Forensic Insights into Borderline Personality Disorder: The Influence of Childhood Adversity and Antisocial Traits on Male Aggression and Violence

Submitted to the Institute of Forensic Psychology and Psychiatry

Saarland University, Homburg, Germany

Director: Univ.-Prof. Dr. med. Wolfgang Retz

A Dissertation Submitted for the Attainment of the Degree of Doctor of Medicine

at the Medical Faculty of Saarland University,

2025

Supervised by:

Prof. Dr. biol. hum. Petra Retz-Junginger (Main Supervisor)

Dr. phil. M. Sc. Steffen Barra (Main Advisor)

Author:

Daniel Garcia Fittipaldi

Born: 11/04/1995 in Botucatu, Brazil

Tag der Promotion: 16.07.2025

Dekan: Univ. -Prof. Dr. med. dent. M. Hannig

Berichterstatter: Prof. Dr. Petra Retz-Junginger

Prof. Dr. Eva Möhler

Abstract

Despite borderline personality disorder's well-documented association with emotional instability and impulsive behaviors, its role in criminal careers, particularly in offenders with co-occurring antisocial traits, remains insufficiently explored.

This dissertation aims to investigate the complexities of aggression and violent crime in male offenders with borderline personality traits within a forensic setting.

Using a dataset of 315 male offenders, this study employed self-reported questionnaires, clinical evaluations, and officially registered criminal records from the German Federal Central Register (Bundeszentralregister). Participants were evaluated for borderline traits (SCID-II), antisocial traits (PCL-R), aggression tendencies (Buss-Perry Aggression Questionnaire) and adverse childhood experiences (as defined by the ACE-Questionnaire) using validated psychometric assessments.

Through latent class analysis, three distinct offender profiles were identified: (1) a group exhibiting both borderline and antisocial traits, (2) a group primarily characterized by antisocial traits, and (3) a low-symptom group with minimal traits from either domain. The borderline-antisocial group exhibited the highest levels of verbal, physical, and indirect aggression, and had a significantly higher likelihood of violent crime compared to other groups. Moreover, age and adverse childhood experiences were found to significantly predict both higher levels of aggression as well as a greater likelihood of future violent offending, with the borderline antisocial class exhibiting the highest prevalence of adverse childhood experiences.

This research contributes to the field of forensic psychiatry by clarifying how the dynamic between borderline and antisocial traits, under consideration of adverse childhood experiences, predicts patterns of aggression and criminal outcomes. The findings emphasize the need for targeted interventions addressing both personality pathology and childhood trauma in offenders.

Zusamenfassung

Ziel der vorliegenden Dissertation war, die Komplexität von Aggression und Gewaltkriminalität bei männlichen Straftätern mit borderline Persönlichkeitszügen im forensischen Kontext zu untersuchen. Trotz der bekannten Verbindung der Borderline-Persönlichkeitsstörung mit emotionaler Instabilität und impulsivem Verhalten, bleibt ihre Rolle in kriminellen Karrieren unzureichend erforscht.

Mit einem Datensatz von 315 männlichen Straftätern wurden selbstberichtete Fragebögen, klinische Bewertungen und offiziell erfasste Strafregister aus dem deutschen Bundeszentralregister verwendet. Die Teilnehmer wurden auf Borderline-Merkmale (SCID-II), antisoziale Merkmale (PCL-R), Aggressionstendenzen (Buss-Perry-Aggressionsfragebogen) und belastende Kindheitserfahrungen (gemäß ACE-Fragebogen) anhand validierter psychometrischer Instrumente untersucht.

Durch latente Klassenanalyse konnten drei Täterprofile identifiziert werden: (1) eine Gruppe mit Borderline- und antisozialen Zügen, (2) eine Gruppe mit überwiegend antisozialen Zügen und (3) eine Kontrollgruppe mit minimalen Merkmalen aus beiden Bereichen. Die Borderline-antisoziale Gruppe zeigte die höchsten Werte in verbaler, physischer und indirekter Aggression und wies eine signifikant höhere Wahrscheinlichkeit für gewalttätige Rückfälligkeit auf. Darüber hinaus erwiesen sich Alter und belastende Kindheitserfahrungen als signifikante Prädiktoren für sowohl erhöhte Aggressionsneigung als auch für zukünftige Gewaltstraftaten. Die Borderline-antisoziale Klasse wies dabei die höchste Prävalenz belastender Kindheitserfahrungen auf.

Diese Dissertation trägt zur Untersuchung der Dynamik zwischen Borderline- und antisozialen Merkmalen, beeinflusst durch frühe Lebensbelastungen bei und zeigt, wie Aggressionsmuster und kriminelles Verhalten vorhersagbar sein können. Die Ergebnisse unterstreichen ebenfalls die Notwendigkeit gezielter Interventionen, die sowohl Persönlichkeitsstörungen als auch Kindheitstraumata berücksichtigen.

Table of Contents

List of Tables and Figures

List of Abbreviations

α	Cronbach's Alpha
aBIC	Sample-size adjusted Bayesian Information Criterion
ACE	Adverse Childhood Experience
AIC	Akaike Information Criterion
Antisoc.	Antisocial
AQ	Buss Perry Aggression Questionnaire
BIC	Bayesian Information Criterion
BLRT	Bootstrapped Parametric Likelihood Ratio Test
BZR	Bundeszentralregister
CI	Confidence Interval
DSM	Diagnostic and Statistical Manual of Mental Disorders
ICC	Intraclass Correlation Coefficient; Index of Interrater Agreement
ICD	International Classification of Diseases
κ	Cohen's kappa
LCA	Latent Class Analysis
LMR LRT	Lo-Mendell-Rubin Likelihood Ratio Test
n	Sample Size
OR	Odds Ratio
PCL-R	Psychopathy Checklist – Revised
PTSD	Post Traumatic Stress Disorder
SD	Standard Deviation
SCID	Structured Clinical Interview for DSM
StGB	Strafgesetzbuch (German Penal Code)
τ	Kendall's Tau
§	Paragraph

1 General Introduction

1.1 Historical Background

The term borderline personality disorder (BPD) was first introduced by Adolph Stern in the year 1938, describing a group of patients who Stern believed suffered from a condition that did not fit either psychotic or neurotic diagnostic or therapeutical criteria at the time, a group of patients "bordering" the two categories of diseases mentioned [82].

During that era, the classification of mental disorders was strongly influenced by psychoanalytic principles and beliefs: patients with neuroses were considered analyzable, and therefore treatable, while those with psychoses were considered not analyzable, and therefore untreatable. Stern gave clinical meaning to the construct by identifying the tendency of certain patients to regress into "borderline schizophrenia" mental states in unstructured situations [49].

BPD was formally recognized as a distinct clinical diagnosis in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) in 1980.

1.2 Current Definitions and Diagnostics

1.2.1 DSM-5 Criteria

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) [6], is a publication by the American Psychiatric Association (APA) that serves as the principal authority for psychiatric diagnoses and classifications in the United States.

BPD is understood, according to the DSM-5, as a cluster B type of personality disorder, the same cluster that includes antisocial personality disorder, narcissistic personality disorder and histrionic personality disorder. BPD presents a set of pervasive patterns of instability of interpersonal relationships, self-image, and affects, and marked impulsivity, beginning by early adulthood and present in a variety of contexts [6].

For the diagnosing of the disorder, at least five of the following criteria have to be fulfilled according to the DSM-5:

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

1.2.2 ICD-10 Criteria

The International Classification of Diseases (ICD) [128] is a global diagnostic classification system developed and maintained by the World Health Organization (WHO). It serves as a standard tool for the classification of diseases, disorders, injuries, and other health-related conditions.

At the time of this study, the 10th edition of the International Classification of Diseases (ICD-10) remains the primary reference in clinical practice, as an official German translation of the ICD-11 is not yet available. Consequently, the diagnostic criteria for BPD have been presented based on ICD-10 standards, where it is classified under code F60.3:

1. “Affective instability: There must be marked shifts in mood, often with episodes of intense dysphoria, irritability, or anxiety lasting a few hours to a few days.”
2. “Impulsivity: There may be a tendency to act on impulse without considering the consequences, resulting in potentially harmful behaviors such as reckless driving, substance abuse, binge eating, or self-injury.”
3. “Interpersonal instability: There are disturbances in relationships characterized by alternating between extremes of idealization and devaluation. This may manifest as intense, unstable, and stormy relationships with frequent conflicts, breakups, and reconciliations.”
4. “Identity disturbance: There is a marked and persistent disturbance in the individual's sense of self, leading to uncertainty about self-image, goals, career choices, friendships, sexual orientation, and values.”
5. “Paranoid ideation or severe dissociative symptoms: The individual may experience transient paranoid thoughts under stress or severe dissociative symptoms such as depersonalization or derealization.”
6. “Self-harm or suicidal behavior: There may be recurrent threats or acts of self-harm, gestures, or attempts at suicide, usually in response to interpersonal conflicts, abandonment fears, or feelings of emptiness.”

7. “Chronic feelings of emptiness or boredom: The individual may experience persistent feelings of emptiness, loneliness, or boredom, leading to a sense of existential dissatisfaction and restlessness.”
8. “Inappropriate, intense anger or difficulty controlling anger: There may be frequent displays of inappropriate, intense anger or difficulty controlling anger, often resulting in verbal or physical aggression.”

1.2.3 ICD-11 Criteria

Prior to the introduction of ICD-11, personality disorders were conceptualized as distinct categorical illnesses, differing from the longstanding "cluster model" utilized by the DSM over the years.

With the release of ICD-11 in 2019 [129], the diagnosis of BPD was replaced by a new concept termed "borderline pattern." This pattern is applied in conjunction with an overarching personality disorder category, classified as mild, moderate, or severe. Notably, the borderline pattern (6D11.5) serves as the sole exception to the newly established trait domain specifiers for personality disorders.

The borderline pattern specifier may be assigned based on specific criteria, which are largely aligned with the DSM-5 definition of BPD:

1. “Frantic efforts to avoid real or imagined abandonment.”
2. “A pattern of unstable and intense interpersonal relationships.”
3. “Identity disturbance, manifested in markedly and persistently unstable self-image or sense of self.”
4. “A tendency to act rashly in states of high negative affect, leading to potentially self-damaging behaviors.”
5. “Recurrent episodes of self-harm.”
6. “Emotional instability due to marked reactivity of mood.”
7. “Chronic feelings of emptiness.”

8. “Inappropriate intense anger or difficulty controlling anger.”
9. “Transient dissociative symptoms or psychotic-like features in situations of high affective arousal.”

Despite substantial treatment evidence and recognition from health authorities, the initial ICD-11 proposal refrained from distinguishing a BPD type due to debates surrounding its construct validity. In response, advocates such as representatives from the European Society for the Study of Personality Disorders (ESSPD) emphasized the necessity of introducing a "borderline pattern specifier" into the ICD-11 classification. The challenge was to transition to a fundamentally new classification system without forsaking the proven strengths of the previous one, particularly its ability to encompass the manifestations of BPD [8]. In this context, the formal integration of a borderline pattern specifier ensures the continuity and clinical usefulness of the ICD-11 system for practitioners, researchers, and patients alike. This inclusion facilitates the identification of individuals who may positively respond to well-established evidence-based treatments [8,109,110].

1.3 Epidemiology and Comorbidity

BPD is not a rare condition in the general population, with epidemiological studies conducted in the USA revealing a prevalence between 0.5% and 5.9% [48,69]. The only epidemiological study in Germany employing standardized diagnostic interviews was conducted on a sample of 2,488 individuals from the general population, with a five- to ten-year prevalence rate of BPD at 0.8% [125].

In clinical settings, a prevalence of 10% of all psychiatric outpatients and between 15% and 25% of inpatients has been reported [49,114].

Comorbidity with other DSM-5 disorders is common in individuals with BPD. Most personality disorders do not occur in isolation; comorbidity with other personality disturbances is the norm rather than the exception [11].

Research indicates that 84.5% of patients diagnosed with BPD meet the criteria for one or more axis I disorders within a 12-month period [48,67,69]. Additionally, 73.9% of individuals with BPD fulfill the criteria for at least one axis II disorder during their lifetime [48,67,69]. The disorder is particularly associated with mood disorders, anxiety disorders, and substance misuse-related disorders [48,67,69]. Interestingly BPD seems to share significant genetical overlap with antisocial personality disorder [62]

1.3.1 Gender Variances and Parallels

The DSM-5 (as well as prior versions) itself states that, BPD is diagnosed predominantly (about 75%) in females, this diagnosing bias has been accounted on studies backing 30 years, that confirmed the aforementioned bias towards women when diagnosing BPD [1,13,54].

As a result, the belief that BPD is more common in women and that they are more susceptible to the disorder is widely accepted among both the general population and clinicians [87]. According to Biskin et al. (2015) [15] on her meta-analysis on the lifetime course of BPD, as well as Grant et al. (2008) [48] longitudinal study with over 34,000 face to face interviews with a representative sample of the adult population of the USA, have determined that there is no statistically significant difference in the prevalence of BPD among men and women.

Another interesting consideration regarding gender distribution of BPD and gender bias was discussed in the paper by Sansone et al. (2011) [94]; the gender distribution of BPD may not be accurately reflected in most prevalence studies conducted traditionally in psychiatric settings. This is because if women with BPD engage in more self-directed self-harm behavior and consequently seek mental health treatment more often than men, prevalence studies conducted in such settings would suggest that BPD is more prevalent in women than men. Similarly, if men with BPD

are more likely to have substance abuse and antisocial features and end up in related treatment programs or in jail, prevalence studies conducted in mental health settings would consistently underestimate the percentage of men with BPD. It is also stated that the genders tend to exhibit slightly different behaviors and presentations, which could culminate in different clinical dispositions and result in a sampling bias, as noted previously [94]. Limited research has been conducted on the comparative clinical presentation and symptomatology of BPD in men and women. Men typically exhibited elevated scores on aggression and impulsiveness scales. While there is no significant gender difference in suicide rates, there is a noticeable trend toward higher suicide lethality among men [12,101].

While the clinical features of BPD manifest similarly in both men and women, the intriguing aspect lies in the distinctive comorbidities associated with each gender. A handful of academic publications [9,12,60,101,131] have investigated this phenomenon, consistently arriving at comparable conclusions. Notably, females with BPD tend to exhibit a higher likelihood of concurrent diagnoses of PTSD and eating disorders. On the other hand, males with BPD tend to have co-occurring diagnoses associated with substance use disorders, as well as schizotypal, narcissistic, and antisocial personality disorders. Furthermore, a higher proportion of women than men meet the diagnostic criterion for identity disturbance in the context of BPD. These insights underscore the importance of recognizing and addressing the gender-specific nuances in the comorbidity landscape of BPD. Such distinctions not only contribute to a more comprehensive understanding of the disorder but also hold implications for tailored treatment approaches and unique challenges faced by individuals based on their gender.

1.3.2 Age-Related Variations in Psychopathology

In the past, clinicians tended to be very cautious when diagnosing BPD in subjects younger than 18 years of age, current research however points out that BPD typically first manifests itself in adolescence, and that adolescent BPD symptoms can be distinguished reliably from normative adolescent development [26]. This knowledge has sanctioned the diagnosis of BPD in young people and this has now been integrated into national guidelines for the management of BPD; Section III of the DSM-5 as well as the ICD-11.

While healthy adolescents typically experience a decrease in symptoms such as impulsivity, identity issues, and affective instability as they progress through adolescence, adolescents with BPD tend to see an increase in these symptoms over time [33].

The progression of BPD from adolescence to adulthood involves a shift in symptoms, transitioning from primarily experiencing affective dysregulation, impulsivity, and suicidality to developing maladaptive interpersonal functioning and persistent functional impairments. This is accompanied by periods of remission and relapse throughout the course of the disorder [50,119].

Throughout adulthood, the core features of BPD exhibit a persistent course. Affective symptoms, including chronic dysphoria, anger, and feelings of emptiness, as well as interpersonal symptoms associated with fears of abandonment, continue to be present. However, impulsivity tends to decrease as individuals progress into adulthood [50].

