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**DELINEATING THE CONSTRUCT OF
PSYCHOPATHY:
PSYCHOMETRIC EVIDENCE OF ALTERNATIVE
MEASURES**

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DELINEATING THE CONSTRUCT OF PSYCHOPATHY:
Psychometric evidence of alternative measures.
THESIS FOR DOCTORAL DEGREE (Ph.D.)

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To Clara and Ingrid

ABSTRACT

Psychopathy is a complex construct with various definitions featuring both personality traits, such as egocentricity, lack of empathy and guilt, dishonesty, callousness, and interpersonal dominance, as well as maladaptive behavior patterns. PCL-R is currently the most commonly used method of assessment. However, how psychopathy should best be defined and measured is debated.

The overall aim of this thesis was to contribute to enhanced methods of assessment of psychopathic personality as well as add to the knowledge of the construct of psychopathy. For study I, we conducted a survey study with prison staff ($n = 87$) exploring their attitudes towards psychopathy. Study II, III and IV is based on a cross-sectional study of offenders serving a prison sentence at any of the high security facilities in Sweden ($n = 201$).

The CAPP is a conceptual model aiming to be a comprehensive and comprehensible presentation of psychopathy in a clinical context. The aim of Study I was to investigate if correctional staff perceived the symptoms of the CAPP to be indicative of psychopathy in men and women. The results gave support for the CAPP conceptualization, demonstrating few differences in what is perceived as typical comparing men and women with psychopathy.

Study II focused on investigating the psychometric properties of the TriPM, which is a self-rating instrument based on the triarchic model of psychopathy. We found that the convergence of the TriPM and the PCL-R was generally satisfying. Furthermore, the associations validity evidence was generally in accordance with expectations. However, we also saw some problems in the measurement, particularly regarding the subscales of Meanness and Disinhibition, that did not seem to be adequately differentiated.

In study III we investigated if ADHD symptoms and cognitive functioning were related to specific subcomponents of psychopathy. We found that self-rated ADHD symptoms and psychopathy was highly associated, both regarding the PCL-R and the TriPM, but that cognitive functioning was not associated with psychopathy. The results highlight that there is a considerable symptom overlap in the measurements of ADHD and psychopathy.

Study IV aimed to investigate the risk pathway of COMT genotypes to ADHD and antisocial behavior. We did not find any support for COMT genotype as a risk factor for ADHD or psychopathy in our sample. However, this might be attributable to the fact that the effects of individual genotypes are too small to be detectable in small sample studies.

The main conclusion of this thesis is that the inclusion of items of impulsive and antisocial behavior in measures of psychopathy may contribute to making them too unspecific. That might result in difficulties distinguishing psychopathic traits from ADHD in offenders and points to the need of thorough consideration of all available information in clinical assessments of ADHD to avoid over-diagnosing.

SAMMANFATTNING PÅ SVENSKA

Psykopati är ett komplext begrepp med varierande definition som omfattar både personlighetsdrag såsom egocentricitet, bristande empati och skuld känslor, oärlighet, känslökyla samt dominans, liksom maladaptiva beteendemönster. PCL-R är idag den mest använda bedömningsmetoden. Hur psykopati bäst ska definieras och mätas är dock debatterat.

Det övergripande syftet med den här avhandlingen är att bidra till förbättrade metoder för att mäta psykopati, liksom att öka kunskapen om psykopatibegreppet. Studie I baserades på en enkätstudie med kriminalvårdspersonal ($n = 87$), där vi undersökte deras uppfattningar om psykopati. Studie II-IV baserades på en tvärsnittsstudie av personer som avtjänade fängelsestraff på högsäkerhetsanstalt i Sverige ($n = 201$).

CAPP är en teoretisk modell, som syftar till att ge en heltäckande och förståelig bild av psykopati i en klinisk kontext. Syftet med studie I var att undersöka om kriminalvårdspersonal uppfattade CAPP-symptomen som typiska för psykopati för män och kvinnor. Resultaten gav stöd för att CAPP modellen är relevant och visade få skillnader i vad som uppfattades som typiskt för män respektive kvinnor med psykopati.

Studie II fokuserade på att undersöka de psykometriska egenskaperna för TriPM, vilket är ett självskattningsinstrument som baseras på den triarkiska psykopatimodellen. Vi fann att TriPM och PCL-R generellt överensstämde tillfredsställande. Vidare visade sig validitetsevidensen från relaterade variabler överlag ligga i linje med förväntningarna. Dock såg vi också vissa problem med instrumentets mätegenskaper, särskilt med avseende på delskalorna för Meanness och Disinhibition, vilka inte verkade vara tillräckligt separerade från varandra.

I studie III undersökte vi om adhd-symtom och kognitivt fungerande var relaterade till psykopatiska personlighetsdrag. Vi fann att självskattade adhd-symtom och psykopati samvarierade starkt, både med avseende på PCL-R och TriPM. Kognitiva funktioner var dock inte relaterade till psykopati. Resultaten belyser att de mätinstrument vi använder för adhd och psykopati har ett betydande symptomöverlapp.

Studie IV syftade till att utforska riskmekanismer för COMT-genotyp och adhd samt antisocialt beteende. Vi fann inget stöd för att COMT-genotyp är en riskfaktor för adhd eller psykopati i vårt urval. Dock skulle det kunna bero på att effekten av en enstaka genotyp är för liten för att den ska gå att upptäcka i ett urval i den här storleksordningen.

Den huvudsakliga slutsatsen för avhandlingen är att inflytandet av impulsiva och antisociala beteenden i mätinstrument för psykopati kan bidra till att göra dem för ospecifika. Det kan leda till svårigheter att skilja psykopatiska drag från adhd-symtom hos lagöverträdare och visar på vikten av att noggrant överväga all tillgänglig information vid en klinisk bedömning för att undvika överdiagnosticering.

LIST OF SCIENTIFIC PAPERS

- I. **Pauli, M.**, Essemyr, K., Sörman, K., Howner, K., Gustavsson, P., & Liljeberg, J. (2018). Gendered expressions of psychopathy: correctional staffs' perceptions of the CAPP and CABP models. *International Journal of Forensic Mental Health*, 17(2), 97-110. doi:10.1080/14999013.2018.1431337
- II. **Pauli, M.**, Ölund Alonso, H., Liljeberg, J., Gustavsson, P., and Howner, K. Investigating the validity evidence of the Swedish TriPM in high security prisoners using the PCL-R and NEO-FFI [Manuscript]
- III. **Pauli, M.**, Liljeberg, J., Gustavsson, P., Kristiansson, M., & Howner, K. (2019). Assessing the relevance of self-reported ADHD symptoms and cognitive functioning for psychopathy using the PCL-R and the TriPM. *Journal of Forensic Psychiatry & Psychology*, 30(4), 642-657. doi:10.1080/14789949.2018.1560489
- IV. **Pauli, M.**, Ölund Alonso, H., Liljeberg, J., Gustavsson, P., Tiihonen, J., and Howner, K. Exploring the relation between high-activity COMT Val158Met genotype and psychopathy in male offenders [Manuscript]

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LIST OF ABBREVIATIONS

ADHD	Attention-Deficit/Hyperactivity Disorder
AIC	Average inter-item correlation
ASPD	Antisocial personality disorder
BPD	Borderline personality disorder
CABP	Comprehensive Assessment of Borderline Personality Disorder
CAPP	Comprehensive Assessment of Psychopathic Personality
CAPP-IRS	CAPP Institutional Rating Form
CD	Conduct disorder
CU	Callous-unemotional
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, Fifth edition
EISs	Emergent interpersonal syndromes
ESI	Externalizing Spectrum Inventory
FD	Fearless dominance
FFM	Five Factor Model
GWAS	Genome-wide association studies
ICD-11	International classification of diseases for mortality and morbidity statistics 11 th Revision
PCL/PCL-R	Psychopathy Checklist/ Psychopathy Checklist-Revised
SNP	Single-nucleotide polymorphisms
SSRT	Stop signal reaction time
TriPM	Triarchic Psychopathy Measure
ASRS	World Health Organisation Adult ADHD Self-Report Scale
CWIT	Color-Word Interference Test
IRI	Interpersonal Reactivity Index
BIS-11	Barratt Impulsiveness Scale
COMT	Catechol O-methyltransferase gene
WAIS-IV	Wechsler Adult Intelligence Scales – Fourth Edition
NEO-FFI	NEO Five-Factor Inventory

1 INTRODUCTION

When I started working in forensic psychiatry in 2007, one of the first things I was introduced to was the clinical assessment of psychopathy. I was intrigued by the description of this group of individuals in forensic psychiatry and correctional services, that lack some of the basic emotional processes, social sensitivities and afterthoughts that we generally expect from others. In the following years, in my personal experience of interacting with highly psychopathic individuals, I was struck by the paradox of their surface charm, clear-headedness and adaptability, yet dysfunctional behavior in real-life situations. This is captured in the term “Mask of sanity”, the title of Hervey Cheekley’s seminal work (1941/1955) describing a group of patients who do not have typical symptoms associated with psychiatric illness (e.g. psychotic symptoms, depression, anxiety), but who nonetheless do not function in society. As described by Christopher Patrick: “It entails a highly credible appearance of psychological normality (“sanity”) that operates to conceal (“mask”) a severe underlying pathology that is manifested in reckless, unrestrained behavior across multiple areas of life” (Patrick, 2018, p. 3). So, why don’t they function in society? Being interested in neuropsychology my first question was if we can understand the cognitive processes underpinning this phenomenon.

Prior to the publication of the first version of the Psychopathy Checklist (current version Psychopathy Checklist Revised, PCL-R; Hare, 2003) in the 1980s, there was no real consensus on the definition and measurement of psychopathy. As described by Robert Hare, researchers discussed the topic from various perspectives and frameworks, resulting in “a considerable amount of armchair speculation and uninformed debate, but few productive discussions about the nature of psychopathy” (Hare, 1998, p. 1). In the following years, the psychopathy field progressed as researchers could now compare, discuss and reproduce their findings in a common framework (Gacono, 2016). However, in the 2000s, there was an increased concern that the acquired status of the PCL model as a “gold-standard” was problematic: “Because all measures of constructs are by definition fallible (Cronbach & Meehl, 1955), inferences about psychopathy solely on the basis of one measure and its descendants may well be incomplete or misleading” (Skeem, Polaschek, Patrick, & Lilienfeld, 2011, p. 102). The scientific debate on the subject became infected, as Hare threatened to sue the authors who raised the question (Skeem & Cooke, 2010), as well as the scientific journal on the grounds of professional and financial damage (Poythress & Petrila, 2010).

