are ACEs.

- The abstract refers to the role of ACEs in the development of VDT without clarifying whether it concerns VDT in adulthood.
- The abstract refers to the role of ACEs in the development of VDT in adulthood without clarifying the research methodology.

Point 2:

- The abstract refers to Adverse Childhood Experiences or ACEs and their role in the development of the Vulnerable Dark Triad or VDT personality traits in adults.
- The abstract refers to a specific Adverse Childhood Experience (e.g. emotional maltreatment or neglect) and its role in the development of the Vulnerable Dark Triad or specific VDT traits.

Level 3: Text evaluation

Point 0:

- The study refers to Adverse Childhood Experiences or ACEs but focuses on age groups other than adults.
- The study refers to Vulnerable Dark Triad or VDT personality traits but focuses on age groups other than adults.
- The study refers to Adverse Childhood Experiences or ACEs but not on their potential impact on the development of Vulnerable Dark Triad or specific VDT traits.
- The study refers only to Vulnerable Dark Triad or VDT personality traits without mentioning the role of Adverse Childhood Experiences or ACEs.
- The study is written in language other than English.

Point 1:

- The study refers to the role of Adverse Childhood Experiences or ACEs on the development of psychopathology in adulthood that may relate to Vulnerable Dark Triad or VDT traits.
- The study refers to the impact of Adverse Childhood Experiences or ACEs on the development of Vulnerable Dark Triad or VDT traits but offers ambiguous evidence of the history of ACEs in the participants.

- The study refers to the impact of Adverse Childhood Experiences or ACEs on the development of Vulnerable Dark Triad or VDT traits but offers ambiguous evidence concerning the diagnosis of psychopathology in the participants.

Point 2:

- The study investigates the role of Adverse Childhood Experiences or ACEs on the development of Vulnerable Dark Triad.
- The study investigates the role of Adverse Childhood Experiences or ACEs on the development of a specific Vulnerable Dark Triad's trait.

Appendix C – Quality Assessment Sheets

JBI CRITICAL APPRAISAL CHECKLIST FOR ANALYTICAL CROSS SECTIONAL STUDIES

Reviewer Nikoleta Dima Date 22/05/2024

Author Wilson et al. Year 2023 Record Number 01

	Yes	No	Unclear	Not applicable
1. Were the criteria for inclusion in the sample clearly defined?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were the study subjects and the setting described in detail?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Was the exposure measured in a valid and reliable way?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were objective, standard criteria used for measurement of the condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were confounding factors identified?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Were strategies to deal with confounding factors stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes measured in a valid and reliable way?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Was appropriate statistical analysis used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (Including reason for exclusion)

JBI CRITICAL APPRAISAL CHECKLIST FOR ANALYTICAL CROSS SECTIONAL STUDIES

Reviewer Nikoleta Dima Date 22/05/2024

Author Nguyen & Shaw Year 2020 Record Number 02

	Yes	No	Unclear	Not applicable
1. Were the criteria for inclusion in the sample clearly defined?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were the study subjects and the setting described in detail?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Was the exposure measured in a valid and reliable way?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were objective, standard criteria used for measurement of the condition?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were confounding factors identified?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Were strategies to deal with confounding factors stated?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes measured in a valid and reliable way?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Was appropriate statistical analysis used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

Comments (including reason for exclusion)