1.4 Etiology

The origins of BPD are intricate and still unclear. None of the existing models have successfully encompassed all the available evidence [82]. Similar to many other psychiatric disorders, the causes of BPD are likely multifactorial, involving genetics

and inherent vulnerabilities, dysfunctions in neurophysiology and neurobiology related to emotional regulation and stress, histories of childhood maltreatment and abuse, and disruptions in the affiliative behavioral system, particularly the attachment system [82].

1.4.1 Genetics

A review conducted by Chanen et al. [25] concluded the heritability of BPD is estimated to be in the range from 35% to 45%. According to the authors there appears to be a common genetic factor related to vulnerability to BPD, as well as genetic factors associated with impulsivity, low agreeableness, and introversion [25]. Evidence supports gene-environment interaction and correlation in the development of BPD, indicating that individuals with a sensitive genotype are at a higher risk of BPD when exposed to a predisposing environment [25,34]. In his review, Chanen points out a range of molecular genetical studies that have been conducted, mainly on the serotonergic system, with associations found in genes coding for serotonin receptors and the serotonin transporter gene [25].

1.4.2 Neuroimaging

Neuroimaging research in adults suggests that abnormalities in frontolimbic networks, including the amygdala, insula, anterior cingulate cortex, orbitofrontal cortex, and dorsolateral prefrontal cortex are associated with many of the features of BPD [65]. A heightened responsiveness of the amygdala and insula, coupled with reduced engagement of frontal brain regions, appears to mirror commonly observed characteristics of disrupted emotion processing and regulation in individuals with BPD [98].

Impulsivity, another fundamental characteristic of BPD, has been linked to reduced activity in frontal brain regions responsible for inhibitory control, such as the orbitofrontal cortex and anterior cingulate cortex [117].

However, it is unclear whether these findings are a cause, an effect, or an epiphenomenon of BPD, so that more research is needed [65].

1.4.3 Theoretical Models

As of the time of writing this thesis, the vulnerability-stress model, also known as Diathesis-Stress-Modell, proposed as an alternative model to patients with schizophrenia by J. Zubin in 1977, appears to be the prevailing theory regarding the development of BPD and mental disorders by and large. In accordance with the general model, each person possesses a certain level of inherent vulnerability, referred to as diathesis, that predisposes them to the development of a specific disorder. The onset of the disorder can then be activated by environmental stress, but the degree or intensity of stress required for triggering the disorder is contingent upon the individual's inherent vulnerability. To illustrate, the more vulnerable an individual is to a disorder, the less stress is needed to initiate its development. This interplay between diathesis and stress aids in understanding why certain individuals may develop a disorder while others do not [21]. Genetically predisposed individuals who encounter adverse childhood experiences are the most likely to develop BPD [34].

Over the years, numerous alternative etiological models have been suggested. However, for the purpose of this summary, it might be more compelling to delineate the distinctions between the vulnerability-stress model and the biopsychosocial model. Notably, the latter serves as the foundation for dialectical behavior therapy, which has emerged as a primary treatment option for BPD [68].

Proposed by George Engel in 1977, the biopsychosocial model emerged as a holistic alternative to the prevailing biomedical model of disease, which continues to dominate the approach to illness in most western healthcare settings. Unlike the vulner-

ability-stress model, the biopsychosocial model posits that various factors including biological (genetic, neurochemical), psychological (cognitive, emotional), and social (environmental, cultural) significantly influence an individual's mental health. Importantly, it does not insist on a fixed diathesis or predisposition. In essence, the biopsychosocial model offers a comprehensive viewpoint on mental health by taking into account a broader range of factors biological, psychological, and social. On the other hand, the vulnerability-stress model focuses on the interplay between predisposition and stressors, often employed to elucidate the onset of specific disorders in those with a predisposition.

1.5 Personality Traits and Criminal Behavior

The correlation between mental illness and criminal or violent behavior has attracted continuous attention from academia and the media over the years. However, it is challenging to make definitive statements about this correlation. Recent literature presents varying conclusions, suggesting that the mentally ill are equally likely to be violent, more likely to be violent, or no more likely to be violent compared to non-mentally ill individuals. Methodological challenges faced by researchers make it difficult to determine the nature of this association [111].

While assessing the direct correlation between criminal behavior and mental illness may pose challenges, it is worth noting the disproportionate representation of individuals with severe mental illnesses in forensic and prison settings, this pattern was observed in a systematic review done by Fazel et al. [39] with over 22,000 inmates in 12 countries looking at the prevalence of mental illnesses, including psychotic disorders, depression and personality disorders, particularly antisocial and BPD in incarcerated cohorts.

Another study where a random sample of 220 offenders entering Iowa's prison system were evaluated, was able to conclude that BPD was present in 29.5% and 93.2% had at least one DSM-4 BPD trait [16].

As much as 68% of men diagnosed with BPD exhibit concurrent antisocial traits [57,88,93]. "Antisocial personality traits" is a collective term encompassing various personality characteristics widely deemed undesirable or socially unacceptable within the prevailing cultural norms [61]. These traits are most commonly linked with antisocial personality disorder and psychopathy.

The co-occurrence of BPD and antisocial traits appears to serve as a robust predictor for violent criminal behavior as seen in a prospective study from by Robitaille et al. [93] spanning 27 years, involving over 300 subjects, explored the effects of comorbid antisocial traits in BPD. The findings highlight a substantial increase in the association with violent criminal offending within the comorbid cohort compared to those without antisocial traits. Offenders diagnosed with BPD, coupled with comorbid antisocial traits, were, on average, convicted four times more frequently for violent crimes than individuals with either disorder in isolation. These results seem to concur with other literature on the topic [58,63].

BPD appears to be a common condition among male offenders, with estimates ranging from 19.8% [122] to 31.7% [30]. Notably, as mentioned above, it often co-occurs with substance use. This combination of a personality disorder and substance use seems like a particularly strong predictor for recidivism, with a two-fold increase for general recidivism [120].

It is crucial to emphasize that, regardless of the correlation between mental illness and violent behavior, individuals who have been discharged from a psychiatric care facility and received appropriate treatment demonstrate a reduced likelihood of engaging in criminal activities [79,106].

Impulsiveness also plays an important role in this context. Impulsiveness has been described as a key predictor of delinquency [80,91] as well as of general criminality [113]. It is of special relevance in the context of this study since impulsiveness is a

common characteristic and a diagnostic criteria in BPD and antisocial behavior. Impulsiveness is defined as “a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions to the impulsive individual or to others” [77].

An extensive study done in Pittsburgh, USA with over 1500 subjects in the 1990s with the goal of investigating the development of delinquency and related behaviors in children showed impulsiveness as the strongest risk factor related to delinquency in children between ages 10 and 13 [71,123]. Comparable outcomes were found in older populations as well [102].

1.6 The Role of Adverse Childhood Experiences

Defining adverse childhood experiences (ACEs) has proven to be an arduous process, multiple studies on the subject provide different concepts, defining what the term ACEs compromises. According to the CDC (Centers for Disease Control and Prevention), ACEs encompass potentially traumatic events that transpire during childhood (ages 0-17). These events include, but are not restricted to, encounters with violence, abuse, or neglect, observing violence within the home or community, and facing situations where a family member attempts or succumbs to suicide [24]. Additionally, ACEs encompass elements within a child's surroundings that may jeopardize their sense of safety, stability, and bonding. These elements involve growing up in a household grappling with substance use issues or other mental health challenges, as well as instability resulting from parental separation or incarceration of household members. Numerous other traumatic experiences can impact health and well-being, such as insufficient access to food, homelessness or precarious housing, and encounters with discrimination [43].

That being said, the correlation between ACEs and BPD has garnered significant attention within the mental health research community. Numerous clinical [130] and

national [2] representative samples have been analyzed, revealing strong associations between ACEs and BPD; A meta-analysis by C. Porter et al. [90] a significant relationship between BPD and ACE where individuals with BPD were 3.36 times more likely to report childhood adversity when compared to psychiatric control groups [90].

However, the existing studies on this topic often focus on individual risk factors, such as sexual abuse or neglect. This approach fails to capture the complexity of real-life experiences, as these variables are interrelated and tend to co-occur in individuals potentially playing significant etiological roles [20].
In the end, BPD has been associated with ACEs, including trauma, neglect, and sexual abuse [44]. Individuals with BPD exhibit significantly higher prevalence rates of childhood and adolescent physical abuse compared to non-affected populations [47].

Children who experience neglect, corporal punishment, or physical abuse are at risk of exhibiting externalizing, antisocial, and criminal behaviors [116]. Other forms of maltreatment, such as emotional abuse and exposure to domestic violence, are also linked to aggression and criminality [116]. The connection between sexual abuse and externalizing, antisocial, and criminal behavior is less reliably established, as some studies indicate an association while others fail to find a clear relationship [74]. Research also suggests that more severe forms of maltreatment, characterized by more invasive and/or more physically debilitating maltreatment exposure, are correlated with elevated levels of aggressive and criminal behaviors [59].
A detailed review performed by Malinosky-Rummell and Hansen [72] showed that being physically abused as a child predicts later violent and nonviolent criminal behavior. Another study that utilized an international sample to explore the impact of child maltreatment on violent delinquency, found similar findings [107] resulting in

even more support to the idea of cross generational violent tendencies.
Childhood adversities are multifaceted, differing greatly in type, severity, duration, and subjective interpretations, which may elucidate why it correlates with aggressive and criminal behavior in some children and adolescents but not in others [38].

1.7 The Use of Latent Class Analysis in Understanding BPD

Latent class analysis (LCA) [3,4] is a is a statistical technique used to identify unobserved (latent) subgroups/classes within a population, based on responses to observed categorical variables. It is a model-based clustering method grounded in probabilistic reasoning, its main purpose being to uncover hidden heterogeneity within a dataset and classify individuals into latent groups for better understanding of underlying phenomena.

LCA can be a very useful tool in psychiatric research when used to uncover unobserved subgroups within heterogeneous populations, particularly in the research of personality disorders in order to identify distinct patterns of symptoms, behaviors and comorbidities, offering a more nuanced perspective beyond just examining the syndrome as a whole [132].

At the time of writing this thesis, at least 20 studies have been conducted on the topic of BPD using LCA. A portion of these studies has been conducted with the goal of differentiating BPD from other conditions, mainly post-traumatic stress disorder and attention-deficit/hyperactivity disorder
Cloitre et al. [28] conducted a study that distinguished between PTSD, complex PTSD, and BPD, revealing three distinct classes: one dominated by complex PTSD symptoms, another by PTSD symptoms, and a third primarily characterized by BPD traits. The BPD group exhibited heightened emotional dysregulation and interpersonal difficulties, which overlapped with PTSD but had a distinct symptom profile.
Saraiya et al. [96] employed LCA to examine the intersection of PTSD, complex

PTSD, and BPD among a diverse sample of young adults. They identified four latent classes, with one group displaying severe social-emotional dysregulation and trauma symptoms consistent with both BPD and complex PTSD. The results showed that this group had the highest rates of functional impairment, suggesting that comorbid BPD and trauma symptoms are associated with worse psychosocial outcomes.

Frost et al. [46] conducted a study to differentiate between BPD and complex PTSD in individuals with a history of sexual trauma. The results identified two distinct subgroups: one characterized by symptoms predominantly of BPD (with higher impulsivity and affective instability) and another by complex PTSD (with more pervasive emotional numbing and avoidance). This LCA study underscored the clinical relevance of distinguishing between BPD and trauma-related disorders to guide treatment approaches better.

Finally, van Dijk et al. [115] investigated the overlap between ADHD and BPD in women, identifying three latent classes based on temperament and character traits. The study found that impulsivity, emotional dysregulation, and novelty-seeking were common to both conditions, but the BPD-dominant class exhibited greater interpersonal dysfunction and emotional instability compared to the ADHD group. This highlighted the importance of disentangling the symptomatic overlap between these disorders to ensure accurate diagnoses and treatment planning.

The remaining studies focused on differentiating subgroups of BPD affected patients based on clinical characteristics like comorbid substance use and symptom severity: Bornovalova et al. [19] identified three distinct subgroups among a sample of inner-city substance users with BPD: (1) a high-symptom class characterized by severe affective instability, impulsivity, and interpersonal dysfunction, (2) a moder-

ate-symptom class with moderate emotional dysregulation and substance use issues, and (3) a low-symptom class with minimal affective symptoms but high substance use. The study emphasized how individuals with BPD can present with varying symptom severity and comorbidity profiles, particularly in populations with high rates of substance use. Antoine et al. [7] identified four subgroups in a clinical sample of individuals with BPD, differentiated by levels of symptom severity and psychosocial functioning. The results revealed one class with severe BPD symptoms, including frequent self-harm and interpersonal dysfunction, a second class with moderate symptoms and high levels of anxiety and depression, a third class characterized by impulsivity and high substance use, and a fourth class with fewer BPD symptoms but significant issues with identity disturbance. This study highlighted the variability in psychosocial outcomes, with more severe classes showing poorer social and occupational functioning.

Cavelti et al. [23], in a study of adolescents with BPD traits, identified three subgroups based on the severity and persistence of BPD symptoms. The first group, labeled the "severe-chronic" group, showed persistent and high levels of emotional instability and interpersonal difficulties. The second group, the "moderate-transient" group, experienced fluctuating symptoms that improved over time, while the third group, the "mild-stable" group, exhibited mild symptoms that remained stable without escalation. This study illustrated the potential for symptom fluctuation in adolescence and reinforced the need for early intervention to prevent symptom escalation.

No studies were identified regarding BPD or borderline traits in forensic settings using LCA, particularly in assessing violent behavior and criminality. Additionally, there is a lack of literature examining the grouping of antisocial and borderline traits through LCA.

2 Aim of this Study and Hypotheses

Based on the current state of research, there are notable gaps in our understanding of BPD, particularly within forensic settings. These gaps include insufficient literature on male individuals in forensic contexts especially considering the overlap of borderline and antisocial traits, the limited use of LCA in forensic studies and the impact of borderline traits on aggression and criminal behavior [39]. As a result, there remains a significant need for further investigation.

In a forensic context, it's crucial to accurately assess and manage personality disorders and traits in order to effectively evaluate risk and plan treatment as well as rehabilitation efforts. Understanding the dynamics between BPD, antisocial traits, aggression and criminal behavior along with predisposing factors, is especially relevant due to the high rates of comorbidity between BPD and other psychiatric conditions.

This study aims to contribute to a more comprehensive understanding of BPD, its co-occurrence with antisocial traits and investigate their associations with physical aggression and criminal behavior, including both past and future violent offending, while also considering the influence of ACEs.

Hypothesis:

1. Among male criminal offenders, latent class analysis will identify four distinct classes based on the presence and severity of borderline personality disorder traits and antisocial personality traits.
2. Based on previous literature, when compared to one another, the latent classes will significantly distinguish themselves from one another regarding physical aggression as well as prior, and future violent offending:
    - A class with concurrent borderline and antisocial traits will exhibit the highest levels of emotional dysregulation, impulsivity as well as aggression and violent criminal tendencies.
    - A class primarily associated with borderline traits is likely to demonstrate elevated impulsivity and a heightened risk of physical aggression; however, this will not inherently predispose individuals to violent criminal behavior.
    - A class predominantly marked by antisocial traits will show lower emotional dysregulation but will engage in more goal-directed and versatile violent criminal behaviors.
    - A class lacking significant borderline or antisocial traits is predicted to present minimal levels of aggression, emotional instability, and involvement in criminal activity.
3. An increased rate of adverse childhood experiences is expected to correlate with a heightened propensity for engaging in violent and aggressive conduct.

3 Methods and Materials

3.1 Procedures

This thesis reports on a study conducted within an ongoing research project at the Institute for forensic psychology and psychiatry in Homburg, Germany. The overarching goal of the project is to investigate the connection between childhood adversity and aggressive behavior in male offenders from various angles. The research involved a retrospective analysis of data through evaluation reports obtained from a consecutive sample of male criminal offenders who had undergone psychological/psychiatric evaluations at the institute between August 2007 and September 2020. The evaluations included examining criminal and psychiatric records and considering various factors such as biographical information (family dynamics and education), physical and mental development, sexual development, history of health issues (including substance use), past and current delinquency, as well as childhood adversity.