When starting my PhD project, in a time of controversies, but also of new ideas and exciting discussions, I soon realized that before we can find a useful answer to questions that are more clinically applied, for example how psychopathy relates to other constructs such as intelligence and inhibition, we need to determine what we mean and how we measure it. Consequently, my thesis project started out aiming to discover more about the individuals associated with the construct, but ended up focusing on the prerequisites for defining and measuring psychological constructs, that is psychometrics.

2 BACKGROUND

In a forensic setting, a large proportion of clients manifest antisocial personality traits (Fazel & Danesh, 2002). Although useful in an ordinary psychiatric context, in the forensic field a diagnosis of Antisocial Personality Disorder (ASPD; American Psychiatric Association, 2013) may not be adequate for distinguishing the clients (Skeem et al., 2011). Furthermore, the criteria of ASPD have been criticized for focusing too heavily on observable antisocial and criminal behavior, while ignoring latent personality traits, with the consequence of identifying a diverse group of recidivistic offenders with various personality profiles (Yildirim & Derksen, 2015). The psychopathy construct can be thought of as a stricter diagnostic category, as compared to ASPD, that enables identification of the most problematic individuals within the forensic setting.

2.1 PERSONALITY AND PERSONALITY DISORDER

In order to understand what psychopathy is, it is important to understand the theoretical presumptions that constitute its framework, that is the constructs of personality and personality disorders. Personality refers to individual differences in characteristic patterns of thoughts, emotions and behavior. A personality disorder is a psychiatric diagnosis signifying that a persons' patterns of thoughts, emotions and behavior is dysfunctional and results in the person repeatedly getting into trouble. There are four general components that need to be fulfilled for diagnosis of a personality disorder:

- ✓ it is a maladaptive pattern of thinking, feeling and behaving that deviates from the expectations of the culture
- ✓ it causes distress or functioning problems
- ✓ it is pervasive to different contexts and situations in a persons life
- ✓ it emerges no later than adolescence or early adulthood and endures over time

Personality disorders are classified in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) and International classification of diseases for mortality and morbidity statistics (ICD-11; World Health Organization, 2018). As it is the diagnostic manual primarily used in psychiatric research I will from now on refer to the diagnostic criteria in the DSM-5. There are different types of personality disorders (e.g. narcissistic and borderline personality disorder). The classification of psychopathic individuals in use in the DSM-5 is ASPD, although there are features in other diagnostic types (i.e. narcissistic, histrionic and paranoid personality disorder) that also have relevance for psychopathy as used in contemporary forensic psychiatry.

2.2 THE ORIGINS OF THE PSYCHOPATHY CONSTRUCT

There are early historical examples of individuals who do not conform to society's rules, who are cruel and ruthless and lack concern for others. In the Old Testament there is a passage that describes a person that is a close resemblance of what we would today consider as a prototypically psychopathic person (English Standard Version Bible, 2001, Psalm 10):

Why, O LORD, do you stand far away?
Why do you hide yourself in times of trouble?
In arrogance the wicked hotly pursue the poor;
let them be caught in the schemes that they have devised.
For the wicked boasts of the desires of his soul,
and the one greedy for gain curses and renounces the LORD.
In the pride of his face the wicked does not seek him;
all his thoughts are, "There is no God."
His ways prosper at all times;
your judgments are on high, out of his sight;
as for all his foes, he puffs at them.
He says in his heart, "I shall not be moved;
throughout all generations I shall not meet adversity."
His mouth is filled with cursing and deceit and oppression;
under his tongue are mischief and iniquity.
He sits in ambush in the villages;
in hiding places he murders the innocent.
His eyes stealthily watch for the helpless;
he lurks in ambush like a lion in his thicket;
he lurks that he may seize the poor;
he seizes the poor when he draws him into his net.

Likewise, there are descriptions of the same personality disposition from varying cultures. Jane Murphy (1976), when studying psychiatric labels from a cross-cultural perspective, discovered that both the Yoruba tribe in West Africa as well as the Inuits of the Bering Sea had words corresponding to psychopathy. The Inuit word *kunlangeta* refers to the breaking of rules, in spite of understanding the rules. It would be applied to someone who "for example, repeatedly lies and cheats and steals things and does not go hunting and, when the other men are out of the village, takes sexual advantage of many women – someone who does not pay attention to reprimands and who is always being brought to the elders for punishment" (Murphy, 1976, p. 1026). When asked what would be done with such a person, the answer was that "somebody would probably have pushed him off the ice when nobody else was looking" (Murphy, 1976, p. 1026).

In the 1900s, the psychiatrist Phillippe Pinel (1809) described a variant of insanity, *manie sans délire*, referring to individuals capable of rational and coherent thoughts, but who in spite of that comport themselves as a mentally insane. James Prichard (Prichard, 1837) described

similar symptoms under the term of moral insanity, defining it as: "madness consisting of a morbid perversion of the natural feelings, affections, inclinations, temper, habits, moral dispositions, and natural impulses, without any remarkable disorder or defect of the intellect or knowing and reasoning faculties, and particularly without any insane illusion or hallucination" (Prichard, 1837, p. 16). A German psychiatrist, Julius Koch, introduced the term *psychopathy* in the early 1890s, but in a broad sense to describe diverse mental disorders (Gutmann, 2008) – not a surprising use as psychopathy derives from the Greek words *psykhe* (mind) and *pathos* (suffering).

The modern construct of psychopathy is heavily influenced by the work of Hervey Cleckley. In *The mask of sanity* (Cleckley, 1941/1955), he presented a group of patients with a set of problematic character traits that he felt were not adequately described in the psychiatry literature. The mask of sanity refers to his observation that these patients often present as self-confident and well-adjusted on the surface, but that closer acquaintance with them reveal a severely disturbed personality functioning that continuously gets them into trouble. Cleckley's work is held as the first systematic account of psychopathic personality disorder, hence his great influence on contemporary research.

Cleckley did not associate psychopathy with a pervasive pattern of law breaking and aggressive behavior. This association to psychopathy refers to his contemporaries Joan and William McCord and sociologist Lee Robins. The McCords (1964, as cited in Skeem et al., 2011) worked with criminal offenders, and portrayed a more maladjusted and antagonistic individual than Cleckley. Robins (1978) based her descriptions on large follow-up studies of the development of antisocial behavior from childhood to adulthood. Her observation formed the foundation of the DSM-criteria of ASPD in the third and fourth revisions (Skeem et al., 2011), which are more or less unchanged in the current edition, DSM-5 (APA, 2013).

2.3 PSYCHOPATHY OR SOCIOPATHY – SUBTYPES OF PSYCHOPATHY?

The term sociopathy was first used by Partridge (1930) in response to psychopathic personality as applied by Koch, in the broad and general sense. Partridge reasoned that the targeted problem behavior was "anything deviated or pathological in social relations" and suggested the use of sociopathy for reasons that it has a "communicable meaning" (Partridge, 1930, p. 55). He reasoned further that all people with mental disorders are in some way affected in their social relations, but stated that there is a specific group distinguishable by their "persistent and chronic sociopathic behavior" (Partridge, 1930, p. 56). In contrast, psychopathic essentially means a disturbed mind, and in that sense it is not very informative. Even so, most researchers to-date do not use the term sociopathy, instead referring to the terms of ASPD or psychopathy. However, in some modern writings, it is still used to distinguish two groups characterized by chronic antisocial behavior, who are differentiated by the etiology of their problematic behavior:

"Species that I classify as *psychopaths* fail to become socialized primarily because of a genetic peculiarity, usually a peculiarity of temperament. A child who is relatively

fearless, or unusually impulsive, or given to intense fits of rage, for example, may be too difficult for average parents to control and steer clear of trouble. The larger and most important genus of the APD family consists of those people whom I call *sociopaths*. Many of these people might have become law-abiding and productive citizens had they been reared by healthy, competent and socialized parents” (Lykken, 2006, p. 4).

Furthermore, most researchers agree that psychopathy is a heterogeneous construct, and some advocate for the need to clarify this construct in subgroups. The idea of primary and secondary psychopathy, distinguishable by degree of impulsivity, neuroticism, and their association to narcissistic and borderline personality traits (Skeem et al., 2011; Skeem, Poythress, Edens, Lilienfeld, & Cale, 2003), is one of the most influential models and similar to Lykken’s (2006) ideas on sociopathy versus psychopathy. In theory, primary psychopathy is related to an affective deficit, thought to have a strong genetic base. Secondary psychopathy is proposed to be more closely related to stressful environmental influences, leading to an affective disturbance that has a similar manifestation, but with different etiological mechanisms (Skeem et al., 2011; Yildirim & Derksen, 2015). Contrasting to primary psychopathy, which is characterized by emotional stability, secondary psychopathy is characterized by a disposition for stress, anxiousness as well as externalizing and internalizing problem behaviors (Skeem et al., 2011), possibly placing it on a continuum with ASPD and Borderline personality disorder (BPD; Yildirim & Derksen, 2015).

2.4 MODERN CONCEPTUALIZATIONS OF PSYCHOPATHY

As previously mentioned, ASPD is the classification of psychopathic individuals agreed by the committee of the DSM-5 (American Psychiatric Association, 2013). ASPD is characterized by a general disregard for and violation of the rights of others. In addition to the general criteria for personality disorder, this pattern of functioning should be apparent from the age of 15, and be preceded by conduct disorder (CD) before the age of 15. The point of this is that the diagnostic criteria are set to fit individuals with a pervasive pattern of antisocial behavior throughout the life-course. Although some authors refer to ASPD as separate from psychopathy, the manual states that the pattern of behavior targeted in the diagnostic criteria can also be referred to as psychopathy, sociopathy, or dissocial personality disorder, signifying that psychopathy and ASPD differs in definition rather than in kind. Moreover, in addition to the specific criteria (see Table 1) the DSM-5 manual also includes a summary of associated features to look for in support of a diagnosis. Many of these associated features closely correspond to the PCL-R model of psychopathy (e.g. lack of empathy, superficial charm, sexual promiscuity and exploitative behavior in intimate relationships).