The evaluation reports were analyzed using a coding system specifically designed for this purpose, offenders were also asked to complete several self-rating instruments (see 3.3). Moreover, the offender's criminal careers were assessed by official criminal records through the Bundeszentralregister (German Federal Central Register).

The offenders were not personally invited to participate in the current research; however, data selection and analysis adhered to the German Code of Criminal Procedure (§476), which allows research institutions to use personal data for scientific purposes. The study procedure was approved by the ethics committee of the medical chamber of Saarland, Germany (No. 179/21).

3.2 Participants

The initial sample size was composed of 325 male participants. Of these 325, only the data collected from participants that completed the SCID-II Screening questions as well as the aggression questionnaire (AQ-G) with an inconsistency responding index lower than 5 (see below), were used for this study. We applied no further exclusion criteria. In total 315 participants, aged 16 to 73 (M = 36.04 years; SD =11.90 years) were assessed.

Out of the total sample, 190 participants (60.3%) had prior convictions for violent crimes (does not include sexual crimes), while 80 participants (25.4%) had been convicted of sexual offenses. Additionally, 78 participants (24.8%) had no prior convictions for sexual or violent crimes but had been convicted of other offenses such as fraud, property damage, or theft.

Regarding lifetime psychiatric diagnosis, 20 participants (6.3%) had a schizophrenia spectrum disorder or another psychotic disorder. Additionally, 44 participants (14%) were diagnosed with an affective disorder, while 29 (9.2%) exhibited symptoms of anxiety disorder, obsessive-compulsive disorder, or adjustment disorder. Personality disorders were prevalent among 66 (21%) participants. Furthermore, 12 individuals (3.8%) were identified as suffering from a paraphilic disorder, predominantly pedophilia. ADHD and conduct disorders were detected in 43 (13.7%) individuals. Substance abuse disorder or polysubstance use, alongside drug-induced psychosis, was observed in 135 (42.9%) individuals. PTSD was identified in 7 (2.2%) individuals. Additionally, 29 individuals (9.2%) exhibited other conditions that were not further specified.

3.3 Data Collection and Assessment Methods

The data for this study was gathered using three methods: self-report questionnaires filled out by the participants, clinical assessments performed by an examiner

based on prior conducted evaluation reports and analysis of the German federal central register (Bundeszentralregister).

3.3.1 Self-Reported Data

3.3.1.1 SCID-II – Self Report Screening Questionnaire - Borderline Traits

The SCID (Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders) [42] is a commonly conducted measure that aims to determine whether an individual meets the criteria for any disorder listed in the DSM.
The patient is asked to provide details regarding the history of their present illness, as well as past occurrences of psychiatric disturbances, treatment history and their current functioning; items are binary yes or no questions.

The SCID can be used for multiple purposes, different versions of the SCID are available for researchers, for clinicians, and for use with community samples.
The test used to be made up of two parts, the SCID-I for Axis I disorders. The SCID-II for Axis II disorders which are used to identify the following personality disorders based on the DSM-IV; borderline, antisocial, narcissistic, histrionic, avoidant, dependent, schizoid, schizotypal, paranoid, and obsessive-compulsive [42].

The SCID-II comprises a two-step process: Firstly, patients complete a self-report screening questionnaire in advance, aiming to identify traits associated with the 12 personality disorders covered by the SCID-II. Subsequently, a clinical interview is conducted to further delve into the patient's responses.

A frequent source of confusion arises from the existence of multiple iterations of the SCID over the years, each tailored to correspond with different editions of the DSM. The latest rendition, SCID-V, has been refined to evaluate the criteria set forth in DSM-5. The most recent version of the SCID-V in German has been available since 2019.

Our study utilized the German edition of the SCID-II self-report screening questionnaire, which has had its validity tested [35,86]. First published in 1997, aligning with the diagnostic criteria outlined in DSM-IV, this instrument served as a standard procedure in our forensic psychiatry institute, aiding in the identification of personality disorder traits among offenders. This thesis specifically focused on traits linked to BPD, notably, criteria 89 to 102 served as indicators of this condition. Item 89 highlights an intense fear of abandonment, often resulting in frantic efforts to avoid real or imagined separation. This is accompanied by Item 90, which describes a pattern of unstable and intense interpersonal relationships.

A persistent disturbance in self-identity, noted in Items 91-93, is characterized by significant instability in self-image or sense of self. Individuals may also display impulsive and reckless behaviors (Item 94), such as excessive spending, unsafe sexual practices, substance abuse, reckless driving, or binge eating.

Recurrent suicidal (95) and self-destructive behaviors (96), including suicidal gestures, threats, or attempts, along with self-mutilative actions such as cutting or burning.

Emotional dysregulation, detailed in Item 97, manifests as affective instability, with intense episodic dysphoria, irritability, or anxiety that typically lasts for hours to a few days.

Chronic feelings of emptiness, described in Item 98, are pervasive, with individuals reporting a consistent sense of hollowness or lack of fulfillment. Difficulties managing intense anger, noted in Item 101, often result in inappropriate outbursts, verbal aggression, or physical altercations.

Under periods of extreme stress, Item 102 identifies transient paranoia or dissociative symptoms, such as feelings of detachment from reality or unreality, which are typically short-lived and resolve as the stress diminishes.

3.3.1.2 Buss-Perry Aggression Questionnaire - Aggression

The Buss-Perry Aggression Questionnaire, also known as the Aggression Questionnaire (AQ) is a self-report psychological assessment tool designed to measure different dimensions of aggression in individuals. The questionnaire was developed by Arnold H. Buss and Mark Perry in 1992 [22]. A German version of the questionnaire (AQ-G) has been available since 2003 [55].

The questionnaire consists of 34 items, each of which represents a statement describing a specific behavior or feeling related to aggression. These items are categorized into five distinct subscales: physical aggression, verbal aggression, anger, hostility and indirect aggression. Respondents rate how characteristic each statement is of their behavior on a scale ranging from 1 (extremely uncharacteristic of me) to 5 (extremely characteristic of me).

The Buss-Perry aggression questionnaire is commonly used in research and clinical settings to assess aggression and related constructs, such as anger and hostility. It has been validated in various populations and has demonstrated good reliability and validity [53].

3.3.2 Clinically Evaluated Data – Forensic Coding System

The comprehensive coding system, consisting of 44 pages, encompassed a wide range of variables relevant to forensic investigations. These variables covered various domains, including administrative data, demographic information, current/index delinquency, offense analysis, previous delinquency, biographical and family information, general and sexual development ACEs, content of forensic evaluation, and risk assessment. Trained psychologists and medical students (including the author of this thesis), who were independent of the initial evaluation process, conducted retrospective analyses using this coding system. The training for raters included an introductory session on the coding system and its associated manual, led

by the scientific project manager, who was certified by the authors of the PCL-R to administer the measure. Following this, raters independently worked through a training case. A second session was held to review the coding and address any questions or clarifications. To ensure the inter-rater reliability of the coding system, a repeated analysis was performed on a sample of 30 cases. This selection was stratified according to the purpose of evaluation, encompassing 15 cases dedicated to risk assessments and an additional 15 for culpability assessments. Retrospective analyses utilizing this coding system have been employed in prior studies at our institute [126].

Our coding system is available for review upon request.

3.3.2.1 Psychopathy Checklist-Revised - Antisocial Traits

Originally developed in the 1970s by Robert D. Hare [52], the Psychopathy Checklist-Revised (PCL-R) was created drawing on Hare's research with male offenders and forensic inmates. Each of the 20 items is rated on a scale of 0 ("not applicable"), 1 ("maybe applicable"), or 2 ("applicable"). The total score ranges from 0 to 40, with scores exceeding the 25-point cutoff indicating a notably high likelihood of a psychopathic personality. Additionally, the PCL-R yields four subscales, or facets, which are interpersonal, affective, lifestyle, and antisocial. The first two facets contribute to a primary factor which reflects the emotional and interpersonal characteristics of psychopathy. It includes traits like glibness and superficial charm, a grandiose sense of self-worth, pathological lying, manipulativeness, lack of remorse or guilt, shallow affect, callousness, and lack of empathy. The other two facets contribute to a secondary factor which captures the behavioral aspects of psychopathy, including traits related to impulsivity, poor behavioral controls, early behavior problems, juvenile delinquency, and criminal versatility.

Facet 4 is especially important for assessing the behavioral patterns associated with psychopathy, which often manifest early in life and persist into adulthood [52]. It

includes several key items that highlight persistent antisocial tendencies. The first, “Poor behavioral controls”, refers to difficulties in managing anger and frustration, often resulting in frequent displays of aggression and temper outbursts. “Early behavior problems” capture a history of significant issues during childhood or adolescence, such as serious rule violations and disruptive behaviors. “Juvenile delinquency”, involves engagement in criminal activities or serious infractions before the age of 18. “Revocation of conditional release” describes a pattern of failing to comply with parole, probation, or other forms of conditional release. Finally, “criminal versatility” reflects the individual's involvement in a wide range of criminal behaviors.

The PCL-R holds a pivotal position in psychology as a risk assessment predictor of recidivism and violent tendencies, with evidence supporting its validity [51,52] as well as for its German version [56]. The newest German version of the PCL-R [78] from 2017 was used for a retrospective assessment of antisocial behavior. This study focused exclusively on evaluating Facet 4 of the PCL-R.

3.3.2.2 ACE Questionnaire for Adults – Adverse Childhood Experiences

The ACE Questionnaire for Adults is a tool developed to assess exposure to adverse experiences during childhood. It was originally developed by Vincent J. Felitti and Robert F. Anda in the late 1990s as part of a study conducted by the Centers for Disease Control and Prevention [41].

The questionnaire consists of a series of questions designed to measure various forms of childhood trauma or adverse experiences, including physical abuse, emotional abuse, sexual abuse, neglect, household dysfunction (such as parental substance abuse, mental illness, domestic violence, divorce, or incarceration), and other related factors.

The ACE Questionnaire typically consists of ten questions, each focusing on a different type of adverse experience. Respondents answer "yes" or "no" to each question based on whether they experienced the particular event during their childhood. The total score on the ACE questionnaire reflects the cumulative number of adverse experiences a person has encountered.

A German version of the questionnaire has been available since 2010 [97] with tested reliability and validity [124].
In this study, the examiner evaluated the ten ACE categories from the ACE-Questionnaire using data derived from previously conducted evaluation reports, instead of relying on self-reported information in a questionnaire format.

3.3.2.3 German Federal Central Register – Convictions of Violent Crime

The participants' criminal careers were further evaluated by examining entries in the Bundeszentralregister (BZR). The BZR is a central official registry managed by the Federal Office of Justice in Germany in accordance with §1 of the Federal Central Register Act (BZRG).

The register records criminal convictions by German courts, specific decisions by administrative authorities, cases on diminished responsibility, and special judicial findings. It also includes subsequent decisions and facts related to these entries. Additionally, foreign convictions against Germans, individuals born or residing in Germany, are entered into the register when certain conditions are met.

In accordance with § 4 BZRG (German Federal Central Criminal Register Act), the BZR records final court decisions related to unlawful acts. This includes when a sentence is imposed, a measure of improvement and security is ordered, an individual receives a warning with a reservation of punishment per § 59 of the Criminal Code, or the guilt of a juvenile or young adult is established according to § 27 of the Youth Courts Act.

In Germany, violent crimes, as defined in the police crime statistics (polizeiliche Kriminalstatistik) include offenses such as murder (§ 211 StGB), manslaughter (§ 212 StGB), and murder on request (§ 216 StGB). They also cover aggravated and dangerous bodily harm (§ 224, § 226 StGB), bodily harm resulting in death (§ 227 StGB), and participation in brawls (§ 231 StGB).

Additionally, crimes such as rape and severe sexual coercion (§ 177, § 178 StGB) are included, alongside robbery-related offenses (§ 249–252, § 255, § 316a StGB) and extortionate kidnapping (§ 239a StGB).

Hostage-taking and attacks on maritime or air traffic (§ 239b StGB) also fall under this category.

In this study, convictions for the aforementioned violent crimes (including hands-on sexual offenses) were categorized as either a history of or future convictions for violent offending, depending on whether they occurred before or after the psychiatric/psychological evaluation. As the data was directly extracted from the register, inter-rater reliability was not evaluated.

The observation period, defined as the time between the evaluation report and the extracted entry from the register, averaged 8.13 years (SD: 2.32), encompassing a range from 2.38 years to 14.63 years. Notably, data from the BZR was unavailable for two participants.

3.4 Data Analysis

3.4.1 Latent Class Analysis

LCA was carried out in Mplus version 8.8 [81] using a robust maximum likelihood estimator, incorporating the 14 SCID-II items describing borderline symptoms alongside the 5 items pertaining to antisociality in the PCL-R (Facet 4). These items were dichotomized with 0=0 and 1 or 2=1.

LCA serves as a statistical tool designed to identify homogenous latent classes or groups within a heterogeneous population. Membership in a particular class is deduced from patterns within observed variables, referred to as "indicators" [3]. These classes can encapsulate various underlying constructs, including preferences, disease burden, symptom profiles, or genetic phenotypes. In conditions characterized by heterogeneity, such as BPD, where individuals may exhibit a diverse array of traits, LCA proves valuable in categorizing the varied manifestations of BPD and exploring patterns of comorbidity.

Identifying the optimal number of classes can be challenging. It is advisable to initiate the analysis with a one-class model and systematically introduce one class at a time. During this process, careful consideration should be given to evaluating whether each added class contributes to conceptually and statistically superior outcomes. This evaluation involves the use of statistical indices as well as whether the inclusion of each additional class aligns with clinical understanding and is interpretable from a practical perspective [4,84].

In this study, we incorporated the Akaike Information Criterion [5] (AIC), the Bayesian Information Criterion [99] (BIC), and the sample-size adjusted Bayesian Information Criterion [100] (aBIC) as indicators of model fit. The model exhibiting the smallest fit indicators demonstrates the optimal balance between fit and parsimony. Additionally, the significant test statistics of the Lo-Mendell-Rubin Likelihood Ratio Test [70] (LMR LRT) and the Bootstrapped Parametric Likelihood Ratio Test [75] (BLRT), comparing a model with k classes to a model with (k-1) classes, suggest that the incorporation of an extra latent class has improved the model fit. Entropy was also quantified; Entropy is a measure used to assess the quality of classification or the precision of the model in assigning individuals to latent classes. It is calculated based on the probabilities of class membership for each individual. Generally

speaking, an entropy value greater than 0.80 is considered a good indicator of high classification accuracy and clear distinction between latent classes [27], meaning individuals are being clearly assigned to latent classes with minimal overlap or ambiguity.

In the context of our current research, LCA is particularly well-suited, as the addition of subgroups enhances our ability to address the inherent heterogeneity of the condition, thereby contributing to a more nuanced understanding of the complexities involved.

The LCA was conducted using indicators from the SCID-II and PCL-R, following a "three-step approach" [118] in order to identify distinct subgroups of male offenders. The first step involved running the latent class model based solely on the borderline traits from the SCID-II and the antisocial traits from the PCL-R, producing a solution that identifies different subgroups of offenders. The second step incorporated our two covariates— ACEs and age—to evaluate their influence on class membership. Lastly, the third step examined the relationships between the latent classes and specific outcomes, such as violent behavior, using regression models.

3.5 Reliability Measures

To assess agreement between raters, Cohen's kappa was computed for categorical variables to assess inter-rater agreement. For ordinal data, Kendall's Tau was utilized. Dimensional variables were evaluated using the intraclass correlation coefficient, calculated with a two-way random effects model based on a single measure with absolute agreement. Additionally, the internal consistency of self-reported data was assessed using Cronbach's Alpha. These were conducted using IBM SPSS Version 28.0.