Table 1. Antisocial personality disorder (American Psychiatric Association, 2013, p. 659)

Diagnostic Criteria	
A.	A pervasive pattern of disregard for and violation of the rights of others, occurring since age 15 years, as indicated by three (or more) of the following: <ol style="list-style-type: none">1. Failure to conform to social norms with respect to lawful behaviors, as indicated by repeatedly performing acts that are grounds for arrest.2. Deceitfulness, as indicated by repeated lying, use of aliases, or conning others for personal profit or pleasure.3. Impulsivity or failure to plan ahead.4. Irritability and aggressiveness, as indicated by repeated physical fights or assaults.5. Reckless disregard for safety of self or others.6. Consistent irresponsibility, as indicated by repeated failure to sustain consistent work behavior or honor financial obligations.7. Lack of remorse, as indicated by being indifferent to or rationalizing having hurt, mistreated or stolen from another.
B.	The individual is at least age 18 years.
C.	There is evidence of conduct disorder with onset before age 15 years.
D.	The occurrence of antisocial behavior is not exclusively during the course of schizophrenia or bipolar disorder.

The goal of the later versions of the DSM was to formulate clear, observable and objective criteria that would facilitate reliable and replicable assessments. Albeit a big step forward from the impressionistic and general diagnostic assessment that signified the early years of psychiatry, the DSM-model of personality disorders has also been met by criticism. One aspect is that the empirical evidence for a categorical model of personality disorder is weak, and rather point to a dimensional model (that people differ in trait rather than in kind; Clark, 2007; Livesley, 2007; Marcus, Lilienfeld, Edens, & Poythress, 2006; Widiger, Simonsen, Krueger, Livesley, & Verheul, 2005).

ASPD might be the type of personality disorder that is most obviously affected by the drawbacks of the DSM personality disorder model, as it is heavily reliant on behavioral descriptors rather than psychological dispositions or traits (Lykken, 2006). Others have reflected that the modern ASPD criteria do not reflect the affective and interpersonal disturbances of psychopathic personality that were characteristic in for example Cleckley's clinical descriptions. However, an important issue in this respect, is to discuss the target group that one wants to capture with the diagnostic criterion set. ASPD is rare in the general population (about 1-3 %). If the target group is those few in the general population or psychiatry that

distinguish themselves by a lack of concern and respect for others, ASPD will likely be effective in identifying most cases as this behavior clearly distinguishes those with a diagnosis from the absolute majority of the population. Accordingly, in this context, a diagnosis of ASPD can provide useful information, while the more specific criteria of for example the PCL-R might not provide much additional information (Widiger & Crego, 2018). However, in an offender population, the prevalence of ASPD is about 50 % (Fazel & Danesh, 2002). In this context, the information gained in classifying those with and without a diagnosis is of limited value. Interestingly, this refers back to the debated relevance of criminality as an indicator for psychopathy in correctional settings, which lacks specificity – criminal offending is universal in prison populations. In general psychiatric settings, however, it might well be a useful indicator of psychopathy (Widiger & Crego, 2018).

2.4.1 Psychopathy Checklist Revised

The PCL model of psychopathy, with its latest version the PCL-R (Hare, 2003), was developed by Robert Hare to fill the gap of well-validated assessment instruments of psychopathy. Currently, it is the most accepted method of assessing psychopathy. Although Hare built his model on Cleckley's description of psychopathy, he also took influence from the criminal psychopath of the McCords. The PCL was initially developed for prison settings. Consequently, the psychometric properties of the PCL were primarily tested for male criminals as opposed to Cleckley's somewhat more well-adjusted sample. According to the PCL conceptualization, psychopathy encompasses two broad domains: deviant patterns of affective and interpersonal function on the one hand, and antisocial behavior and an impulsive lifestyle on the other hand. The PCL-R is an expert rating scale meant for clinical use and for research purposes. The ratings are based on a clinical interview as well as collateral information from file material. The twenty items are scored from 0 to 2 with a maximum score of 40.

There has been an extensive discussion about the underlying factor structure of the PCL-R model. Hare (2003) supports a two factor, four facet solution as the best way to describe the underlying dimensions of the psychopathy construct (see Table 2). Factor 1 covers deviant personality traits related to interpersonal (facet 1) and affective functioning (facet 2), for example selfishness, callousness and remorselessness. Factor 2 captures behavioral maladjustment related to an impulsive lifestyle (facet 3) and antisocial behavior (facet 4). Other researchers support the three-factor model proposed by Cooke and Michie (2001) based on the 13 items of the first three facets. The three-factor model excludes the items of antisocial behavior that, according to Cooke and Michie, do not contribute to the identification of the core features of psychopathy.

As previously mentioned, during recent years concern has arisen regarding the conflation of the measure and the construct, in other words that the PCL-R operationalization has gradually come to dominate the research field to the effect that it has mistakenly been equated with the underlying construct it was supposed to measure. In addition, it has been criticized for failing

to capture the affective and interpersonal aspects unconfounded by criminality (Cooke, Michie, Hart, & Clark, 2004; Skeem & Cooke, 2010).

Table 2. The PCL-R Four Factor Model (Hare, 2003)

Factor 1		Factor 2	
F1: Interpersonal	F2: Affective	F3: Lifestyle	F4: Antisocial
1. Glibness/ superficial charm	6. Lack of remorse or guilt	3. Need for stimulation/proneness to boredom	10. Poor behavioral controls
2. Grandiose sense of self worth	7. Shallow affect	9. Parasitic lifestyle	12. Early behavioral problems
4. Pathological lying	8. Callous/lack of empathy	13. Lack of realistic, long-term goals	18. Juvenile delinquency
5. Conning/ manipulative	16. Failure to accept responsibility for own actions	14. Impulsivity	19. Revocation of conditional release
		15. Irresponsibility	20. Criminal versatility
Items not included			
11. Promiscuous sexual behavior			
17. Many short-term marital relationships			

Another important topic, that links back to the critique of the DSM model of personality disorder, is the question whether psychopathy should be treated as a dimensional or categorical construct. In other words, is it a discreet category/taxon or does it represent a gradual scale or continuum, stretching from no symptoms to the highest possible level of a certain trait. This is of importance for the use of diagnostic categories or cut-offs. Research indicates that psychopathic individuals differ from others in degree rather than in kind (Edens, Marcus, Lilienfeld, & Poythress, 2006). The PCL-R manual (Hare, 2003) suggest the use of a cut-off score of 30 as a diagnostic indication (about one standard deviation above the mean value in correctional samples), with the reminder that a cut-off of 30 might not be equally applicable in all settings. For example, in the Swedish correction system, a use of 26 as cut-off based on file review has been suggested as useful (Grann, Långström, Tengström, & Kullgren, 1999; Grann, Långström, Tengström, & Stålenheim, 1998; Tengström, Grann, Långström, & Kullgren, 2000). Moreover, Hare (2003) notes that measurement errors are inevitable, and will thus affect if a person is categorized as psychopathic or not. The individual score is likely to differ from a theoretical true value by at least a couple of points, or even more, in any direction, meaning that a score of 30 might well signify a true value of anything from 26 to 34. The important message here is that we need to be aware that the

difference between a score of 29 and 30, or even 28 and 32 is arbitrary and can easily result from measurement error. Therefore, cut-off scores might be useful primarily for research purposes, but for clinical purposes it might merely be used as an indication.

2.4.2 Comprehensive Assessment of Psychopathic Personality

The Comprehensive Assessment of Psychopathic Personality (CAPP) is a conceptual model of psychopathic personality disorder developed by a group of experts in the psychopathy field (Cooke, Hart, Logan, & Michie, 2012), with the aim to reevaluate the core construct of psychopathy and revitalize the research field. The developers present six basic assumptions that guided their work when formulating the CAPP model (Cooke, Hart, Logan, & Michie, 2012). Firstly, they reasoned that symptoms of personality should reflect personality deviance, rather than social or cultural deviance. In other words, it is not relevant to describe personality disorder through specific norm-breaking behaviors. Secondly, symptoms of personality disorder should not be described in terms of complex or blended features, as reliable categorization and measurement is dependent on the clarity of the construct's definition. Thirdly, the CAPP model is based on the lexical hypothesis of normal personality, stating that as social and interpersonal behavior is a fundamental base of human existence, symptoms of personality are likely to be encoded in natural language (Goldberg, 1993). This means that symptoms of personality, including personality disorder, can be described in words of common language as opposed to technical jargon. Fourth, symptoms of personality disorder should be described in a way that is sensitive to change, meaning that it is not static over a life-time perspective. Fifth, symptoms should be possible to organize in hierarchical models, in theoretically meaningful symptom groups. And lastly, the CAPP model was designed to be comprehensive of all primary features of the disorder. This means that it aimed to be over rather than under-inclusive as it is easier to remove than to add symptoms guided by empirical results (Cooke et al., 2012).

Cooke and colleagues based the CAPP model on a thorough review of the literature and of interviews with other experts in the field, making an inventory of symptoms descriptive of psychopathy. They identified 33 symptoms or key features of psychopathic personality, which they organized into six domains or problem areas: Attachment, Behavior, Cognitive, Dominance, Emotional, and Self (Figure 1). The CAPP is primarily assessed using an expert rating instrument; the CAPP Institutional Rating Form (CAPP-IRS), but is also available in a self-rating version (Sellbom, Cooke, & Shou, 2019).