3.5.1 Cohen's Kappa (κ)

Cohen's Kappa is a statistical measure used to assess inter-rater agreement for categorical data. It considers the agreement that could be expected to occur by chance and adjusts the observed agreement accordingly. Kappa is particularly useful when evaluating the reliability of observations or classifications made by different raters or observers [66].

In the context of Cohen's Kappa, "agreement" refers to the degree of consensus or similarity between two observers or raters when they are tasked with categorizing items into different groups or classes.

Cohen's Kappa values from −1 to 1, where a of $\kappa = 1$ indicates perfect agreement, $\kappa = 0$ reflects agreement equivalent to chance, and $\kappa < 0$ denotes agreement worse than chance.

Cohen's Kappa is commonly interpreted using specific guidelines [66]: values between 0.81 and 1.00 suggest almost perfect agreement; values from 0.61 to 0.80 indicate substantial agreement; 0.41 to 0.60 represents moderate agreement; 0.21 to 0.40 corresponds to fair agreement; and values ≤ 0.20 suggest only slight agreement.

3.5.2 Kendall's Tau (τ)

The Kendall rank correlation coefficient is a measure used to assess the strength and direction of association between two sets of ranked data. In simpler terms, it helps you understand how the order of values in one set corresponds to the order of values in another set [29].

The Kendall's Tau correlation coefficient ranges from −1 to 1, and its value provides information about the strength and direction of the relationship between two sets of ranked data. A Kendall's Tau value of 1 indicates a perfect positive correlation, meaning there is complete agreement in the rankings between the two sets; when

one set has a higher rank, the other set also has a higher rank, and vice versa. Conversely, a Kendall's Tau of -1 signifies a perfect negative correlation, showing complete disagreement in the rankings; when one set has a higher rank, the other set has a lower rank, and vice versa. A Kendall's Tau value of 0 reflects no correlation, implying no consistent pattern or association between the rankings of the two sets, with the ranks not tending to move in either the same or opposite direction.

In interpreting Kendall's Tau values, correlation strength can be categorized as follows [29]: values between 0.1 and 0.3 (or -0.1 and -0.3 for negative correlations) are considered weak, indicating slight agreement or disagreement in the rankings. Values between 0.3 and 0.5 (or -0.3 and -0.5) are classified as moderate correlations, reflecting a more noticeable, though not robust, association. Values greater than 0.5 (or less than -0.5 for negative correlations) are considered strong, indicating a high degree of agreement or disagreement between the rankings. Finally, values closer to 0, whether positive or negative, imply negligible or no correlation, suggesting an absence of meaningful association between the two sets.

3.5.3 The Intraclass Correlation Coefficient (ICC)

The Intraclass Correlation Coefficient (ICC) is a measure that quantifies the proportion of total variance in a set of measurements that can be attributed to the variability between different groups or subjects. This coefficient is particularly useful when dealing with repeated measurements on the same subjects or items.

An ICC of 0 indicates no agreement or consistency between measurements, suggesting that the observed variation is largely due to random factors or errors rather than true differences. On the other hand, an ICC of 1 reflects perfect agreement or consistency, implying that all observed variation is attributable to genuine differences between subjects, with no influence from errors. ICC values between 0 and 1

represent varying degrees of reliability, where values closer to 1 denote greater measurement reliability.

The interpretation of ICC values can be summarized as follows [64]: Low ICC values (0 to 0.4) indicate poor reliability, implying that the measurements may be inconsistent and influenced by significant error variability. Moderate ICC values (0.4 to 0.75) suggest a moderate level of reliability, indicating some agreement in the measurements, but improvements are advisable for better consistency. High ICC values (0.75 to 1) reflect good to excellent reliability, indicating strong agreement and consistent measurements that are dependable for drawing conclusions or making decisions.

3.5.4 Cronbach's Alpha (α)

The internal consistency of self-report questionnaires within this study was evaluated using Cronbach's alpha (see 3.7.4 and 3.7.5). Cronbach's alpha is a coefficient that measure the reliability of a set of items within a measurement scale or test, it indicates the degree to which these items consistently measure the same underlying construct or trait [17,32].

Cronbach's alpha ranges from 0 to 1, where a value of 0 indicates no internal consistency among the items, suggesting that the items in the scale or test do not measure the same underlying construct. In contrast, a value of 1 represents perfect internal consistency, implying that all items in the scale are perfectly correlated and measure the same construct without any error.

In practical terms, the interpretation of Cronbach's alpha values can be outlined as follows [112]: values between 0 and 0.2 indicate very poor internal consistency, suggesting that the items lack coherence in measuring the intended construct. Values from 0.2 to 0.4 reflect poor internal consistency, where items have limited correlation and may not reliably represent the same construct. Values between 0.4 and

0.6 indicate moderate internal consistency, showing that the items share some commonality, but improvements are needed for better reliability. Values from 0.6 to 0.8 are considered to indicate good internal consistency, suggesting that the items are well-aligned and measure the construct reliably. Values between 0.8 and 1.0 are seen as excellent internal consistency, meaning the items have high coherence and can be trusted for consistent measurement.

Researchers typically aim for a Cronbach's alpha of at least 0.70 as a threshold for acceptable internal consistency, although the appropriate level may vary depending on the specific field [112].

3.6 Further Statistical Indicators

3.6.1 Odds Ratio

The odds ratio was employed to discern the presence and extent of an association between latent class membership and the observed categorical variable based on regression analysis.

If the odds ratio is greater than 1, it indicates that individuals in a particular latent class are more likely to exhibit a certain characteristic or behavior compared to individuals in another latent class.

If the odds ratio is equal to 1, it suggests that there is no difference in the likelihood of the characteristic or behavior between the compared latent classes.

If the odds ratio is less than 1, it implies that individuals in a particular latent class are less likely to exhibit a certain characteristic or behavior compared to individuals in another latent class.

The confidence interval set to 95% provides a range of values within which there is a 95% confidence that the true odds ratio lies. A narrower confidence interval indicates greater precision in estimating the true odds ratio, while a wider interval suggests more uncertainty.

If the confidence interval for the odds ratio includes 1, it suggests that the odds ratio is not statistically significant at the 95% confidence level. In other words, there is no significant difference in the likelihood of the characteristic or behavior between the compared latent classes.

If the confidence interval is entirely above 1, it suggests that individuals in one latent class are more likely to exhibit the characteristic or behavior compared to individuals in another latent class, and this difference is statistically significant.

Tables 1 to 3 display a range of statistical coefficients, including inter-rater agreement and ICC from the ACE-Q (table 1), correlation coefficient of the PCL-R Facet 4 items (table 2), as well as Cronbach's alpha values for the AQ-G (table 3).

3.6.2 ACE-Scale

Table 1: Inter-Rater Agreement of ACE

ACE-Scales by Felitti et al. (1998)	Cohen's Kappa	ICC
Physical Abuse	0.93	
Emotional Abuse	0.63	
Physical Neglect	0.60	
Emotional Neglect	0.74	
Sexual Abuse	1.00	
Mother Treated Violently	0.85	
Household Substance Abuse	0.78	
Mental Illness in Household	0.85	
Parental Separation or Divorce	0.93	
Criminal Household Member	0.76	
Total ACE Score		0.98

3.6.3 PCL-R Items

Table 2: Correlation Coefficient of the PCL-R

PCL-R Facet 4 Item	Kendall's Tau
Poor Behavioral Control	0.56
Early Behavioral Problems	0.53
Juvenile Delinquency	0.62
Revocation of Conditional Release	0.74
Criminal Versatility	0.54

3.6.4 AQ-G

Table 3: Cronbach's Alpha Values for AQ-G

AQ-G Item	Cronbach's Alpha
Verbal Aggression	0.64
Physical Aggression	0.86
Indirect Aggression	0.73
Anger	0.82
Hostility	0.79

3.6.5 SCID-II

The study's primary focus was identifying BPD traits within the cohort rather than utilizing the SCID-II for diagnostic purposes. Therefore, the internal consistency is rendered less pertinent within the scope of our investigation, as our aim was to pin-point borderline traits by focusing on individual items rather than the overall score on the SCID-II. The borderline items demonstrated strong reliability with an internal consistency of $\alpha = 0.82$.

4 Results

4.1 Descriptive Findings

4.1.1 SCID-II Borderline Items

On average, 3.01 items that indicate BPD on the SCID were answered positively (SD = 3.01, Range 0-14). 76 participants (24.1%) answered at least 5 items positively, which is considered an indicator for clinically relevant borderline symptomatology. Table 4 presents a breakdown of the frequency with which individual items from the SCID-II related to BPD were answered positively.

Table 4: Number of Positive Responses to BPD SCID-II-Items

Number of Items	*n*	%
0	64	20.3
1	61	19.4
2	45	14.3
3	43	13.7
4	26	8.3
5	20	6.3
6	12	3.8
7	17	5.4
8	9	2.9
9	4	1.3
10	5	1.6
11	2	0.6
12	2	0.6
13	1	0.3
14	4	1.3
Total	315	100

4.1.2 PCL-R

The overall value of facet 4 of the PCL-R Checklist which accounts for antisocial behavior was on average 4.01 (SD = 2.92, range 0-10). Taking into account the comparison sample in the German manual, 25 people (7.9%) were in the above-average range ($T \geq 60$). Table 5 presents a categorical analysis of responses to the PCL-R Facet 4 items.

Table 5: Individual PCL-R Facet 4 Responses

PCL-R Facet 4 Items:	Poor Behav. Control		Early Behav. Problems		Juvenile Delinquency		Revocation of Cond. Release		Criminal Versatility	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
No	67	21	127	40	157	48.9	133	42.2	159	50.5
Maybe	136	43.2	82	26	72	22.9	25	7.90	75	23.8
Yes	92	29.2	79	25.1	62	19.7	90	28.6	55	17.5
Total	295	93.7	288	91.4	288	91.4	248	78.7	289	91.7
Missing	20	6.30	27	8.60	27	8.60	67	21.3	26	8.30
Total	315	100	315	100	315	100	315	100	315	100

4.1.3 AQ-G

Table 6 provides a categorical summary of statistical parameters for aggression as measured by the AQ-G.

Table 6: Descriptive Statistical Parameters for Aggression According to the AQ-G (n=315)

	Phys. Aggr.	Verb. Aggr.	Ind. Aggr.	Anger	Hostility
Mean	14.58	12.98	11.70	13.61	17.01
Median	13	13	11	13	16
SD	6.28	2.99	4.15	4.74	5.47
Range	30	17	22	26	28
Minimum	8	6	6	7	8
Maximum	38	23	28	33	36

4.1.4 ACE Questionnaire

The ACE Score data for the sample of 315 participants was analyzed. The mean ACE Score was calculated as 3.15, with a median of 3.00. The standard deviation of the scores was 2.67, reflecting a large degree of variability within the sample. The range of ACE Scores extended from a minimum of 0 to a maximum of 9.00 resulting in a total range of 9.00. No data was missing from the sample. Table 7 outlines the distribution of binary responses to various categories of ACEs.

Table 7: Frequency and Valid Percentage Table of ACEs (n=315)

Adverse Childhood Experience	Yes	
	n	*%*
Physical Abuse	93	29.5
Emotional Abuse	128	40.6
Physical Neglect	83	26.3
Emotional Neglect	178	56.5
Sexual Abuse	21	6.70
Parental Separation	137	43.5
Drugs in Household	114	36.2
Family Psychiatric Problems	87	27.6
Violence in Household	104	33.0
Crime in Household	50	15.9

4.1.5 Violent Offending Analysis Using the BZR

The table summarizes the distribution of participants with a history of violent offending, meaning an offense committed before psychological/psychiatric evaluation and future violent offending which describes crimes committed after psychological/psychiatric evaluation.

Table 8: History of - and Future Violent Offending According to the BZR

	History of Violent Offending		Future Violent Offending	
	n	*%*	*n*	*%*
No	78	24.8	268	85.1
Yes	237	75.2	45	14.3
Total	315	100	313	99.4
Missing	-	-	2	0.6
Total	315	100	315	100

4.2 Latent Class Analysis Models

The 6-class solution boasted the smallest aBIC, emphasizing its optimal fit. Furthermore, the BLRT indicated a preference for a greater number of classes, consistently suggesting that more classes tend to be superior to fewer.

The 3-class solution stood out with the smallest BIC value. Furthermore, both additional Likelihood-Ratio Tests affirm that the superiority of the 3-class solution over

the 2-class alternative, while the 4-class solution failed to surpass the effectiveness of the 3-class configuration. The entropy was also good, around 0.84, for the 3-class solution.

As per Nylund et al. [83], the BIC stands out as the superior indicator, whereas the aBIC might tend to overestimate the number of classes. Conversely, the BLRT is deemed the most reliable among the Likelihood-Ratio Tests. It is advisable to initially consider the BIC, turning to the BLRT in instances of uncertainty.

The 6-class solution provided greater differentiation but resulted in smaller sample sizes, with three classes containing fewer than 50 individuals, posing statistical challenges. A comprehensive assessment, encompassing model fit, interpretability, and the consideration of class sizes, leads to the selection of the 3-class model for subsequent analyses. Table 9 summarizes the statistical indicators for the class models tested:

Table 9: Model Fit Indices of LCA with Increasing Number of Latent Classes (n = 315)

	Log	AIC	BIC	aBIC	Entropy	LMR LRT	BLRT
1	-3164.04	6366.08	6437.38	6377.12	-	-	-
2	-2865.19	5808.38	5954.73	5831.03	0.858	0	0
3	-2754.62	5627.24	**5848.64**	5661.51	0.837	0.005	0
4	-2702.02	5562.05	5858.51	5607.94	0.834	**0.120**	0
5	-2648.96	5495.93	5867.43	5553.43	0.878	0.126	0
6	-2618.01	5474.02	5920.58	**5543.14**	0.873	0.184	0

In our three-class model, we identified the following groups: The first class (n = 63) is comprised of individuals who demonstrated a blend of borderline and antisocial traits. Class two (n = 150) is characterized solely by antisocial traits, while class three (n = 102) represents a cohort with a low probability of either trait, thus serving as our low-symptom group.

Figure 1 provides a graphical representation of the three-class model, illustrating the range of antisocial and borderline traits. A table presenting the mean item response probabilities using the three-class model is presented below as well (table 10). The table containing the mean item response probabilities for the six-class model (table 13) as well as the corresponding diagram (figure 2) are included in the appendix.

Figure 1: Latent Class Analysis Model Using Three Classes

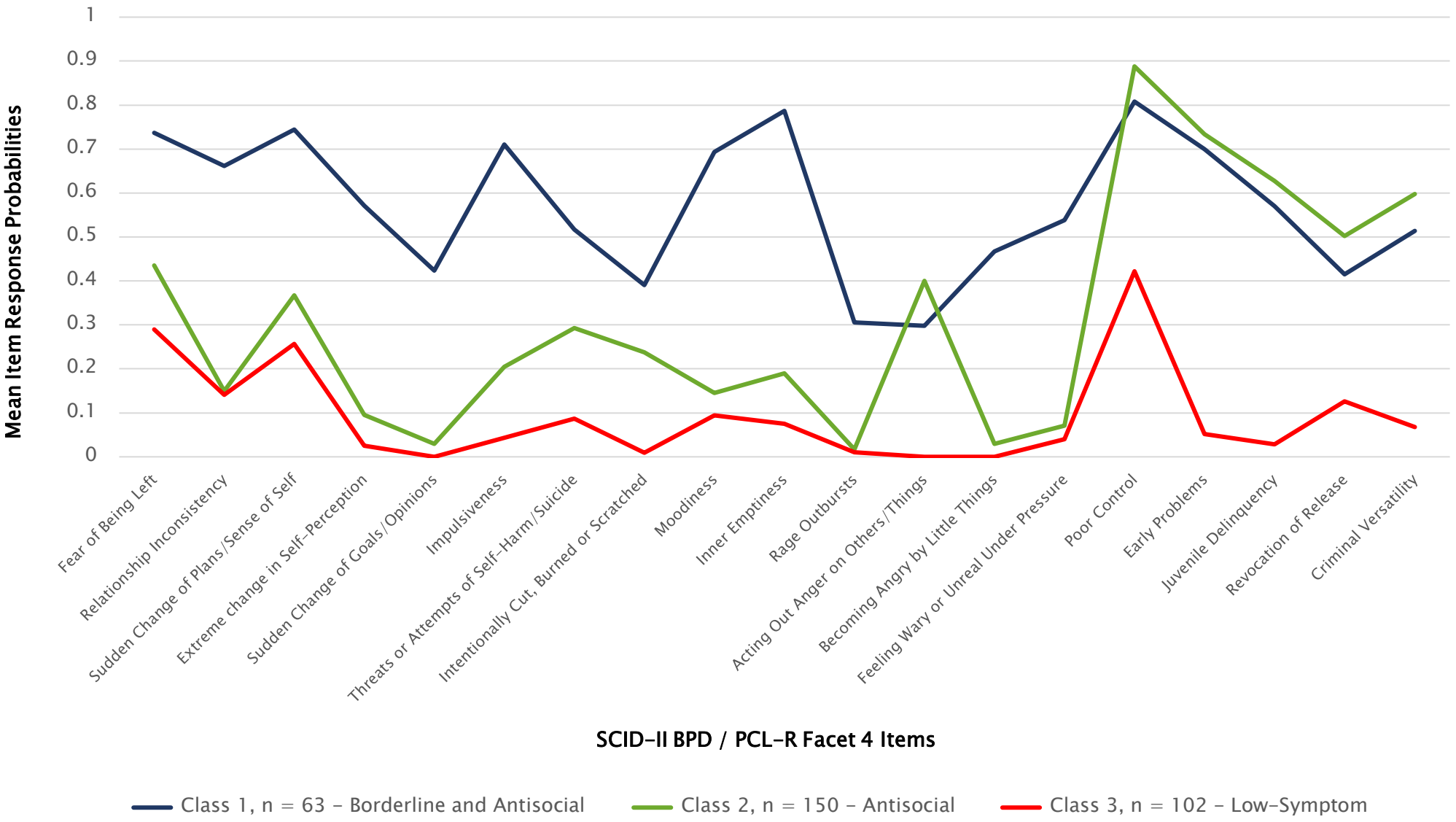


Table 10: Mean Item Reponse Probabilities (Three Class Model)

	Item (Number)	Class 1	Class 2	Class 3
SCID-II (Borderline)	Fear of Being Left (89)	0.73	0.43	0.29
	Relationship Inconsistency (90)	0.66	0.15	0.14
	Sudden Change of Plans/Sense of Self (91)	0.74	0.36	0.25
	Extreme change in Self-Perception (92)	0.57	0.09	0.02
	Sudden Change of Goals/Opinions (93)	0.42	0.02	0.00
	Impulsiveness (94)	0.71	0.20	0.04
	Threats or Attempts of Self-Harm/Suicide (95)	0.51	0.29	0.08
	Intentionally Cut, Burned or Scratched (96)	0.39	0.23	0.00
	Moodiness (97)	0.69	0.14	0.09
	Inner Emptiness (98)	0.78	0.19	0.07
	Rage Outbursts (99)	0.30	0.01	0.01
	Acting Out Anger on Others/Things (100)	0.29	0.40	0.00
	Becoming Angry by Little Things (101)	0.46	0.02	0.00
	Feeling Wary or Unreal Under Pressure (102)	0.53	0.07	0.04
PCL-R Facet 4 (Antisocial)	Poor Behavioral Control (10)	0.80	0.88	0.42
	Early Behavioral Problems (12)	0.70	0.73	0.05
	Juvenile Delinquency (18)	0.57	0.62	0.02
	Revocation of Conditional Release (19)	0.41	0.50	0.12
	Criminal Versatility (20)	0.51	0.59	0.06

Note. n = 315. PCL-R Coding Was Dichotomized as 0 = 0 and 1/2 = 1.

To summarize, class 1 exhibits the highest levels of emotional instability and anti-social behaviors. Class 2 is characterized primarily by antisocial traits, with relatively lower levels of emotional dysregulation. Class 3 demonstrates minimal traits from either domain, indicating a baseline level of stability.

Impulsivity and aggression are most pronounced in class 1, followed by class 2, with class 3 displaying the lowest levels. Notably, class 1 combines these traits with heightened emotional reactivity, whereas class 2 primarily manifests antisocial behaviors without the same degree of emotional dysregulation.

Self-perception and interpersonal relationships also differ significantly across the classes. Class 1 individuals experience profound difficulties in maintaining stable self-perception and relationship stability, while class 2 shows fewer issues in these

areas. In contrast, class 3 maintains stable self-perception and well-adjusted relationships, highlighting their emotional and interpersonal stability. Overall, class 1 presents severe and pervasive traits across both borderline and antisocial domains, distinguishing it from the more narrowly focused antisocial profile of class 2 and the minimal symptomatology observed in class 3.

An analysis of the effects of the covariates ACEs and age on class membership revealed that, compared to the low-symptom class, higher ACE scores significantly increased the likelihood of assignment to both the borderline-antisocial class (OR = 1.31, 95% CI [1.14, 1.52], $p < .001$) and the antisocial class (OR = 1.31, 95% CI [1.14, 1.51], $p < .001$). In contrast, age was negatively associated with membership in both the borderline-antisocial class (OR = 0.94, 95% CI [0.91, 0.98], $p = .003$) and the antisocial class (OR = 0.94, 95% CI [0.92, 0.97], $p < .001$), indicating that younger individuals were more likely to be assigned to these classes. However, direct comparisons between the borderline-antisocial and antisocial classes revealed no significant differences in either ACE scores (OR = 1.00, 95% CI [0.89, 1.12], $p = .974$) or age (OR = 1.00, 95% CI [0.97, 1.04], $p = .929$), suggesting that these factors did not differentiate between the two groups.

ACEs are particularly influential in the borderline-antisocial class. Individuals in this group reported higher levels of childhood trauma. Age also played a significant role in this class; younger individuals were more likely to belong to this group, while older participants demonstrated a reduced likelihood of exhibiting these combined traits.

In terms of outcomes, the borderline-antisocial class was the strongest predictor of both history of and future violent offending. Members of this group exhibited the highest levels of verbal, physical, and indirect aggression.

The antisocial class, while also predictive of aggressive outcomes, showed a different behavioral pattern. Individuals in this group were less emotionally dysregulated than those in the borderline-antisocial class, but they still displayed high levels of aggression, particularly physical aggression.

In contrast, the low-symptom group, which consisted of individuals with minimal borderline or antisocial traits, had significantly lower levels of aggression and were much less likely to engage in violent crime.

When ACE and age were controlled for in the analysis, both remained significant predictors of aggression and crime. Higher ACE scores were consistently associated with greater aggression across all forms (verbal, physical, indirect) and higher rates of future violent offending. Age, conversely, was associated with a decrease in these outcomes, especially in the antisocial class.

Tables 11 and 12 present the results of regression analyses aimed at predicting self-reported physical aggression, as measured by the AQ-G, alongside history of and future violent offending, utilizing data derived from the BZR. Two sets of regression analyses were performed; both with and without the inclusion of covariates. The first analysis compared the low-symptom class with the combined borderline and antisocial class, using the low-symptom class as the reference group (Table 11). The second analysis examined differences between the antisocial class and the combined borderline and antisocial class, designating the antisocial class as the reference group (Table 12).

Table 11: Regression Comparing Low-Symptom with Borderline-Antisocial and Antisocial Classes

Reference Class: Low-Symptom

Measured Outcomes:	*Prior and Future Violent Offending (BZR)*				*Aggression (AQ-G Items)*											
	Hist. Viol. Crime		Fut. Viol. Crime		Verb. Aggr.		Phys. Aggr.		Ind. Aggr.		Anger		Hostility		Total Aggr.	
	OR	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*
Class: BPD - Antisoc.	0.90	(0.40-2.02)	1.51	(0.51-4.48)	1.39	(1.26-1.54)	1.50	(1.24-1.81)	1.49	(1.27-1.76)	1.95	(1.63-2.34)	1.73	(1.45-2.06)	1.18	(1.13-1.24)
ACE	1.31	(1.13-1.52)	1.31	(1.13-1.51)	1.23	(1.04-1.45)	1.27	(1.08-1.48)	1.22	(1.04-1.44)	1.08	(0.87-1.33)	1.16	(0.95-1.42)	1.12	(0.92-1.37)
Age	0.94	(0.90-0.98)	0.94	(0.90-0.98)	0.98	(0.93-1.03)	0.95	(0.91-0.99)	0.95	(0.90-1.00)	0.96	(0.91-1.01)	0.94	(0.90-0.99)	0.97	(0.92-1.03)
Class: Antisocial	1.85	(0.85-4.06)	2.51	(0,99-6,40)	1.21	(1.09-1.33)	1.15	(1.03-1.29)	1.12	(0.99-1.26)	1.24	(1.09-1.41)	1.08	(0.98-1.20)	1.06	(1.02-1.10)
ACE	1.29	(1.12-1.48)	1.30	(1.13-1.48)	1.28	(1.12-1.46)	1.30	(1.13-1.49)	1.27	(1.12-1.45)	1.26	(1.10-1.45)	1.28	(1.12-1.47)	1.26	(1.11-1.47)
Age	0.9	(0.91-0.96)	0.94	(0.92-0.96)	0.95	(0.92-0.98)	0.94	(0.91-0.96)	0.94	(0.91-0.96)	0.93	(0.91-0.96)	0.93	(0.90-0.96)	0.94	(0.91-0.97)

Table 12: Regression Comparing Antisocial with Borderline-Antisocial Class

Reference Class: Antisocial

Measured Outcomes:	*Prior and Future Violent Offending (BZR)*				*Aggression (AQ-G Items)*											
	Hist. Viol. Crime		Fut. Viol. Crime		Verb. Aggr.		Phys. Aggr.		Ind. Aggr.		Anger		Hostility		Total Aggr.	
	OR	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*	*OR*	*95% CI*
Class: BPD - Antisoc.	0.48	(0.21-1.07)	0.60	(0.25-1.40)	1.15	(1.08-1.23)	1.30	(1.10-1.53)	1.33	(1.20-1.49)	1.57	(1.33-1.86)	1.59	(1.34-1.89)	1.11	(1.07-1.15)
ACE	1.02	(0.91-1.14)	1.00	(0.89-1.13)	0.96	(0.83-1.10)	0.97	(0.86-1.10)	0.95	(0.82-1.11)	0.85	(0.71-1.02)	0.90	(0.75-1.09)	0.89	(0.74-1.06)
Age	1.00	(0.96-1.03)	1.00	(0.96-1.03)	1.02	(0.98-1.07)	1.01	(0.97-1.04)	1.01	(0.97-1.05)	1.02	(0.91-1.07)	1.01	(0.96-1.06)	1.03	(0.98-1.09)

5 Discussion

5.1 Summary

This thesis aimed to deepen the understanding of BPD in male offenders, particularly in relation to its co-occurrence with antisocial personality traits. It further examined the associations of these conditions with aggression, the prevalence of violent crime convictions, and the influence of ACEs.

This study hypothesized that among male criminal offenders, latent class analysis would identify four distinct classes based on the presence and severity of BPD traits and antisocial personality traits. These classes being expected to differ significantly in terms of violent tendencies and criminal behavior, with ACEs serving as a significant predictor of both the severity and type of aggressive behavior and violent crime exhibited by the offenders. The prevalence of BPD traits within the sample was notably high, with approximately four-fifths of participants endorsing at least one diagnostic criterion and nearly one-quarter meeting a threshold of five or more BPD criteria.

These findings align with prior research indicating significantly elevated rates of BPD traits in forensic populations compared to clinical or community samples [16,30,122]. Nevertheless, the majority of the sample was categorized within the class marked by antisocial traits without significant BPD symptomatology. This distribution could reflect the heterogeneity of the sample, which encompassed individuals with diverse mental health profiles, including both offenders requiring (forensic) psychiatric care and those without apparent psychiatric needs.

Contrary to prior expectations, a class displaying only BPD traits could not be identified. Approximately one-third of the total sample exhibited low probabilities BPD and antisocial traits, with minimal psychopathological features, what we ended up describing as our low-symptom class. In contrast, the remaining two-thirds of the

sample were distributed across two distinct symptomatic classes. Nearly half of the offenders demonstrated elevated probabilities of antisocial traits, classified as the "antisocial class," while approximately one-fifth of the sample was assigned to a "borderline-antisocial class," characterized by a high comorbidity of BPD and antisocial traits.

Regarding violent crime history, the antisocial class had twice the likelihood of violent delinquency compared to the low-symptom group. The antisocial class and the borderline-antisocial class displayed no significant difference in terms of propensity for violent delinquency.

When future violent crime was considered, offenders in the antisocial class were three times more likely to commit violent crimes in the future compared to those in the low-symptom class.

In terms of verbal, physical, and indirect aggression as well as anger and hostility, both the antisocial and antisocial-borderline classes exhibited higher levels than the low-symptom group, with the borderline-antisocial class often showing the highest aggression, this could be explained by an increased propensity for emotional instability, impulsivity, and interpersonal difficulties, all of which are known to contribute to externalizing behaviors, including physical aggression toward others. These factors collectively highlight the complex interplay between emotional dysregulation and aggressive tendencies, particularly in individuals with heightened vulnerability to such maladaptive behaviors [95].

Lastly, the examination of total aggression scores revealed that both high-risk classes had elevated scores compared to the low-symptom group, with the borderline-antisocial class showing the strongest tendencies, underscoring the pervasive nature of aggressive behaviors in these populations. Our findings regarding aggression also align with previous literature [93,95].

We also hypothesized that the presence of adverse childhood experiences was anticipated to serve as a significant predictor of both the severity and specific manifestations of aggressive behavior and violent criminal activity. A higher prevalence of ACEs was expected to correlate with an increased propensity for engaging in violent and aggressive actions. Both the antisocial as well as the borderline-antisocial showed a high burden of ACEs when compared to the low-symptom group. ACEs did not independently predict future convictions for violent crime, but they demonstrated incremental predictive validity for future violent offending within the borderline-antisocial and antisocial classes, as compared to the low-symptom class. An increasing number of ACEs was found to be significantly associated with a heightened risk of physical aggression and a prior history of convictions for violent crime, irrespective of the presence of BPD or antisocial traits. Contrary to our hypotheses, the symptomatic classes did not significantly differ in terms of cumulative ACEs. This finding suggests that ACEs serve as a pervasive and non-specific risk factor for a range of maladaptive outcomes relevant to forensic psychiatry and psychology [31,36,45].

Age emerged as a significant factor influencing the observed dynamics within the study. Younger offenders were more likely to be assigned to either of the symptomatic classes, reflecting a heightened prevalence of BPD and antisocial traits in this age group. Consistent with existing literature [89], younger offenders also demonstrated higher levels of physical aggression and an elevated risk of future violent crime convictions.

The absence of a significant association between age and a history of violent crime convictions may be partially attributed to the limited time younger offenders have had to engage in violent behavior prior to their psychiatric or psychological evalua-

tion. Nonetheless, when contrasting LCA models, younger age remained a significant predictor of future convictions for violent crime, underscoring the importance of early intervention and risk assessment within this demographic.

5.2 Practical Implications

Research on offenders with psychopathic traits consistently demonstrates that tailored and individualized treatment approaches can lead to improved outcomes, including reductions in violent behavior and recidivism [104,105]. Similarly, the identification of distinct subgroups among offenders with BPD traits and antisocial personality traits suggests that interventions could be optimized by tailoring treatment strategies to the specific needs and psychological profiles of each subgroup. This approach could enhance the effectiveness of forensic rehabilitation by addressing the unique behavioral and psychological characteristics of these offenders.

To achieve this, it is essential to conduct comprehensive assessments that include not only evaluations of personality disturbances such as BPD and antisocial traits but also screenings for ACEs and patterns of aggressive behavior. Such assessments facilitate the alignment of offenders with targeted interventions that address their individual needs, thereby reducing the risk of aggression and violent conduct. This approach aligns with the principles of the Risk-Need-Responsivity Model [18], which emphasizes the importance of individualized treatment strategies for offender rehabilitation.