Research using the CAPP model has of yet mostly been focused on evaluating the conceptual model using prototypicality analysis to investigate to what extent CAPP symptoms and domains are perceived to be indicative of psychopathy (e.g. Hoff et al., 2014; Hoff, Rypdal, Mykletun, & Cooke, 2012; Kreis, Cooke, Michie, Hoff, & Logan, 2012). Prototypicality analysis is based on the idea that members of a category will resemble a theoretical 'ideal' construct (prototype) to various degrees and can be used to validate psychological constructs (cf. Kreis et al., 2012). Previous prototypicality studies of the CAPP model generally indicate that most, but not all of the CAPP symptoms are perceived as indicative of psychopathy

(Florez et al., 2014; Hoff et al., 2012; Kreis et al., 2012; Sörman et al., 2014), which is to be expected as the idea was for it to be broad and comprehensive. The few studies that have investigated the CAPP in clinical samples have demonstrated promising results. The CAPP-IRS showed high convergence with ratings on the PCL-R (Sandvik et al., 2012) as well as predictive validity evidence with respect to violent and nonviolent recidivism (Pedersen, Kunz, Rasmussen, & Elsass, 2010). There are few studies of the measurement model, so far not supporting the theoretically derived six domains. Sellbom, Cooke, and Hart (2015) concluded that the best fit for their online survey sample corresponded to a general factor of global psychopathy, as well as three residual factors representing boldness/emotional stability, emotional detachment, and disinhibition. Florez and colleagues (2018), using Spanish prison inmates as their sample, found that the best fit for their data was a three-factor model: items representing callous and unemotional traits, pathological interpersonal style, as well as items associated with impulsivity.

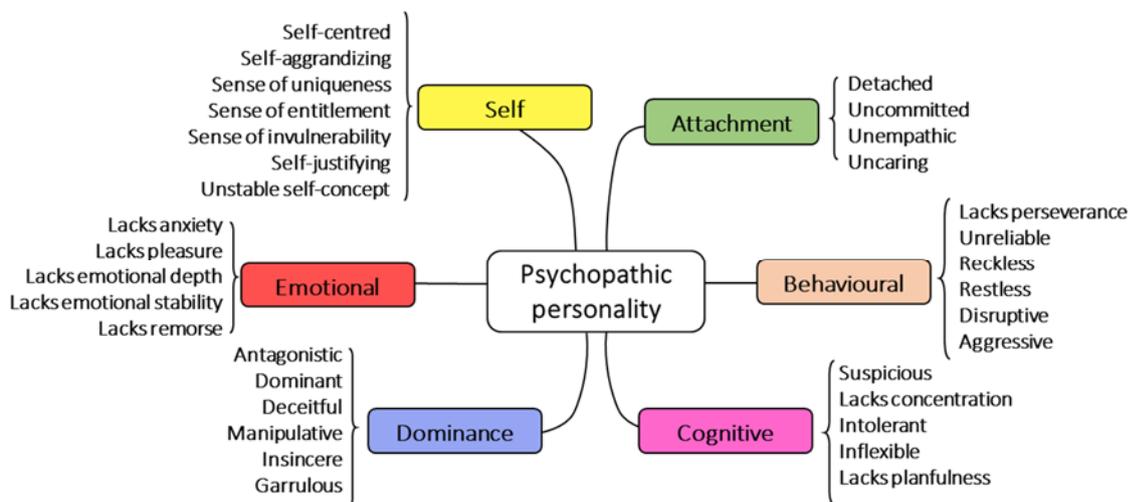


Figure 1. The Comprehensive Assessment of Psychopathic Personality (CAPP)

Research on psychopathy has generally focused on men in correctional contexts. The knowledge on psychopathy in women is generally lacking (Forouzan & Cooke, 2005; Verona & Vitale, 2006), but available research indicate that there are gender differences in the presentation of psychopathy (Cale & Lilienfeld, 2002; de Vogel & Lancel, 2016; Forouzan & Cooke, 2005; Logan, 2009). One of the aims of the CAPP developers was to provide a gender-neutral model that could capture psychopathic traits as it is expressed in both women and men, in correctional as well as in alternative settings. Although research to date is sparse, results are generally promising (Kreis & Cooke, 2011; Sellbom et al., 2015; Viljoen et al., 2015).

2.4.2.1 *Comprehensive Assessment of Borderline Psychopathy – a corresponding model*

The Comprehensive Assessment of Borderline Personality Disorder (CABP; Cook et al., 2013) is a corresponding model developed for assessment of borderline personality disorder (BPD). It was developed in the same theoretical framework as the CAPP, intending to facilitate the investigation of the construct overlap of psychopathy and BPD. The CABP is organized according to the same domains as the CAPP and share 10 of the symptoms. It also

includes 17 symptoms unique of BPD (see Figure 2). There is to date only one previous study using the CABP model, investigating gendered prototypicality of the CAPP and the CABP models (Viljoen et al., 2015). Results demonstrated that the CAPP symptoms were seen as more typical of men, while CABP symptoms were perceived as more typical of women, independent of whether participants rated someone as prototypical of psychopathy or of BPD. However, although these disorders seem to have a gender bias, the authors concluded that the results did not support the hypothesis that psychopathy and BPD can be understood as differently gendered variants of the same general disorder.

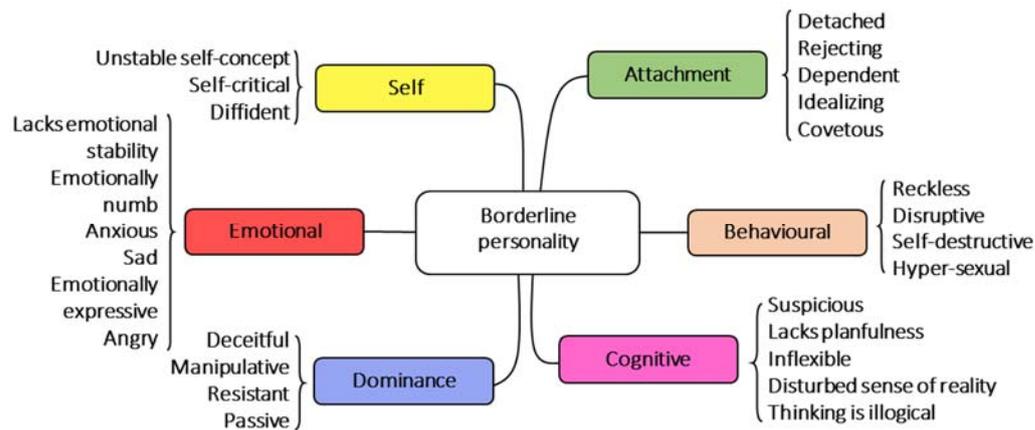


Figure 2. Comprehensive Assessment of Borderline Personality Disorder (CABP; Cook et al., 2013).

2.4.3 The triarchic model of psychopathy

In contrast to the trait-based approach of the CAPP model, the triarchic model (Patrick, Fowles, & Krueger, 2009) takes a more biological perspective and is based on the idea that psychopathy comprises three phenotypic constructs: disinhibition, boldness and meanness. Disinhibition refers to a general disposition of impulse control problems. Boldness refers to social dominance, emotional resilience and venturesomeness, thus including a potentially adaptive component of psychopathy. Meanness is defined as an aggressive competitiveness without regard for others, linked to the cold and predatory descriptions of psychopathy.

The general aim of the triarchic model is to reconcile the different and partly contradictory views of psychopathy. The difference in varying conceptions (and different manifestations/subtypes) of psychopathy can be understood by the importance placed on the respective phenotypic constructs. Thus, varying levels of the components of boldness, meanness and disinhibition are crucial to pinpoint the differences in the Cleckleyan psychopathy via the PCL model to the antagonistic criminal described by the McCords (Patrick et al., 2009).

The concept of disinhibition is linked to so-called externalizing behavior and a general tendency of impulse control problems, lack of planfulness, and impaired emotional regulation. This phenotypic disposition can be linked to a range of problem behaviors often targeted in models of psychopathy; irresponsibility, drug and alcohol abuse, unruly and norm-

breaking behavior, and aggressiveness. Earlier conceptualizations of psychopathy have stressed this externalizing factor in different degrees, from the generally non-criminal and relatively well-adapted Cleckleyan psychopathy on the one hand, to the pervasive pattern of criminal and externalizing behavior described by the McCords on the other.

The construct of meanness is meant to capture another important feature of externalizing behavior – a propensity towards aggressiveness, cruelty and exploitativeness. According to the triarchic model (Patrick et al., 2009), meanness is vital to understanding the conceptualizations of psychopathy in offender samples. In terms of the PCL-R, it corresponds to affective deficiencies such as lack of empathy and shallow affect, as well as an interpersonal style marked by arrogance and superiority of others.

‘Fearlessness’, often discussed in the psychopathy field, is vital in the understanding of both boldness and meanness: “fearlessness is conceptualized as an underlying constitutionally based (genotypic) disposition entailing reduced sensitivity of the brain’s defensive motivational system to cues signaling threat” (Patrick et al., 2009, p. 926), that is central in the dual-deficit model of psychopathy (Fowles & Dindo, 2009). According to Patrick and colleagues (2009) the genotype of fearlessness can lead to varying phenotypic expressions, thus contributing to boldness as well as meanness.

2.4.3.1 *TriPM: Triarchic Psychopathy Measure*

The triarchic model has been operationalized in a 58-item self-report inventory, the Triarchic Psychopathy Measure (TriPM; Patrick, 2010), that assesses each component of the model in three separate subscales. The Boldness scale (20 items) is a brief version of the 130 item Boldness Inventory (Patrick et al., 2019). Examples of items from the boldness scale are: “I have a knack for influencing people”; “It worries me to go into an unfamiliar situation without knowing all the details” (reversed); “I’m afraid of far fewer things than most people”. The Meanness (19 items) and Disinhibition (20 items) scales were drawn from the Externalizing Spectrum Inventory (ESI; Krueger, Markon, Patrick, Benning, & Kramer, 2007). Examples of items from the Meanness scale are: “I’ve injured people to see them in pain” and “It’s easy for me to relate to other people’s emotions” (reversed). Examples of items from the Disinhibition scale are “I often act on immediate needs” and “I often get bored quickly and lose interest”. The Disinhibition scale contains several items assessing explicit criminal behavior, for example “I have taken money from someone's purse or wallet without asking” and “I have robbed someone”. As opposed to the other items of the scale, which can be answered on a four-point scale, these items are essentially dichotomous.