Interventions grounded in evidence-based frameworks, such as dialectical behavioral therapy adapted for forensic settings (DBT-F) [73,85], have shown promise in addressing the complex needs of offenders with personality disorders. These interventions should also include robust anger management and hostility reduction programs, potentially reducing the risk of recidivism and improving overall treatment outcomes [14,40].

Additionally, therapies that focus on ACEs and associated traumatic experiences, such as narrative exposure therapy for forensic offender rehabilitation [37,103], provide a structured approach to mitigating the long-term effects of trauma while addressing criminogenic factors.

The established positive correlation between ACEs and aggressive behavior highlights the critical need for integrating trauma-informed care into clinical practice. Recognizing the profound impact of early-life adversity on behavioral outcomes not only promotes a deeper understanding of patient needs but also serves as a foundation for developing more empathetic and efficacious therapeutic interventions [76,127].

The observed negative correlation between age and aggression underscores the importance of tailoring interventions to align with age-related behavioral trends. Younger offenders, exhibiting higher levels of impulsivity and aggression, may benefit from intensive behavioral interventions, whereas older individuals might require alternative support structures that address their distinct needs.

The incorporation of structured diagnostic tools, such as the SCID-II, in forensic settings facilitates more accurate identification of personality disorders. This precision supports the development of tailored treatment plans and appropriate placement decisions within the criminal justice system.

Furthermore, identifying specific personality disorder traits associated with elevated recidivism risk enables the refinement of risk assessment tools. This advancement can inform the design of more effective post-release supervision and monitoring strategies, ultimately contributing to a reduction in reoffense rates.

5.3 Study Strengths and Limitations

5.3.1 Strengths

One of the key strengths of the study is its ability to identify distinct subgroups within the offender population. This segmentation could enable the development of more tailored interventions that cater to the specific needs of each subgroup. Such an approach could help improve the effectiveness of treatment and rehabilitation programs, as it would allow for more individualized care that addresses the unique characteristics and challenges of each group.

The study also has significant implications for risk assessment, particularly in identifying personality disorder traits that are linked to a higher risk of recidivism. This information could help refine risk assessment tools, enhancing their ability to predict future criminal behavior. As a result, the findings could have practical implications for improving supervision and monitoring strategies, particularly for individuals under post-release supervision.

Furthermore, the study integrates self-report questionnaires, clinical assessments, and official data from the German Federal Central Register (BZR), providing a nuanced and empirically grounded framework for analyzing criminal behavior. Additionally, the analysis of two key covariates—age and ACEs—provides deeper insight into their impact on criminal trajectories and violent behavior, enhancing the overall understanding of these relationships.

Finally, the study was conducted over a long period of time (M=8.13 years). It also demonstrated high internal consistency of its self-report questionnaires, as measured by Cronbach's alpha. This suggests that the measurement scales used in the study reliably assess the underlying constructs, reinforcing the validity of the findings. High internal consistency in these tools ensures that the data collected is both accurate and dependable, further strengthening the study's overall credibility [17].

5.3.2 Limitations

The study comes with certain limitations. While it specifically focused on forensic patients exhibiting borderline and antisocial traits, formal clinician-administered diagnoses of personality disorder(s) could not be included. As such, the results may not be directly applicable to a broader population, or to individuals who have been formally diagnosed with either borderline, antisocial or any other personality disorder. This limits the generalizability of the findings, especially when considering other groups outside the scope of this population or when comparing the results to research that did so [93].

Furthermore, other psychiatric syndromes frequently comorbid with BPD and of particular relevance in forensic contexts were not addressed in this analysis. Among these, ADHD stands out as a condition with significant forensic implications, as highlighted in previous studies [92,115].

We were also unable to account for potential confounding effects of prior treatment interventions [2], which may have independently influenced individual risk profiles for aggression and violent criminal behavior.

Additionally, while we employed a cumulative ACE-Score as a measure, existing literature on deviant behavior underscores the advantages of utilizing person-centered approaches to ACE patterns [10]. However, such an in-depth, person-centered analysis was beyond the methodological and analytical scope of the current investigation.

Methodologically, the study relied on self-report measures and structured interviews, both of which are commonly used in research of this nature. However, these methods are not without their potential biases. Social desirability bias, which is expected to some degree when evaluating offenders [121], refers to the tendency of individuals to present themselves in a more favorable light. Additionally, recall bias,

where participants may have difficulty accurately recalling or reporting past experiences, could affect the accuracy of the data collected. While the sample size is deemed adequate for the purposes of the study, it still presents some limitations when it comes to generalizing the findings. Data from offenders was collected from a single forensic institute in Germany, which restricts the diversity of the sample. Variability in demographic characteristics and other relevant factors could further impact the external validity of the results.

5.4 Future Directions

There are several avenues for future research to build on the findings of this study. One key area is the need for further evaluation of forensic therapeutic interventions specifically tailored to individuals with borderline and antisocial traits. While substantial research on interventions for offenders with psychopathic traits has been conducted [104,105], as well as for individuals with borderline traits aimed at improving clinically assessed BPD behaviors [108], less is known about the effectiveness of treatments designed especially for offenders with borderline traits, with the intent of reducing recidivism rates. Future studies should also focus on the development and rigorous testing of interventions that address the emotional dysregulation, impulsivity, and interpersonal difficulties characteristic of BPD.

In addition to intervention strategies, future research should also incorporate more diverse populations, including female offenders, individuals from different cultural backgrounds, and offenders across various age groups. This would allow for cross-cultural comparisons, providing insights into how the manifestation of borderline and antisocial traits might differ across populations and how these traits interact with cultural and environmental factors to influence criminal behavior.

Moreover, the role of comorbid psychiatric disorders, such as ADHD, substance use disorders, anxiety, and mood disorders, in the expression of borderline and antisocial traits warrants further investigation. Understanding the interaction between these comorbidities and personality disorders could aid the development of more comprehensive and integrated treatment approaches. Future studies should examine how these comorbid conditions influence the risk of violent behavior and recidivism, and whether addressing these conditions within a forensic treatment framework can lead to better outcomes.

Another important area for future exploration is the refinement of LCA models used to categorize subtypes of borderline and antisocial personality traits. The findings of this study suggest that LCA is a useful tool for identifying distinct subgroups within offender populations. However, there is room for improvement in the accuracy and robustness of these models. Future research should explore the inclusion of additional variables and larger sample sizes to enhance the precision of these classifications, which could lead to a more nuanced understanding of the specific risks associated with different subtypes of borderline and antisocial traits.

6 Conclusion

This thesis aimed to enhance the understanding of BPD in male offenders through the application of LCA. By examining the interplay between borderline personality and antisocial personality traits, ACEs, and violent behavior, several key insights have emerged.

Our findings underscore the heterogeneity within the forensic population exhibiting borderline and antisocial traits. Specifically, we identified distinct subgroups characterized by varying levels of aggression, hostility and propensity for violent crime. Notably, individuals in the combined borderline and antisocial class demonstrated higher levels of verbal, physical, indirect, and total aggression compared to those in

the antisocial-only class. This differentiation is crucial for tailoring interventions to address the specific needs of each subgroup.

The study revealed that ACEs play a significant role in influencing violent behavior and aggression in both antisocial and borderline-antisocial classes. Higher ACE scores were consistently associated with increased aggression and a higher likelihood of having a history of violent crime. Additionally, age emerged as a protective factor, with younger individuals displaying higher propensities for future delinquency and aggression.

Practical implications of these findings include the potential for more effective risk assessment tools and tailored forensic interventions. By recognizing the distinct behavioral profiles within the offender population, clinicians and forensic professionals can develop targeted treatment and rehabilitation programs, thereby potentially reducing recidivism rates.

Despite its strengths, this study has limitations, including the reliance on self-report measures, which may introduce biases, and a sample size that may limit the generalizability of the findings. Future research should focus on expanding sample diversity, including cross-cultural comparisons, and refining LCA models to better categorize subtypes of borderline and antisocial traits. Additionally, exploring the impact of comorbid psychiatric disorders on the expression of borderline and antisocial traits could provide a more comprehensive understanding of these complex dynamics.

In conclusion, this thesis contributes to the understanding of BPD in a forensic setting, highlighting the importance of considering individual differences in personality traits and childhood experiences. These insights could pave the way for more personalized and effective approaches to managing and treating individuals with borderline and antisocial traits in forensic settings.

References

1. Adler DA, Drake RE, Teague GB (1990) Clinicians' practices in personality assessment: does gender influence the use of DSM-III axis II? Compr Psychiatry 31:125–133

2. Afifi TO, Mather A, Boman J, Fleisher W, Enns MW, MacMillan H, Sareen J (2011) Childhood adversity and personality disorders: Results from a nationally representative population-based study. J Psychiatr Res 45:814–822

3. Aflaki K, Vigod S, Ray JG (2022) Part I: A friendly introduction to latent class analysis. J Clin Epidemiol 147:168–170

4. Aflaki K, Vigod S, Ray JG (2023) Part II: A step-by-step guide to latent class analysis. J Clin Epidemiol 159:348–351

5. Akaike H (1974) A new look at the statistical model identification. IEEE Trans Autom Control 19:716–723

6. American Psychiatric Association, American Psychiatric Association, editors (2013) Diagnostic and statistical manual of mental disorders: DSM-5. 5th ed edition. American Psychiatric Association, Washington, D.C

7. Antoine SM, Fredborg BK, Streiner D, Guimond T, Dixon-Gordon KL, Chapman AL, Kuo J, Links P, McMain S (2023) Subgroups of borderline personality disorder: A latent class analysis. Psychiatry Res 323:115131

8. Bach B, Kramer U, Doering S, Di Giacomo E, Hutsebaut J, Kaera A, De Panfilis C, Schmahl C, Swales M, Taubner S, Renneberg B (2022) The ICD-11 classification of personality disorders: a European perspective on challenges and opportunities. Borderline Personal Disord Emot Dysregulation 9:12

9. Banzhaf A, Ritter K, Merkl A, Schulte-Herbrüggen O, Lammers C-H, Roepke S (2012) Gender Differences in a Clinical Sample of Patients with Borderline Personality Disorder. J Personal Disord 26:368–380

10. Barra S, Bessler C, Landolt MA, Aebi M (2018) Patterns of adverse childhood experiences in juveniles who sexually offended. Sex Abuse 30:803–827

11. Bateman A, Fonagy P (2008) Comorbid antisocial and borderline personality disorders: mentalization-based treatment. J Clin Psychol 64:181–194

12. Bayes A, Parker G (2017) Borderline personality disorder in men: A literature review and illustrative case vignettes. Psychiatry Res 257:197–202

13. Becker D, Lamb S (1994) Sex Bias in the Diagnosis of Borderline Personality Disorder and Posttraumatic Stress Disorder. Prof Psychol Res Pract 25:55–61

14. Berman ME, Fallon AE, Coccaro EF (1998) The relationship between personality psychopathology and aggressive behavior in research volunteers. J Abnorm Psychol 107:651–658

15. Biskin RS (2015) The Lifetime Course of Borderline Personality Disorder. Can J Psychiatry Rev Can Psychiatr 60:303–308

16. Black DW, Gunter T, Allen J, Blum N, Arndt S, Wenman G, Sieleni B (2007) Borderline personality disorder in male and female offenders newly committed to prison. Compr Psychiatry 48:400–405

17. Blanz M (2021) Forschungsmethoden und Statistik für die Soziale Arbeit: Grundlagen und Anwendungen. Kohlhammer Verlag

18. Bonta J, Andrews DA (2007) Risk-need-responsivity model for offender assessment and rehabilitation. Rehabilitation (Stuttg) 6:1–22

19. Bornovalova MA, Levy R, Gratz KL, Lejuez CW (2010) Understanding the Heterogeneity of BPD Symptoms through Latent Class Analysis: Initial Results and Clinical Correlates among Inner-city Substance Users. Psychol Assess 22:233–245

20. Bradley R, Jenei J, Westen D (2005) Etiology of Borderline Personality Disorder: Disentangling the Contributions of Intercorrelated Antecedents. J Nerv Ment Dis 193:24

21. Broerman R (2017) Diathesis-Stress Model. Springer International Publishing, Cham. URL: https://doi.org/10.1007/978-3-319-28099-8_891-1

22. Buss AH, Perry M (1992) The Aggression Questionnaire. J Pers Soc Psychol 63:452–459

23. Cavelti M, Lerch S, Ghinea D, Fischer-Waldschmidt G, Resch F, Koenig J, Kaess M (2021) Heterogeneity of borderline personality disorder symptoms in help-seeking adolescents. Borderline Personal Disord Emot Dysregulation 8:9

24. CDC (2024) About Adverse Childhood Experiences. URL: https://www.cdc.gov/aces/about/index.html

25. Chanen AM, Kaess M (2012) Developmental Pathways to Borderline Personality Disorder. Curr Psychiatry Rep 14:45–53

26. Chanen AM (2015) Borderline Personality Disorder in Young People: Are We There Yet? J Clin Psychol 71:778–791

27. Clark S (2009) Relating latent class analysis results to variables not included in the analysis. University of California.

28. Cloitre M, Garvert DW, Weiss B, Carlson EB, Bryant RA (2014) Distinguishing PTSD, Complex PTSD, and Borderline Personality Disorder: A latent class analysis. Eur J Psychotraumatology 5:25097

29. Cohen J (1988) Statistical Power Analysis for the Behavioral Sciences. 2nd edition. Routledge, New York

30. Conn C, Warden R, Stuewig J, Kim EH, Harty L, Hastings M, Tangney JP (2010) Borderline Personality Disorder Among Jail Inmates: How Common and How Distinct? Correct Compend 35:6–13

31. Craig JM, Piquero AR, Farrington DP, Ttofi MM (2017) A little early risk goes a long bad way: Adverse childhood experiences and life-course offending in the Cambridge study. J Crim Justice 53:34–45

32. Cronbach LJ (1951) Coefficient alpha and the internal structure of tests. Psychometrika 16:297–334

33. De Fruyt F, De Clercq B (2014) Antecedents of Personality Disorder in Childhood and Adolescence: Toward an Integrative Developmental Model. Annu Rev Clin Psychol 10:449–476

34. Distel MA, Middeldorp CM, Trull TJ, Derom CA, Willemsen G, Boomsma DI (2011) Life events and borderline personality features: the influence of gene-environment interaction and gene-environment correlation. Psychol Med 41:849–860

35. Doering S, Renn D, Höfer S, Rumpold G, Smrekar U, Janecke N, Schatz DS, Schotte C, DeDoncker D, Schüßler G (2007) Validierung der deutschen Version des Fragebogens zur Erfassung von DSM-IV Persönlichkeitsstörungen (ADP-IV). Z Für Psychosom Med Psychother 53:111–128

36. Dube SR (2024) Adverse childhood experiences research: The path forward. Child Abuse Negl 154:106899

37. Elbert T, Hermenau K, Hecker T, Weierstall R, Schauer M (2012) FORNET : Behandlung von traumatisierten und nicht-traumatisierten Gewalttätern mittels Narrativer Expositionstherapie.

38. English DJ, Upadhyaya MP, Litrownik AJ, Marshall JM, Runyan DK, Graham JC, Dubowitz H (2005) Maltreatment's wake: The relationship of maltreatment dimensions to child outcomes. Child Abuse Negl 29:597–619

39. Fazel S, Danesh J (2002) Serious mental disorder in 23 000 prisoners: a systematic review of 62 surveys. The Lancet 359:545–550

40. Feigenbaum JD, Fonagy P, Pilling S, Jones A, Wildgoose A, Bebbington PE (2012) A real-world study of the effectiveness of DBT in the UK National Health Service. Br J Clin Psychol 51:121–141

41. Felitti VJ, Anda RF, Nordenberg D, Williamson DF, Spitz AM, Edwards V, Koss MP, Marks JS (1998) Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. Am J Prev Med 14:245–258

42. First MB, Williams JBW, Karg RS, Spitzer RL (2016) User's guide for the SCID-5-CV Structured Clinical Interview for DSM-5® disorders: Clinical version. American Psychiatric Publishing, Inc., Arlington, VA, US

43. Ford JD, Grasso DJ, Elhai JD, Courtois CA (2015) Social, cultural, and other diversity issues in the traumatic stress field. Posttraumatic Stress Disord 503–546

44. Fossati A, Madeddu F, Maffei C (1999) Borderline Personality Disorder and childhood sexual abuse: a meta-analytic study. J Personal Disord 13:268–280

45. Fox BH, Perez N, Cass E, Baglivio MT, Epps N (2015) Trauma changes everything: Examining the relationship between adverse childhood experiences and serious, violent and chronic juvenile offenders. Child Abuse Negl 46:163–173

46. Frost R, Hyland P, Shevlin M, Murphy J (2020) Distinguishing Complex PTSD from Borderline Personality Disorder among individuals with a history of sexual trauma: A latent class analysis. Eur J Trauma Dissociation 4:100080

47. Golier JA, Yehuda R, Bierer LM, Mitropoulou V, New AS, Schmeidler J, Silverman JM, Siever LJ (2003) The Relationship of Borderline Personality Disorder to Posttraumatic Stress Disorder and Traumatic Events. Am J Psychiatry 160:2018–2024

48. Grant BF, Chou SP, Goldstein RB, Huang B, Stinson FS, Saha TD, Smith SM, Dawson DA, Pulay AJ, Pickering RP (2008) Prevalence, Correlates, Disability, and Comorbidity of DSM-IV Borderline Personality Disorder: Results From the Wave 2 National Epidemiologic Survey on Alcohol and Related Conditions. J Clin Psychiatry 69:15398

49. Gunderson JG (2009) Borderline Personality Disorder: Ontogeny of a Diagnosis. Am J Psychiatry 166:530–539

50. Gunderson JG, Stout RL, McGlashan TH, Shea MT, Morey LC, Grilo CM, Zanarini MC, Yen S, Markowitz JC, Sanislow C, Ansell E, Pinto A, Skodol AE (2011) Ten-Year Course of Borderline Personality Disorder: Psychopathology and Function From the Collaborative Longitudinal Personality Disorders Study. Arch Gen Psychiatry 68:827–837

51. Hare RD, Clark D, Grann M, Thornton D (2000) Psychopathy and the predictive validity of the PCL-R: an international perspective. Behav Sci Law 18:623–645

52. Hare RD (2020) The PCL-R Assessment of Psychopathy. John Wiley & Sons, Ltd URL: https://onlinelibrary.wiley.com/doi/abs/10.1002/9781119159322.ch4

53. Harris JA (1997) A further evaluation of the Aggression Questionnaire: issues of validity and reliability. Behav Res Ther 35:1047–1053

54. Henry KA, Cohen CI (1983) The role of labeling processes in diagnosing borderline personality disorder. Am J Psychiatry 140:1527–1529

55. Herzberg PY (2003) Faktorstruktur, Gütekriterien und Konstruktvalidität der deutschen Übersetzung des Aggressionsfragebogens von Buss und Perry. [Psychometric Evaluation and Validity of the German Translation of the Aggression Questionnaire by Buss and Perry.]. Z Für Differ Diagn Psychol 24:311–323

56. Hollerbach P, Habermeyer E, Nitschke J, Sünkel Z, Mokros A (2020) Construct Validity of the German Version of the Hare Psychopathy Checklist – Revised. Eur J Psychol Assess 36:805–816

57. Howard RC, Huband N, Duggan C, Mannion A (2008) Exploring the link between personality disorder and criminality in a community sample. J Personal Disord 22:589–603

58. Howard RC, Khalifa N, Duggan C (2014) Antisocial personality disorder comorbid with borderline pathology and psychopathy is associated with severe violence in a forensic sample. J Forensic Psychiatry Psychol 25:658–672

59. Jackson Y, Gabrielli J, Fleming K, Tunno AM, Makanui PK (2014) Untangling the relative contribution of maltreatment severity and frequency to type of behavioral outcome in foster youth. Child Abuse Negl 38:1147–1159

60. Johnson DM, Shea MT, Yen S, Battle CL, Zlotnick C, Sanislow CA, Grilo CM, Skodol AE, Bender DS, McGlashan TH, Gunderson JG, Zanarini MC (2003) Gender differences in borderline personality disorder: findings from the collaborative longitudinal personality disorders study. Compr Psychiatry 44:284–292

61. Kavanagh PS (2018) Antisocial Personality Traits. Springer International Publishing, Cham. URL: https://doi.org/10.1007/978-3-319-28099-8_2299-1

62. Kendler KS, Aggen SH, Czajkowski N, Røysamb E, Tambs K, Torgersen S, Neale MC, Reichborn-Kjennerud T (2008) The Structure of Genetic and Environmental Risk Factors for DSM-IV Personality Disorders. Arch Gen Psychiatry 65:1438–1446

63. Kolla NJ, Meyer JH, Bagby RM, Brijmohan A (2017) Trait Anger, Physical Aggression, and Violent Offending in Antisocial and Borderline Personality Disorders. J Forensic Sci 62:137–141

64. Koo TK, Li MY (2016) A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. J Chiropr Med 15:155–163

65. Krause-Utz A, Winter D, Niedtfeld I, Schmahl C (2014) The Latest Neuroimaging Findings in Borderline Personality Disorder. Curr Psychiatry Rep 16:438

66. Landis JR, Koch GG (1977) The Measurement of Observer Agreement for Categorical Data. Biometrics 33:159–174

67. Leichsenring F, Leibing E, Kruse J, New AS, Leweke F (2011) Borderline personality disorder. The Lancet 377:74–84

68. Leichsenring F, Heim N, Leweke F, Spitzer C, Steinert C, Kernberg OF (2023) Borderline Personality Disorder: A Review. JAMA 329:670–679

69. Lenzenweger MF, Lane MC, Loranger AW, Kessler RC (2007) DSM-IV Personality Disorders in the National Comorbidity Survey Replication. Biol Psychiatry 62:553–564

70. Lo Y, Mendell NR, Rubin DB (2001) Testing the number of components in a normal mixture. Biometrika 88:767–778

71. Loeber R, Farrington DP, Stallings R (2011) The Pittsburgh Youth Study. Springer US, New York, NY. URL: https://doi.org/10.1007/978-1-4419-9949-8_2

72. Malinosky-Rummell R, Hansen DJ (1993) Long-term consequences of childhood physical abuse. Psychol Bull 114:68–79

73. McCann RA, Ball EM, Ivanoff A (2000) DBT with an inpatient forensic population: The CMHIP forensic model. Cogn Behav Pract 7:447–456

74. McGrath SA, Nilsen AA, Kerley KR (2011) Sexual victimization in childhood and the propensity for juvenile delinquency and adult criminal behavior: A systematic review. Aggress Violent Behav 16:485–492

75. McLachlan G (2000) Finite mixture models. A wiley-interscience publication.

76. Miller NA, Najavits LM (2012) Creating trauma-informed correctional care: a balance of goals and environment. Eur J Psychotraumatology 3:10.3402/ejpt.v3i0.17246

77. Moeller FG, Barratt ES, Dougherty DM, Schmitz JM, Swann AC (2001) Psychiatric aspects of impulsivity. Am J Psychiatry 158:1783–1793

78. Mokros A, Hollerbach P, Nitschke J, Habermeyer E (2017) Deutsche Version der Hare Psychopathy Checklist-Revised (PCL-R) von RD Hare. Hogrefe Goettingen Ger

79. Monahan J, Steadman H, Silver E, Appelbaum P, Robbins P, Mulvey E, Roth L, Grisso T, Banks S (2002) Rethinking Risk Assessment: The MacArthur Study of Mental Disorder and Violence. Thomas Grisso 1:

80. Murray J, Farrington DP (2010) Risk Factors for Conduct Disorder and Delinquency: Key Findings from Longitudinal Studies. Can J Psychiatry 55:633–642

81. Muthén BO, Muthén LK (1998) Mplus user's guide. 8th ed. Los Angeles, CA. http://www.statmodel.com/download/usersguide/MplusUserGuideVer_8.pdf

82. National Collaborating Centre for Mental Health, editor (2009) Borderline personality disorder: treatment and management. British Psycholog. Soc. [u.a.], Leicester

83. Nylund KL, Asparouhov T, Muthén BO (2007) Deciding on the Number of Classes in Latent Class Analysis and Growth Mixture Modeling: A Monte Carlo Simulation Study. Struct Equ Model Multidiscip J 14:535–569

84. Nylund-Gibson K, Choi A (2018) Ten Frequently Asked Questions About Latent Class Analysis. Transl Issues Psychol Sci 4:440–461

85. Oermann A (2017) Dialektisch-Behaviorale Therapie-Forensik. Handb Antisozialen Persönlichkeitsstörung Stuttg Schattauer 452–60

86. Otte S, Lang F, Rasche K, Bernheim D, Vasic N, Dudeck M (2015) Konvergente Validität von SKID-II und TCI: Kategoriale vs. dimensionale Diagnostik von Persönlichkeitsstörungen am Beispiel von Gefangenen mit Kurzzeitstrafe. Fortschritte Neurol · Psychiatr 83:157–161

87. Özel B, Karakaya E, Köksal F, Altinoz AE, Yilmaz-Karaman IG (2024) Gender bias of antisocial and borderline personality disorders among psychiatrists. Arch Womens Ment Health

88. Paris J, Chenard-Poirier M-P, Biskin R (2013) Antisocial and borderline personality disorders revisited. Compr Psychiatry 54:321–325

89. Piquero AR, Jennings WG, Diamond B, Reingle JM (2015) A systematic review of age, sex, ethnicity, and race as predictors of violent recidivism. Int J Offender Ther Comp Criminol 59:5–26

90. Porter C, Palmier-Claus J, Branitsky A, Mansell W, Warwick H, Varese F (2020) Childhood adversity and borderline personality disorder: a meta-analysis. Acta Psychiatr Scand 141:6–20

91. Ragan DT, Osgood DW, Kreager DA (2023) Impulsivity, Peers, and Delinquency: A Dynamic Social Network Approach. J Quant Criminol 39:735–768

92. Retz W, Ginsberg Y, Turner D, Barra S, Retz-Junginger P, Larsson H, Asherson P (2021) Attention-Deficit/Hyperactivity Disorder (ADHD), antisociality and delinquent behavior over the lifespan. Neurosci Biobehav Rev 120:236–248

93. Robitaille M-P, Checknita D, Vitaro F, Tremblay RE, Paris J, Hodgins S (2017) A prospective, longitudinal, study of men with borderline personality disorder with and without comorbid antisocial personality disorder. Borderline Personal Disord Emot Dysregulation 4:25

94. Sansone RA, Sansone LA (2011) Gender Patterns in Borderline Personality Disorder. Innov Clin Neurosci 8:16–20

95. Sansone RA, Sansone LA (2012) Borderline personality and externalized aggression. Innov Clin Neurosci 9:23

96. Saraiya TC, Fitzpatrick S, Zumberg-Smith K, López-Castro T, E. Back S, A. Hien D (2021) Social-Emotional Profiles of PTSD, Complex PTSD, and Borderline Personality Disorder Among Racially and Ethnically Diverse Young Adults: A Latent Class Analysis. J Trauma Stress 34:56–68

97. Schäfer I, Spritzer C (2009) Deutsche Version des "Adverse Childhood Experiences Questionnaire (ACE)". Universität Hamburg.

98. Schulze L, Schmahl C, Niedtfeld I (2016) Neural Correlates of Disturbed Emotion Processing in Borderline Personality Disorder: A Multimodal Meta-Analysis. Biol Psychiatry 79:97–106

99. Schwarz G (1978) Estimating the Dimension of a Model. Ann Stat 6:461–464

100. Sclove SL (1987) Application of model-selection criteria to some problems in multivariate analysis. Psychometrika 52:333–343

101. Sher L, Rutter SB, New AS, Siever LJ, Hazlett EA (2019) Gender differences and similarities in aggression, suicidal behaviour, and psychiatric comorbidity in borderline personality disorder. Acta Psychiatr Scand 139:145–153

102. Shin SH, Cook AK, Morris NA, McDougle R, Groves LP (2016) The different faces of impulsivity as links between childhood maltreatment and young adult crime. Prev Med 88:210–217

103. Siehl S, Robjant K, Crombach A (2021) Systematic review and meta-analyses of the long-term efficacy of narrative exposure therapy for adults, children and perpetrators. Psychother Res J Soc Psychother Res 31:695–710

104. Skeem JL, Monahan J, Mulvey EP (2002) Psychopathy, treatment involvement, and subsequent violence among civil psychiatric patients. Law Hum Behav 26:577–603

105. Skeem JL, Polaschek DLL, Patrick CJ, Lilienfeld SO (2011) Psychopathic Personality: Bridging the Gap Between Scientific Evidence and Public Policy. Psychol Sci Public Interest 12:95–162

106. Steadman HJ, Mulvey EP, Monahan J, Robbins PC, Appelbaum PS, Grisso T, Roth LH, Silver E (1998) Violence by people discharged from acute psychiatric inpatient facilities and by others in the same neighborhoods. Arch Gen Psychiatry 55:393–401

107. Steketee M, Aussems C, Marshall IH (2021) Exploring the Impact of Child Maltreatment and Interparental Violence on Violent Delinquency in an International Sample. J Interpers Violence 36:NP7319–NP7349

108. Stewart NA, Wilkinson-Tough M, Chambers GN (2019) Psychological interventions for individuals with a diagnosis of borderline personality disorder in forensic settings: A systematic review. J Forensic Psychiatry Psychol 30:744–793

109. Stoffers-Winterling JM, Storebøa OJ, Völlm BA, Mattivi JT, Nielsen SS, Kielsholm ML, Faltinsen EG, Simonsena E, Lieb K (2018) Pharmacological interventions for people with borderline personality disorder. Cochrane Database Syst Rev

110. Storebøa OJ, Stoffers-Winterlinga JM, Völlm BA, Kongerslev MT, Mattivi JT, Jørgensen MS, Faltinsen E, Todorovac A, Sales CP, Callesen HE, Liba K, Simonsena E (2020) Psychological therapies for people with borderline personality disorder. Cochrane Database Syst Rev 2020:

111. STUART H (2003) Violence and mental illness: an overview. World Psychiatry 2:121–124

112. Tavakol M, Dennick R (2011) Making sense of Cronbach's alpha. Int J Med Educ 2:53–55

113. Tharshini NK, Ibrahim F, Kamaluddin MR, Rathakrishnan B, Che Mohd Nasir N (2021) The Link between Individual Personality Traits and Criminality: A Systematic Review. Int J Environ Res Public Health 18:8663

114. Torgersen S (2005) Epidemiology. American Psychiatric Publishing, Inc., Arlington, VA, US

115. van Dijk FE, Lappenschaar M, Kan CC, Verkes RJ, Buitelaar JK (2012) Symptomatic overlap between attention-deficit/hyperactivity disorder and borderline personality disorder in women: the role of temperament and character traits. Compr Psychiatry 53:39–47

116. Van Wert M, Mishna F, Trocmé N, Fallon B (2017) Which maltreated children are at greatest risk of aggressive and criminal behavior? An examination of maltreatment dimensions and cumulative risk. Child Abuse Negl 69:49–61

117. van Zutphen L, Siep N, Jacob GA, Domes G, Sprenger A, Willenborg B, Goebel R, Tüscher O, Arntz A (2020) Impulse control under emotion processing: an fMRI investigation in borderline personality disorder compared to non-patients and cluster-C personality disorder patients. Brain Imaging Behav 14:2107–2121

118. Vermunt JK, Magidson J (2021) How to Perform Three-Step Latent Class Analysis in the Presence of Measurement Non-Invariance or Differential Item Functioning. Struct Equ Model Multidiscip J 28:356–364

119. Videler AC, Hutsebaut J, Schulkens JEM, Sobczak S, van Alphen SPJ (2019) A Life Span Perspective on Borderline Personality Disorder. Curr Psychiatry Rep 21:51

120. Walter M, Wiesbeck GA, Dittmann V, Graf M (2011) Criminal recidivism in offenders with personality disorders and substance use disorders over 8 years of time at risk. Psychiatry Res 186:443–445

121. Wente VM, Retz-Junginger P, Crombach A, Retz W, Barra S (2023) The Suitability of the Childhood Trauma Questionnaire in Criminal Offender Samples. Int J Environ Res Public Health 20:5195

122. Wetterborg D, Långström N, Andersson G, Enebrink P (2015) Borderline personality disorder: Prevalence and psychiatric comorbidity among male offenders on probation in Sweden. Compr Psychiatry 62:63–70

123. White JL, Moffitt TE, Caspi A, Bartusch DJ, Needles DJ, Stouthamer-Loeber M (1994) Measuring impulsivity and examining its relationship to delinquency. J Abnorm Psychol 103:192–205

124. Wingenfeld K, Schäfer I, Terfehr K, Grabski H, Driessen M, Grabe H, Löwe B, Spitzer C (2011) Reliable, valide und ökonomische Erfassung früher Traumatisierung: Erste psychometrische Charakterisierung der deutschen Version des Adverse Childhood Experiences Questionnaire (ACE). PPmP - Psychother · Psychosom · Med Psychol 61:e10–e14

125. Winsper C, Bilgin A, Thompson A, Marwaha S, Chanen AM, Singh SP, Wang A, Furtado V (2020) The prevalence of personality disorders in the community: a global systematic review and meta-analysis. Br J Psychiatry J Ment Sci 216:69–78

126. Woehrle L, Retz-Junginger P, Retz W, Barra S (2022) The Maltreatment-Aggression Link among Prosecuted Males: What about Psychopathy? Int J Environ Res Public Health 19:9584

127. Wolff N, Huening J, Shi J, Frueh BC (2014) Trauma exposure and posttraumatic stress disorder among incarcerated men. J Urban Health Bull N Y Acad Med 91:707–719

128. World Health Organization (WHO) (1993) The ICD-10 classification of mental and behavioural disorders. World Health Organization.