Although the TriPM is a new instrument, the empirical base is rapidly growing. The psychometric evidence for the TriPM has been evaluated using different populations and language versions, although commonly samples from the normal population (principally student samples). Most studies of the TriPM have focused on validity evidence from associations to other variables (e.g. Drislane, Patrick, & Arsal, 2014; Phillips, Sellbom, Ben-Porath, & Patrick, 2014; Poy, Segarra, Esteller, Lopez, & Molto, 2014).

The triarchic model primarily conceptualizes psychopathy as distinguishable domains of boldness, meanness and disinhibition as opposed to emphasizing psychopathy as a global unitary construct. However, one of its theoretical assumptions is that the three domains are meaningfully related constructs. One way of approaching this is to investigate the inter-correlations of the triarchic domains. We (Hannibal Ölund Alonso and I) reviewed all 39 studies reporting inter-correlations between the subscales, including student, community as well as correctional samples (e.g. Anderson, Sellbom, Wygant, Salekin, & Krueger, 2014; Anestis, Anestis, & Preston, 2018; Carre, Mueller, Schleicher, & Jones, 2018; Craig, Gray, & Snowden, 2013; Drislane, Patrick, Sourander, et al., 2014; Kyranides, Fanti, Sikki, & Patrick, 2017; Pasion, Cruz, & Barbosa, 2016; Sellbom, Laurinavicius, Ustinaviciute, & Laurinaityte, 2018; Shou, Sellbom, & Han, 2016; Snowden, Smith, & Gray, 2017; Somma, Borroni, Drislane, & Fossati, 2016; Stanley, Wygant, & Sellbom, 2013; van Dongen, Drislane, Nijman, Soe-Agnie, & van Marle, 2017). As hypothesized in the model, the reported inter-correlation of Meanness and Disinhibition was most prominent ($r = .03-.81$, $Mdn = .54$), with a smaller overlap of Meanness and Boldness ($r = -.14-.48$, $Mdn = .20$). However, the inter-correlation of Boldness and Disinhibition was close to zero in most studies ($r = -.33-.31$, $Mdn = -.06$). The reported values are comparable to a recent meta-analysis covering alternative measures of the triarchic model (Boldness – Meanness $r = 0.16$; Boldness – Disinhibition $r = -0.05$; Meanness – Disinhibition $r = 0.53$; Sleep, Weiss, Lynam, & Miller, 2019). This might suggest that Boldness and Disinhibition are largely independent constructs and might not be meaningfully related.

So far, the few studies that have investigated the measurement model of the TriPM (Carre et al., 2018; Latzman et al., 2018; Roy et al., 2020; Shou, Sellbom, & Xu, 2018; Somma, Borroni, Drislane, Patrick, & Fossati, 2018) do not seem to provide conclusive evidence in support of the proposed three-dimensional model based on standard criteria of good model fit. Rather, the evidence points to the subscales being multidimensional, and also displaying psychometric problems that might call for revising the scales (Roy et al., 2020; Shou et al., 2018; Sleep et al., 2019).

2.4.4 Normal personality traits

In the clinical study of psychopathy, many researchers advocate the identification of specific deviant traits characterizing psychopathy (e.g. PCL-R, ASPD). However, another approach is to conceptualize psychopathy as the manifestation of extreme levels (high or low) of normal personality traits in specific configurations (cf. Lynam, Miller, & Derefinko, 2018). One of the most influential models of normal personality, the Five Factor Model (FFM), commonly measured by the NEO Personality Inventory (Costa & McCrae, 1992), is composed of the underlying personality traits of neuroticism, extraversion, openness, agreeableness, and conscientiousness. Neuroticism refers to a person's emotional adjustment and stability; extraversion to being sociable, outgoing and assertive; openness to imagination, curiosity and willingness to explore new experiences and activities; agreeableness to a person's degree of warmth and altruism in interpersonal interactions; and conscientiousness to self-control and

ability to plan and pursue goal-directed behaviors. Using the FFM to describe psychopathy is a useful way of translating different models and measures, clarifying their respective conceptual framework. Generally speaking, psychopathy can be described as a personality configuration of low agreeableness (i.e. low straightforwardness, low altruism, low compliance, low modesty, and low tender-mindedness) as well as low conscientiousness (i.e. low dutifulness, low self-discipline, and low deliberation). In addition to this, some aspects of extraversion (i.e. the subscales of low warmth and high excitement seeking) and neuroticism (i.e. the subscale of impulsiveness) are proposed to be indicative of psychopathy (Lynam et al., 2018).

One of the advantages of using the FFM is that it has been used in various contexts, resulting in a vast empirical base that can be used to connect the research of psychopathy to a wider scientific field of personality research (Lynam et al., 2018). For example, the FFM approach has been demonstrated to be useful for examining the life-course prevalence of psychopathy, linking the knowledge of normative decline in FFM personality traits to predict differential patterns of decline in psychopathy traits when growing older (Vachon et al., 2013).

2.5 ADHD – PART OF A DEVELOPMENTAL PATHWAY TO PSYCHOPATHY?

Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder with childhood onset (American Psychiatric Association, 2013). The defining features are a persistent pattern of inattention and/or hyperactivity and impulsivity leading to a significant impairment of social, academic or occupational functioning. Inattention refers to forgetfulness, difficulties in paying attention to details and sustaining attention, listening to and following-through instructions, organizing tasks etcetera. Hyperactivity refers to excessive motor activity (being fidgety, excessively talkative, having trouble sitting still) and feelings of restlessness. Impulsivity refers to hasty actions without adequate forethought, like having trouble waiting for your turn, interrupting others or risk-taking behavior. It is also related to an inability to delay gratification or excessively reward-seeking behavior. Symptoms of impulsivity targeted in the diagnostic criteria of ADHD can result in problematic behavior also common in reference to psychopathy, such as making rash decisions without proper thought about the consequences, social intrusiveness, risky and harmful behavior such as drug use, driving under the influence as well as aggressive and antisocial behavior.

ADHD is overrepresented in criminal populations, with estimated prevalence rates of about 17-40 % (Ginsberg, Hirvikoski, & Lindfors, 2010; Moore, Sunjic, Kaye, Archer, & Indig, 2013; Retz, Boureghda, Retz-Junginger, Philipp-Wiegmann, & Rösler, 2013), compared to 2-4 % in the normal adult population (Kessler et al., 2006; Simon, Czobor, Balint, Meszaros, & Bitter, 2009). Research has shown that individuals with ADHD have a higher risk of criminal behavior (Dalsgaard, Mortensen, Frydenberg, & Thomsen, 2013; Lundström et al., 2014; Satterfield et al., 2007; Stokkeland, Fasmer, Waage, & Hansen, 2014). Even though most children with ADHD do not develop antisocial tendencies or criminality later in life, there seem to be a subgroup of hyperactive children who develop CD, which progresses into

ASPD, thus proposed to represent a pathway to antisocial behavior. In a review of the longitudinal development of childhood hyperactivity, Hofvander, Ossowski, Lundström, and Anckarsäter (2009) concluded that about one third of all hyperactive children develop CD in combination with ADHD, and about half of those children (i.e. about a fifth of all hyperactive children) develop ASPD as adults. Furthermore, longitudinal studies have demonstrated that ADHD is a risk factor for criminality (Lundström et al., 2014; Mannuzza, Klein, & Moulton, 2008; Satterfield et al., 2007) and ASPD (Storebø & Simonsen, 2013). The blind spots and lack of proper measures and treatment of ADHD in correctional services in Sweden has been brought to notice in recent years resulting in several research studies and development projects (Lundholm, 2014). The correctional services in Sweden have carried out two separate projects to increase the number of ADHD assessments, leading to a two fold increase in performed assessments during the years 2013 to 2016 and a further increase of staff resources in 2016 (Kriminalvården, 2017). A large epidemiological study in Sweden demonstrated that rates of criminality were lower among patients with ADHD when receiving medication, indicating that proper medication might reduce risk of criminality in ADHD (Lichtenstein et al., 2012). Similarly, a Swedish four-year follow-up study (Ginsberg, Hirvikoski, Grann, & Lindefors, 2012; Ginsberg, Långstrom, Larsson, & Lindefors, 2015) has found promising results of treating imprisoned ADHD patients with methylphenidate. Although the sample was small, the treatment was concluded to be safe and feasible and had various positive effects on both ADHD symptoms and general level of functioning compared to non-medicated participants. In addition, even though the participants demonstrated a high level of impairment at the start of the study, they had high attendance to educational and treatment programs, as well as high employment rates subsequent to release. Furthermore, medication has been demonstrated to reduce the risk of drug-relapse in offenders with ADHD and amphetamine dependence (Konstenius et al., 2014).

However, to understand the role of ADHD for the developmental pathway to psychopathy, one needs to be more specific in separating different pathways and personality traits. Frick and Viding (2009) describe that there are three groups of antisocial youth, with different pathways to antisocial behavior. One group start their antisocial behavior in adolescence, in what is described as an exaggeration of normal teenage rebellion (meaning they would not fit the criteria of CD and subsequent ASPD). The two other groups both manifest antisocial behavior prior to adolescence and have persistent adjustment problems throughout their childhood. However, while one group is characterized by callous-unemotional (CU) traits (that is affective psychopathic traits in youth), leading to interference in the normal development of empathy and guilt (development of a conscience), the other is mainly characterized by cognitive deficits and ineffective socialization (Frick & Viding, 2009). In a more recent review, the authors state that youths with severe conduct problems in combination with CU traits seem to be more at risk of severe and persistent antisocial behavior (Frick, Ray, Thornton, & Kahn, 2014). CU traits have been demonstrated to be predictive of psychopathy in adulthood (Lynam, Caspi, Moffitt, Loeber, & Stouthamer-Loeber, 2007). This does not mean that the other subgroups should be over-looked, or that

they do not represent clinical presentations that need to be addressed. Rather, it indicates that the etiological mechanisms seem to differ and that it is important to make specific clinical formulations, as what is needed for treatment to be effective treatment is likely to differ (Frick & Marsee, 2018).