129. World Health Organization (WHO) (2019) International Statistical Classification of Diseases and Related Health Problems (11th ed.). https://icd.who.int/.

130. Zanarini MC, Williams AA, Lewis RE, Reich RB, Vera SC, Marino MF, Levin A, Yong L, Frankenburg FR (1997) Reported pathological childhood experiences associated with the development of borderline personality disorder. Am J Psychiatry 154:1101–1106

131. Zlotnick C, Rothschild L, Zimmerman M (2002) The Role of Gender in the Clinical Presentation of Patients with Borderline Personality Disorder. J Personal Disord 16:277–282

132. Latent Class Analysis: A Guide to Best Practice. URL: https://journals.sagepub.com/doi/epub/10.1177/0095798420930932

133. First MB, Williams JBW, Karg RS, Spitzer RL: Structured Clinical Interview for DSM-5—Research Version (SCID-5 for DSM-5, Research Version; SCID-5-RV). Arlington, VA, American Psychiatric Association, 2015.

Appendix

Table 13: Mean Item Response Probabilities (Six Class Model)

	Item (Number)	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
SCID-II	Fear of Being Left (89)	0.84	0.38	1.00	0.69	0.36	0.24
	Relationship Inconsistency (90)	0.75	0.29	0.72	0.38	0.06	0.11
	Sudden Change of Plans/Sense of Self (91)	0.81	0.51	0.60	0.46	0.30	0.25
	Extreme Change in Self-Perception (92)	0.73	0.18	0.57	0.24	0.04	0.02
	Sudden Change of Goals/Opinions (93)	0.75	0.03	0.31	0.13	0.02	0.00
	Impulsiveness (94)	1.00	0.40	0.32	0.35	0.13	0.03
	Threats or Attempts Self-Harm/Suicide (95)	0.59	0.89	0.44	0.00	0.05	0.07
	Intentionally Cut, Burned or Scratched (96)	0.49	0.74	0.00	0.00	0.06	0.01
	Moodiness (97)	1.00	0.16	0.51	0.63	0.00	0.07
	Inner Emptiness (98)	1.00	0.43	0.84	0.43	0.01	0.03
	Rage Outbursts (99)	0.65	0.06	0.21	0.02	0.01	0.00
	Acting Out Anger on Others/Things (100)	0.45	0.14	0.15	0.08	0.00	0.00
	Becoming Angry by Little Things (101)	0.94	0.04	0.29	0.11	0.02	0.00
	Feeling Wary/Unreal Under Pressure (102)	0.68	0.27	0.20	0.22	0.00	0.04
PCL-R Facet 4	Poor Behavioral Control (10)	1.00	0.91	0.33	0.86	0.86	0.43
	Early Behav. Problems (12)	0.85	0.70	0.12	0.76	0.78	0.04
	Juvenile Delinquency (18)	0.84	0.61	0.08	0.67	0.58	0.02
	Revocation of Release (19)	0.35	0.93	0.24	0.50	0.58	0.12
	Criminal Versatility (20)	0.75	0.46	0.00	0.67	0.65	0.06

Note. n = 315. PCL-R Coding Was Dichotomized as 0 = 0 and 1/2 = 1.

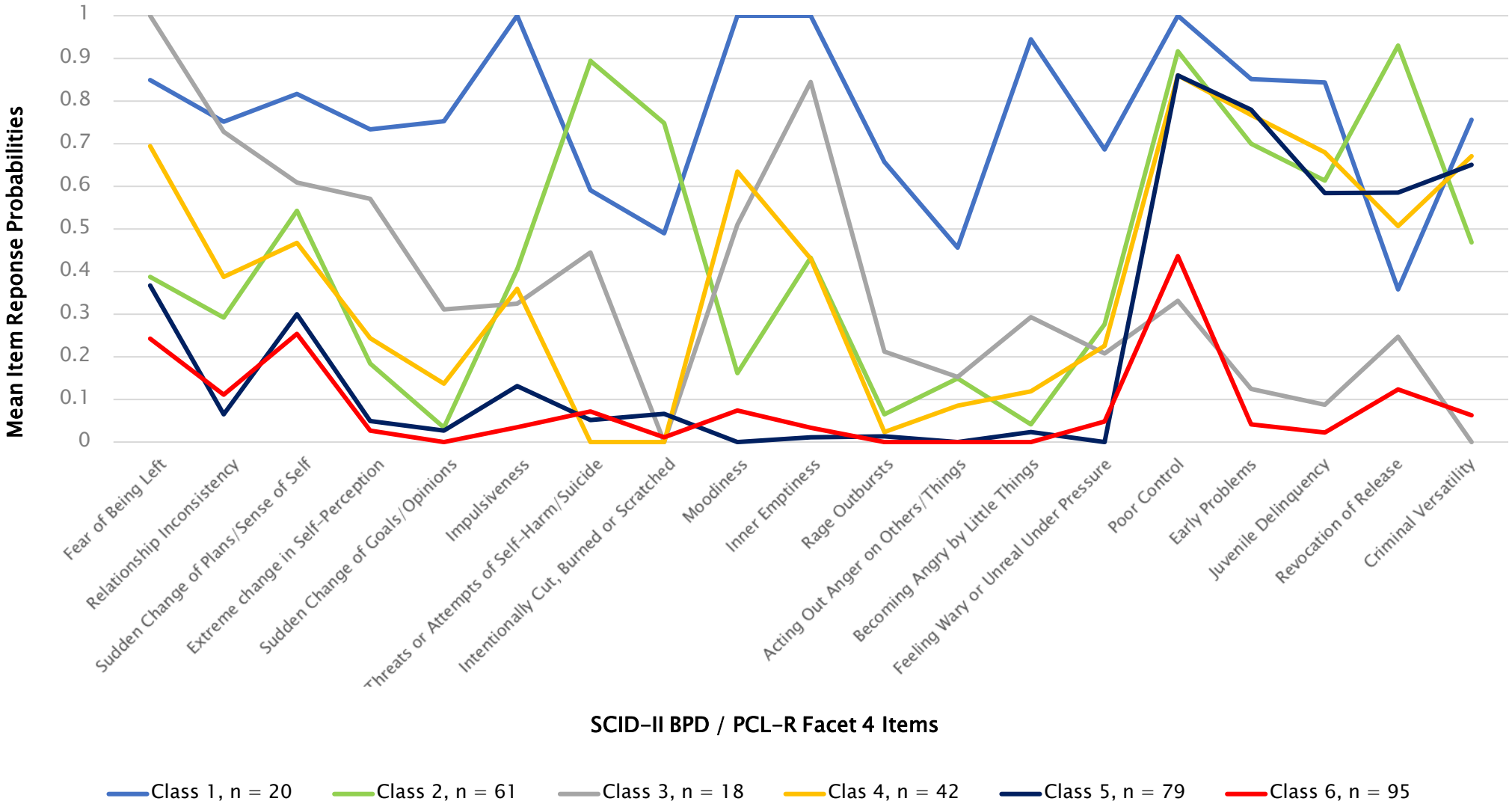
Table 14: Individual SCID-II Item Response Rate

SCID-II Item:		89		90		91		92		93		94		95	
		n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
	No	172	54.6	231	73.3	184	58.4	259	82.2	282	89.5	231	73.3	228	72.4
Valid	Yes	141	44.8	78	24.8	128	40.6	53	16.8	31	9.80	78	24.8	86	27.3
	Total	313	99.4	309	98.1	312	99	312	99	313	99.4	309	98.1	314	99.7
	Missing	2	0.60	6	1.90	3	1	3	1	2	0.60	6	1.90	1	0.30
	Total	315	100	315	100	315	100	315	100	315	100	315	100	315	100

SCID-II Item:		96		97		98		99		100		101		102	
		n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
	No	252	80	236	74.9	226	71.7	290	92.1	288	91.4	279	88.6	260	82.5
Valid	Yes	62	19.7	75	23.8	86	27.3	23	7.30	25	7.9	34	10.8	48	15.2
	Total	314	99.7	311	98.7	312	99	313	99.4	313	99.4	313	99.4	308	97.8
	Missing	1	0.3	4	1.3	3	1	2	0.60	2	0.6	2	0.60	7	2.20
	Total	315	100	315	100	315	100	315	100	315	100	315	100	315	100

Note: See 3.3.1.1 for Individual SCID-II Item Description

Figure 2: Latent Class Analysis Model Using Six Classes



Publication

A manuscript derived from this dissertation was submitted for publication on December 12, 2024, and has successfully passed the initial two rounds of peer review for publication in the journal „Psychiatry Research“. It is currently undergoing final revisions in preparation for its publication.

Acknowledgements

This thesis marks an important step forward in my career, one that has allowed me to deepen my understanding of psychiatry and develop skills that will shape my future endeavors. I am incredibly grateful to have had the chance to make a contribution to this field, and I look forward to building upon the foundations laid here.

I would like to thank Prof. Dr. Retz-Junginger as well as Prof. Dr. Retz for giving me the opportunity to conduct my doctoral thesis at their department.

A special and heartfelt thanks goes to Dr. Steffen Barra, whose guidance, unwavering support, and kindness were invaluable throughout this entire process. From the very beginning, you were always open to hearing my suggestions and ideas, which made this experience all the more meaningful. Your patience and expertise not only helped me navigate the challenges of doing a medical doctorate, but also introduced me to the fascinating world of forensic psychiatry. I am deeply thankful for the insight and passion you have shared with me.

I would also like to extend my sincere appreciation to everyone involved in this project. Whether through direct collaboration or behind-the-scenes efforts.

Lastly, I want to thank my mom, my dad and my brother for always supporting and believing in me.

Thank you, everyone.

Curriculum Vitae

Aus datenschutzrechtlichen Gründen wird der Lebenslauf in der elektronischen Fassung der Dissertation nicht veröffentlicht.

Erklärung gemäß § 7 Abs. 1 Nr. 2 / Affidavit

Ich erkläre hiermit an Eides statt, dass ich die vorliegende Arbeit ohne unzulässige Hilfe Dritter und ohne Benutzung anderer als der angegebenen Hilfsmittel angefertigt habe. Die aus anderen Quellen direkt oder indirekt übernommenen Daten und Konzepte sind unter Angabe der Quelle gekennzeichnet.

Bei der Auswahl und Auswertung des folgenden Materials haben mir die nachstehend aufgeführten Personen in der jeweils beschriebenen Art und Weise unentgeltlich geholfen:

	Name/Tätigkeit	Art der Hilfestellung
1.	Prof. Dr. biol. hum. Petra Retz-Junginger - Mentorin (Doktormutter)	Wissenschaftliche Beratung und inhaltliche Unterstützung
2.	Dr. phil. M. Sc. Steffen Barra Hauptbetreuer	Primärer Ansprechpartner mit Unterstützung in allen Phasen der Arbeit, einschließlich Konzeptualisierung, methodischer Umsetzung und inhaltlicher Ausarbeitung.

Weitere Personen waren an der inhaltlich-materiellen Erstellung der vorliegenden Arbeit nicht beteiligt. Insbesondere habe ich nicht die entgeltliche Hilfe von Vermittlungs- bzw. Beratungsdiensten (Promotionsberaterinnen/Promotionsberater oder anderer Personen) in Anspruch genommen.

Außer den angegebenen hat niemand von mir unmittelbar oder mittelbar geldwerte Leistungen für Arbeiten erhalten, die im Zusammenhang mit dem Inhalt der vorgelegten Dissertation stehen. Die Arbeit wurde bisher weder im Inland noch im Ausland in gleicher oder in ähnlicher Form in einem anderen Verfahren zur Erlangung des Doktorgrades einer anderen Prüfungsbehörde vorgelegt.

Ich versichere an Eides statt, dass ich nach bestem Wissen die Wahrheit gesagt und nichts verschwiegen habe. Die Bedeutung der eidesstattlichen Erklärung und die strafrechtlichen Folgen einer unrichtigen oder unvollständigen eidesstattlichen Erklärung sind mir bekannt.

Heidelberg, 03.03.2025

Daniel Garcia Fittipaldi

Eidesstattliche Versicherung: Belehrung

Die Medizinische Fakultät der Universität des Saarlandes verlangt eine eidesstattliche Versicherung über die Eigenständigkeit der erbrachten wissenschaftlichen Leistungen.

Da der Gesetzgeber der eidesstattlichen Versicherung eine besondere Bedeutung beimisst und sie erhebliche Folgen haben kann, ist die Abgabe einer falschen eidesstattlichen Versicherung unter Strafe gestellt.

Bei vorsätzlicher (also wissentlicher) Abgabe einer falschen Erklärung droht eine Freiheitsstrafe bis zu drei Jahren oder eine Geldstrafe. Eine fahrlässige Abgabe (also Abgabe, obwohl Sie hätten erkennen müssen, dass die Erklärung nicht den Tatsachen entspricht) kann eine Freiheitsstrafe bis zu einem Jahr oder eine Geldstrafe nach sich ziehen.

Die entsprechenden Strafvorschriften sind in § 156 StGB (Falsche Versicherung an Eides Statt) und in § 161 StGB (Fahrlässiger Falscheid, fahrlässige falsche Versicherung an Eides Statt) festgelegt.

§ 156 StGB: Falsche Versicherung an Eides Statt
Wer vor einer zur Abnahme einer Versicherung an Eides Statt zuständigen Behörde eine solche Versicherung falsch abgibt oder unter Berufung auf eine solche Versicherung falsch aussagt, wird mit Freiheitsstrafe bis zu drei Jahren oder mit Geldstrafe bestraft.

§ 161 StGB: Fahrlässiger Falscheid, fahrlässige falsche Versicherung an Eides Statt
(1) Wenn eine der in den §§ 154 bis 156 bezeichneten Handlungen aus Fahrlässigkeit begangen worden ist, so tritt Freiheitsstrafe bis zu einem Jahr oder Geldstrafe ein.
(2) Straflosigkeit tritt ein, wenn der Täter die falsche Angabe rechtzeitig berichtigt. Die Vorschriften des § 158 Abs. 2 und 3 gelten entsprechend.