Research on psychopathy linked to ADHD seems to be consistent with the hypothesis of CU traits as a defining precursor to psychopathy. Although studies have demonstrated that psychopathy is associated with ADHD in both adolescents and adults (Eisenbarth et al., 2008; Fowler, Langley, Rice, Whittinger, et al., 2009), the link to affective and interpersonal psychopathic traits, that is the core personality traits of psychopathy, is weak (Eisenbarth et al., 2008; Kaplan & Cornell, 2004; Langevin & Curnoe, 2010; Retz et al., 2013), indicating that ADHD and psychopathy might essentially be independent constructs, although they share a common component of impulsivity (Retz et al., 2013).

2.6 COGNITION IN PSYCHOPATHY RESEARCH

Clinical neuropsychology is an applied science aiming to study the behavioral expression of brain dysfunction, that is trying to infer information of brain functions through systematic testing of cognitive functions (Lezak, Howieson, & Loring, 2004). Behavior can be thought of as divisible in three functional systems: “(1) cognition, which is the information-handling aspect of behavior; (2) emotionality, which concerns feelings and motivation; and (3) executive functions, which have to do with how behavior is expressed” (Lezak et al., 2004, p. 18). Mostly, neuropsychology is applied to the understanding of cognition, often using global measures of cognitive functioning (i.e. intelligence or IQ). However, it is also concerned with trying to understand more discrete functions affecting behavior.

Personality changes resulting in disinhibited and antisocial behavior is a well-known consequence of frontal brain injuries and frontotemporal dementia, causing patients to behave in an immature, irresponsible or disruptive way (Kolb & Whishaw, 2009). This observation has given rise to the hypothesis that frontal lobe deficiencies might well be linked to psychopathy, seeing as frontal lobe injuries lead to psychopathy-like symptoms. The frontal lobes are important for the temporal organization of behavior; that is to plan, to choose what behavior is appropriate in a certain situation, to monitor and to refrain from inappropriate behavior, in other words a kind of meta-function of behavior (Kolb & Whishaw, 2009). In neuropsychological terms these functions are called executive functions, that is functions that “enable a person to engage successfully in independent, purposive, self-serving behavior” (Lezak et al., 2004, p. 35).

Two meta analyses have demonstrated clear evidence that antisocial behavior in general can be linked to impaired executive functions, but the available studies use various measures of cognitive functions. Even more problematic are the differing definitions of antisocial behavior, which had a clear impact on the findings. The studies using measures of criminality demonstrated larger effect-sizes compared to studies using measures of psychopathy (Morgan & Lilienfeld, 2000; Ogilvie, Stewart, Chan, & Shum, 2011).

Another area of interest is the question of whether psychopathy is characterized by good intelligence, as was Cleckley's assumption (1941/1955). His view that psychopathy is linked to being intellectually resourceful, was mostly due to the fact that he saw psychopathic individuals as masters of manipulation and deception. However, research indicates that psychopathy is not related to intelligence (e.g. Blair et al., 2006; Hart, Forth, & Hare, 1990; Johansson & Kerr, 2005; Sreenivasan, Walker, Weinberger, Kirkish, & Garrick, 2008) although there are exceptions (Beggs & Grace, 2008; Zeier, Maxwell, & Newman, 2009). A limitation of these studies is the use of psychopathy as a dichotomous and unitary construct.

Previous studies from forensic settings reveal that cognitive functions have differential effects on specific psychopathic subcomponents, both with regard to intelligence and executive functions (including cognitive control and attention; e.g. Baskin-Sommers et al., 2015; de Tribolet-Hardy, Vohs, Mokros, & Habermeyer, 2014; Harpur, Hare, & Hakstian, 1989; Heinzen, Kohler, Godt, Geiger, & Huchzermeier, 2011; Kennealy, Hicks, & Patrick, 2007; Salekin, Neumann, Leistico, & Zalot, 2004; Vitacco, Neumann, & Wodushek, 2008; Zeier, Baskin-Sommers, Hiatt Racer, & Newman, 2012). Investigating the associations of cognitive functions with specific deficiencies observed in psychopathic individuals, can contribute to clarifying the underlying mechanisms (including potential evolutionary advantages of specific traits) linked to psychopathy, thus enabling clearer definitions of the psychopathy construct. However, there are few available studies, demonstrating mixed results and heterogeneous methods (Maes & Brazil, 2013).

2.7 GENETICS

Behavior genetics is the study of how genetic variation affects psychological phenotypes, that is individual differences in specific observable characteristics or traits (as opposed to genotype, i.e. the specific genetic variant). Single-nucleotide polymorphisms (SNPs) are sites in the genome where single DNA base pairs may differ. Each SNP have two possible base-pairs, or alleles, coding for a specific amino-acid (which is the building block of proteins), the principle being that an individual is either homozygotic (has either of two identical alleles at the specific site in their genome, i.e. AA or GG) or heterozygotic (has two different alleles, i.e. AG; Chabris, Lee, Cesarini, Benjamin, & Laibson, 2015). Candidate gene studies focus on the associations of one or more SNPs with specific traits or characteristics. However, there are millions of genetic variants in the human genome (Genomes Project et al., 2015). Consequently, another approach is to use genome-wide association studies (GWAS), that simultaneously map SNPs across the human genome in order to discover SNPs (or combinations of SNPs) of interest for a certain characteristic. As GWAS entail multiple comparisons, the significance threshold is set at a very conservative level ($p < .00000005$). As a result, the sample required for a GWAS is sizeable (Chabris et al., 2015).

Heritability is defined as the proportion of phenotypic variance that can be attributed to the genotypically controlled variance in a particular population (Visscher, Hill, & Wray, 2008). Heritability studies indicate that about 40 % of individual difference in personality is due to genetic influences, although twin studies show a higher estimate (.47; Vukasovic & Bratko,

2015). Regarding maladaptive personality traits (i.e. dimensions of personality disorder, e.g. negative emotionality or disinhibition) the heritability is somewhat lower (.26-.37; South et al., 2017). Although this means that some portion of an individual's personality is explained by their genetic make-up, it does not mean that people inherit a gene for personality. Rather, personality is multifactorial, and the genetic and environmental factors influencing individual differences in a specific phenotype are multiple (cf. Chabris et al., 2015). Meta-analytical evidence of the heritability of antisocial behavior, indicates a higher genetic influence, with 56 % of the variance explained by genetic influences (Ferguson, 2010). However, as previously described, antisocial behavior is a heterogeneous phenomenon. Furthermore, the knowledge of the specific genetical underpinnings of antisocial behavior in general, and psychopathy in specific, is as of yet lacking although there are different candidate genes of interest. One candidate is the catechol O-methyltransferase gene (COMT), that codes for the catechol O-methyltransferase enzyme involved in the clearance of dopamine (Diamond, 2007). The COMT gene has been linked to risk of developing antisocial and aggressive behavior in ADHD patients (Caspi et al., 2008; Langley, Heron, O'Donovan, Owen, & Thapar, 2010; Monuteaux, Biederman, Doyle, Mick, & Faraone, 2009; Qian et al., 2009; Salatino-Oliveira et al., 2012; Thapar et al., 2005) but studies in forensic samples are few.

3 AIMS

The overall aim of the doctoral project was to contribute to enhanced methods of assessment of psychopathic personality as well as add to the knowledge of the construct of psychopathy. Study I was based on a survey study with prison staff. Study II, III and IV was based on a cross-sectional study of criminal offenders.

3.1 STUDY I

In the first study we investigated evidence of content validity for the CAPP model, that is we evaluated if the symptoms included in the model are seen as relevant or typical for psychopathy. The aim of the study was to determine whether correctional staff perceived the symptoms of the CAPP to be indicative of psychopathy in men and women. An additional aim was to examine whether there are gender differences in what is considered as typical of psychopathy. A model of borderline personality disorder, the Comprehensive Assessment of Borderline Personality Disorder (CABP; Cook et al., 2013), was included in the survey to investigate if the models could be clearly distinguished from each other and to what extent they are overlapping.

3.2 STUDY II

The second study focused on investigating the properties of a psychometric instrument, the TriPM, when using the Swedish translation in a correctional sample. The study aimed to examine the psychometric properties of the TriPM, primarily focusing on evidence of association validity. Specifically, we investigated if the TriPM showed expected inter-correlations and associations using expert rated psychopathy, self-rated normal personality traits and of other variables relevant of psychopathy.

3.3 STUDY III

In the third study we aimed to explore in what way ADHD symptoms and cognitive functioning were related to specific subcomponents of psychopathy in offenders. For this purpose, we used two models of psychopathy, the PCL-R and the TriPM, thus giving us the opportunity to compare and discuss the different models, again as evidence of associations validity.

3.4 STUDY IV

Study IV aimed to investigate the links of psychopathy, ADHD and cognitive functions by exploring the risk pathway of COMT genotypes to ADHD and antisocial behavior. Besides being a way to elucidate the etiological links of these constructs, comparing the genetic influences using different measures of psychopathy can provide further validity evidence of the triarchic model in general and the TriPM in particular.

4 METHOD

4.1 PSYCHOMETRIC THEORY

Psychometrics refers to scientific study and methods of evaluating the quality or attributes of psychological measures or tests (Furr, 2018). Although it might be seen by many as a bit dull and technical, it is perhaps the most fundamental scientific field of psychology and psychiatry, as virtually all studies depend on using various tests and measures of psychological attributes and behavior. As such, we need to be sure that the measures we use can give us accurate answers to the scientific questions. Failing to evaluate or verify the psychometric evidence for the measures we use would seriously compromise the interpretation of our findings.

4.1.1 Reliability

A critical question when evaluating a test or assessment instrument is if it is reliable, referring to its precision in making correct estimates of the underlying construct: “the reliability for a measurement procedure depends on the extent to which differences in respondents’ observed scores can be attributed to differences in their true score, as opposed to other, often unknown, test administration characteristics” (Furr, 2018, p. 113). Reliability estimates do not provide information on whether a test actually measures the intended construct, but to what degree the measurement process is free of systematic and unsystematic errors.

There are different methods for evaluating a tests reliability. Here, I will focus on the methods most applicable in the current context. Inter-rater reliability, that is evaluating the agreement of two or more assessors, is commonly used with expert-rated instruments such as the PCL-R (e.g. having a second rater assess 10 % of the participants). However, this procedure requires that two independent raters are involved in the process, which is resource consuming and can also be logistically complicated.

Internal consistency is perhaps the most common procedure for evaluating reliability and is easily calculated for any test. Internal consistency estimates are a practical alternative to test-retest reliability (i.e. to evaluate the stability of a person’s scores across repeated tests), that uses the item responses from a cross-sectional study (Furr, 2018). There are different statistical procedures to investigate this. A commonly used estimate is Cronbach’s alpha (α), or “raw” coefficient alpha. The principle is that if the composite score of the test is a measure of a coherent latent construct, then each item should reflect that same latent construct, that is the individual items are to be seen as repeated measures of the same construct and thus should have a positive covariance. Accordingly, evaluating their internal consistency is in some sense equivalent to test-retest reliability. That said, if the items are equivalent, then one item would suffice and be a more time efficient measure than multiple item tests. However, another important principle of reliability is that the length of the test increases reliability due to the effects of measurement error. For that reason, it is preferable to have a test with repeated items that all reflect the same construct. Cronbach’s alpha uses the covariance of each pair of items in the test as well as the variance of the composite score (it accounts for the

variation of the individual composite scores) to calculate a reliability estimate (from 0 to 1). In contrast, it is important not to confuse an estimate of reliability with evaluations of dimensionality or measurement model. In other words, a high reliability estimate does not necessarily mean that the test is unidimensional (measures a unidimensional construct; Furr, 2018).

4.1.2 Dimensionality

There are three important principals when thinking about the dimensionality of a test. First, does the test measure a unitary construct or a multidimensional construct? A vital point here is that a test should always be unidimensional. If the test is multidimensional it is essentially a composite of separate subtests. Second, if it is multidimensional – are the dimensions correlated? Tests with correlated dimensions, that is tests with higher-order factors, for example tests of intelligence, measures distinct but inter-related constructs, that add to the latent construct. In contrast, measures of normal personality (e.g. NEO-PI-R), have separate dimensions, and it does not make sense to add them to a composite personality score, as they do not generally co-vary. Third, what do the dimensions signify – that is, what do the subtests measure? Factor analysis is a statistical method that allows us to investigate the dimensionality of a test, or, depending on the perspective, a method for investigating a theoretical construct or phenomenon (latent factor) through a number of observable variables (Furr, 2018).

4.1.3 Validity

In the traditional psychometric framework, there are three types of validity: content validity, criterion validity, and construct validity. However, according to the contemporary view of validity, as outlined by the Standards for Educational and Psychological testing (American Education Research Association, AERA; American Psychological Association, APA; and National Council on Measurement in Education, NCME; 2014, as cited in Furr, 2018), all types of validity essentially refer to construct validity, meaning what the test actually measures. More specifically, it refers to: "the degree to which evidence and theory support the interpretation of test scores for proposed uses" (AERA, APA, and NMCE, 2014, as cited in Furr, 2018, p. 220). Accordingly, investigating validity focuses on evidence that is important for understanding what the test scores mean in a specified context. It is common to refer to a test as valid, but a test can never be "valid" as such, rather, the evidence for the test as a valid measure of a given construct in a given context can be said to be convincing (or lacking).

According to the Standards for Educational and Psychological testing there are five major sources of validity evidence (as cited in Furr, 2018):

1. *Content validity evidence* refers to the fit of the test to the theoretical construct that it is supposed to measure. Possible ways of studying content validity evidence are delphi studies (which items are relevant; are there items missing?) and prototype studies (to what degree does the test fit the prototype of the construct).

2. *Internal structure validity evidence* refers to the dimensionality of the test, meaning if the test structure matches the conceptual structure. Examples of sources of internal structure validity evidence are factor analysis and item response theory.
3. *Process validity evidence* concerns whether the response processes that the respondents actually use match the processes that they are supposed to use. This can be studied through interviews or other methods of investigating the response processes that respondents use to complete the test, their interpretations and adherence to the instructions etcetera. Studies of inconsistent responding (if similar items are consistently responded) to detect random or careless responding can also be valuable.
4. *Associations validity evidence* refers to whether the evidence of the actual associations of the measure to other measures is consistent with the theorized associations of the construct and other variables. This can pertain to both convergent evidence of similar or related measures as well as discriminant evidence of unrelated variables. In the same manner, the test score differences among different groups should be in accordance with expectance (i.e. if there is an expected difference, the test scores should reflect this difference). Furthermore, predictive validity evidence, (i.e. the tests correlation to a relevant variable at a future point in time, e.g. violence risk) is another source of associations validity evidence.
5. *Consequences of use* is the type of validity evidence that is perhaps the most radical compared to the traditional view of validity and refers to how test scores are used and affect the individuals or institutions where they are used. If the consequences of use leads to adverse effects of some kind, is discriminating for a certain group etcetera, this is to be evaluated as (negative) validity evidence. An example is the use of PCL-R in in capital cases where it can influence the attitudes and subsequently the sanctioning of the defendant (cf. Edens, Davis, Fernandez Smith, & Guy, 2013).

4.2 PARTICIPANTS AND PROCEDURE

The current doctoral project was part of a larger study, *GeBra: From genes to brain – different aspects of psychopathy*, that aimed to investigate the associations between psychopathic traits, genes and brain correlates in offenders with varying degrees of psychopathy. Prior to the start-up of the data collection for From Genes to Brain, we invited correctional officers to participate in a survey (study I). Study II-IV was based a cross-sectional study of male offenders with Swedish ethnicity from high-security prisons.

4.2.1 Study I

In the first study we used so called prototype methodology to investigate content validity evidence of the CAPP model. Content validity studies are a first step in the evaluation process of a new instrument. The idea is to evaluate to what degree the instrument captures the construct that it is supposed to measure, in this case by asking participants to rate if they regard the symptoms of the CAPP as typical of a prototypically psychopathic person (cf. Kreis et al., 2012).

We based the study questionnaire on the study protocol used in previous prototypicality studies of the CAPP (Kreis, 2008). Jenny Liljeberg (co-supervisor) and I translated the CAPP to Swedish, in collaboration with two of the developers of the CAPP (David Cooke and Caroline Logan) as well as Peter Johansson, psychologist and researcher at the Swedish Prison and Probation Services, who had previously worked with the CAPP model. The questionnaire also included foil symptoms, that is control symptoms that are thought to be unrelated/diametrically opposed to psychopathy. In translating the model, we strived to adhere to the CAPP aims of keeping the wording comprehensible and in natural language.

We also included symptoms from a corresponding model of borderline personality disorder, the CABP. The CABP and foil symptoms were also translated by Jenny Liljeberg and myself, but without consulting with the model authors. Due to an omission in the unpublished manual (Cook et al., 2013) we failed to include one symptom of the CABP (“Angry” from the Emotional domain). Aside from this the translation corresponds to the version used in the first published study of the CABP (Viljoen et al., 2015).

The CAPP model consists of 33 symptoms that are all defined by three key words (descriptive adjectives or adjectival phrases). For example, the symptom *Detached* is defined with the key words *Remote*, *Distant*, and *Cold*. The CABP is organized in the same fashion. The models share 10 symptoms that are indicative of both psychopathy and BPD.

The study questionnaire included 57 symptoms, each accompanied by three key words: 23 symptoms unique for the CAPP model, 10 symptoms included in both the CAPP and the CABP model, 16 symptoms unique for the CABP model and 8 foil or control symptoms, (i.e. symptoms not typical of or opposed to psychopathy). The participants were asked to rate to what degree they perceived each symptom to be typical of psychopathy in men or women on a 7-point scale.

We recruited the participants among correctional officers at two correctional facilities, one prison for men and one for women. Data was collected in the autumn 2014. The prison for male inmates, Kumla, is the largest prison in Sweden and it is a maximum-security prison. The facility for women, Hinseberg, is a medium security prison. However, it is the maximum security-level prison available for women in Sweden. We were assisted by administrative staff at each unit, who informed potential participants about the study and invited them to participate. We distributed 140 questionnaires of which 90 were returned. As the distribution and collection of the survey was carried out by administrative staff, we could not monitor the process. However, we have no reason to believe that the data collection was systematically biased. All participants were informed that their participation was voluntary and that declining would not affect their work situation. Completion of the survey was performed during work hours. We asked the respondents to complete the questionnaire individually, without discussing the content with anyone prior to the completion of the study.

Of the 90 questionnaires, two were blank with a comment of not wanting to participate, and we also excluded one questionnaire that was not completed according to the instructions. This

resulted in a final sample of 87 participants. The majority were from Kumla; 25 female officers and 25 male officers. At Hinseberg 25 female officers and 12 male officers participated. We also asked the participants to state their level of education and years of work experience in the Swedish Prison and Probation Services. Their age ranged from 22 to 65 years old ($M = 40.27$; $SD = 12.04$) and work experience in the Swedish Prison and Probation Services ranged from half a year to 39 years ($M = 8.35$; $SD = 8.19$). There were no significant differences comparing the participating staff at Kumla to those at Hinseberg regarding gender, age, educational level or work experience.

4.2.2 Study II-IV

The data for study II-IV were collected at all Swedish high security prisons (7 facilities in total). As we collected genetic material, in order to limit the influence of ethnic variations affecting the results, only those with Swedish ethnicity were invited to participate. This we defined as having both biological parents born in Sweden. Including only participants with Swedish ethnicity also allowed us to use a previously collected data set from the Swedish general population as comparison group (SweGen; Ameer et al., 2017).

We started collecting data in January 2015, with the goal to include at least 200 participants, which we concluded in December 2017. A clinically experienced research assistant was responsible for managing the data collection on site. Each facility appointed contact persons for the project, that helped us to screen their register for potential respondents. The participants were then approached by the research assistant, who informed them of the study and asked for their consent to participate. During the three-year time-frame, all prisons were visited repeatedly.

After having verified that the participants had understood and consented to the studies, they were interviewed using a structured study protocol as well as a semi-structured interview for PCL-R scoring. Their correctional files were reviewed for collateral information and we also collected their prescription lists to verify current medication use.

We aimed to include approximately 50 % of the sample for neuropsychological testing. We judged that to be an adequate sample size for the planned analyses, which matched the limited time and resources. The neuropsychological assessments were performed by experienced clinical psychologists. The selection process was essentially a convenience sampling of available participants. The duration of the test battery was approximately one hour. Some participants declined to participate in neuropsychological testing and some were not invited due to having been released or transferred. Both the psychologists and the research assistant were employed by the National Board of Forensic Medicine and had had no prior contact with the participants they assessed.

4.2.2.1 Genetic analyses

Following inclusion in the study, the nurses at the respective facilities were asked to collect blood samples and send them to KI Biobank, Karolinska Institutet. DNA was extracted

according to standard procedures by KI Biobank. Following the conclusion of the data collection the blood samples were sent for genotyping of single nucleotide polymorphisms (SNPs) to the SNP&SEQ Technology Platform at Uppsala University. Genotyping was performed using an iPLEX single base primer extension assay and allele mass spectrometry detection.

4.2.2.2 *Participants*

In total, we invited 309 inmates to participate, where of 206 agreed (67 %). We have no data concerning those who declined. Of the 206 participants who agreed to participate, five dropped out or were excluded as the data was not valid due to for example suspected dementia or the use of sedating medication, resulting on a final study sample of 201. A subsample of 105 participants participated in neuropsychological testing.

The participants were asked about criminal and psychiatric history and other important demographic variables according to a structured protocol. As data was collected at the highest security level prisons, many of the participants were longtime prisoners serving sentences for major crimes. Most of them (79.6 %) had a history of violence and 26.5 % had committed lethal violence. Sexual offences were not as common: 16.9 % had committed a sexual offence of which 10.9 % was against children. The education level varied: although 12 % had not finished junior high school (i.e. had not completed the obligatory 9 years of Swedish “grundskola”), more than half of the participants had a high school diploma and 7 % had even proceeded to college/university studies. Estimated IQ levels also varied ($M = 96.8$, range = 73-128).

The sample showed a high level of psychiatric problems: 47.8 % reported having a diagnosis of ASPD and 32.8 % reported having ADHD. A majority of the participants (64.0 %) reported having a history of substance abuse, most commonly alcohol abuse (37.0 %). While 59.2 % reported having normal childhood circumstances, 24.4 % reported having had some childhood adversity and 16.4 % reported severe childhood adversity (e.g. abuse). A sizable proportion (12.5 %) was not raised by their biological parents (e.g. raised in foster care). The use of prescribed psychotropic drugs was common. Central stimulants were prescribed to 14.0 % of the participants (used to enhance attention and concentration as well as reduce impulsivity for ADHD patients). Antidepressants were prescribed to 22.1 %, anxiolytics to 9.1%, and antiepileptic medication to 4.0 %. Although only 1.0 % reported having a psychotic disorder, antipsychotic medication to 18.1 % (plausibly prescribed for mood regulation and sedative purposes). Of the total sample, 28.1 % used some kind of medication potentially affecting cognitive functioning (defined as all psychotropic drugs except antidepressants). In addition, although benzodiazepines are generally prohibited in the Swedish correctional services, two participants (not included in the 201 described here) were excluded due to the use of benzodiazepines or equivalent medication.

4.3 MEASURES

4.3.1 Psychopathy measures

We used two measures of psychopathy: an interview based expert rating according to the PCL-R (Hare, 2003), as well as self-rating using the TriPM (Patrick, 2010). Apart from one participant, where item 17 (many short-term marital relationships) was omitted due to his young age, we had no missing values for the PCL-R. Internal consistency estimates for the scales were as follows: PCL-R total score $\alpha = .86$, average inter-item correlation (AIC) = .24; Facet 1 $\alpha = .66$, AIC = .33; Facet 2 $\alpha = .75$, AIC = .43; Facet 3 $\alpha = .72$, AIC = .34; Facet 4 $\alpha = .81$, AIC = .46. The distribution of PCL-R in the sample approximated a normal distribution (see Figure 3a) with a range from 1 to 39 (40 is the maximum value) and mean value of 20.6 (SD = 8). The proportion of participants that were rated as 26 or higher were 32.3 % and 11.4 % were rated as 30 or higher. The PCL-R values varied comparing age groups: participants that were aged 22 to 35 years had the highest mean score (M = 22.1, SD = 6.3) and the oldest participants (56 years or older) had the lowest mean score (M = 10.9, SD = 7.3; see Figure 3b).

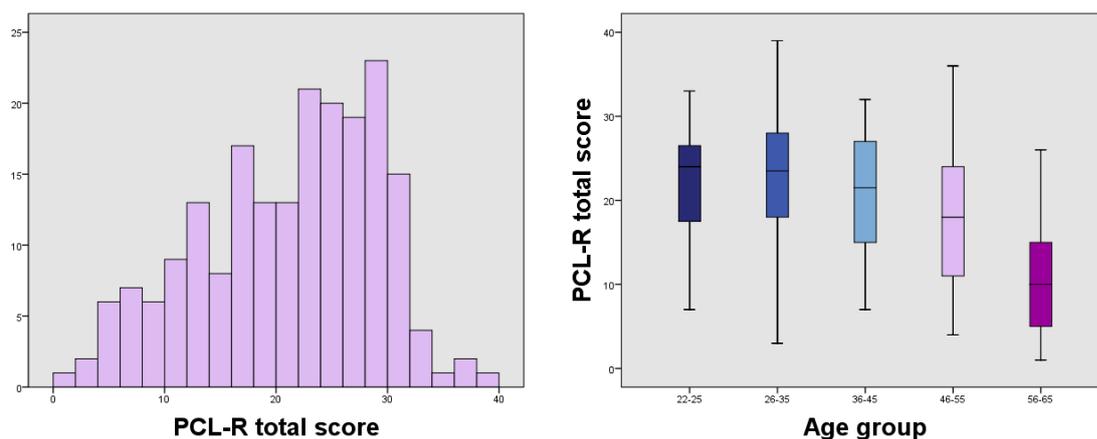


Figure 3. a) PCL-R total score distribution and **b)** boxplot PCL-R total scores across different age groups

Regarding the TriPM, total and facet scores were calculated using proratings to account for missing values (i.e. replacing a maximum of 3 missing values in each facet with the mean value of the respective facet to adjust the score). Valid scores were available for 194 participants. Internal consistency estimate for the scales were as follows: TriPM total score $\alpha = .95$, AIC = .24; Boldness $\alpha = .81$, AIC = .19; Meanness $\alpha = .95$, AIC = .51.; Disinhibition $\alpha = .93$, AIC = .40; The distribution of the respective scales is presented in Figure 4. The mean value for the TriPM total score was 85.9 (SD = 30.8, range = 32-165), Boldness 33.8 (SD = 8.7, range 7-54); Meanness 21.9 (SD = 15.0, range 0-56), and Disinhibition 30.2 (SD = 14.8, range 0-59).

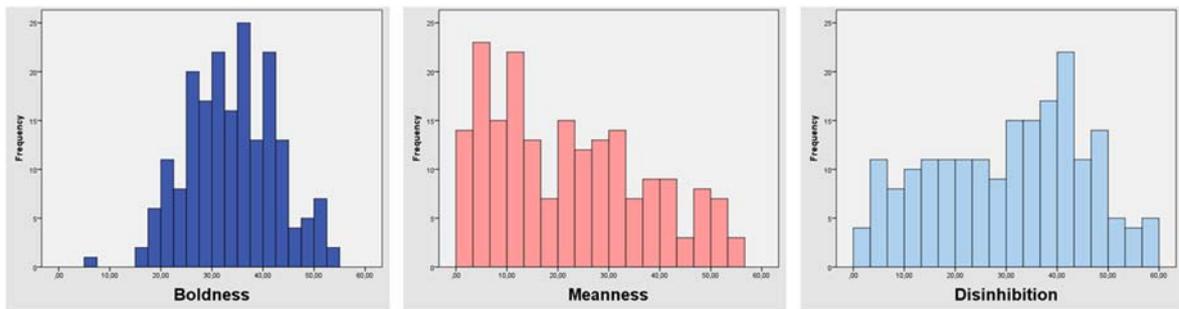


Figure 4. The distribution of the TriPM subscales

4.3.2 ADHD

To measure ADHD symptoms we used the World Health Organization Adult ADHD Self-Report Scale (ASRS; Kessler et al., 2005), which is an 18 item questionnaire based on the DSM-IV-TR (American Psychiatric Association, 2000) criteria of ADHD adapted for use in adults. Each item is rated based on how often a symptom has occurred over the past 6 months from never (0), rarely (1), sometimes (2), often (3), to very often (4). The ASRS was developed to facilitate ADHD screening in adults and has demonstrated high agreement with clinical diagnoses (Kessler et al., 2007).

4.3.3 Additional self-ratings

To measure the FFM personality model we used the short version of NEO (NEO Five-Factor Form, NEO-FFI; Costa & McCrae, 1992). NEO-FFI is a 60 item self-report instrument rated on a 5-point scale (0-4). NEO-FFI assesses the five basic personality constructs of the FFM: Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness, measured by 12 items respectively, but not the facets of each domain.

Impulsivity was measured with Barratt Impulsiveness Scale (BIS-11; Patton, Stanford, & Barratt, 1995). The scale consists of 30 items that are scored from 1 to 4. A higher score indicates a higher degree of impulsiveness.

The Interpersonal Reactivity Index (IRI; Davis, 1983) is a 28-item self-report questionnaire measuring different aspects of empathy. The items consist of statements rated from 1 to 5.

4.3.4 Neuropsychological testing

The neuropsychological testing battery was chosen on the basis of being as easily administrated as possible and also sufficiently short (one hour maximum) to be able to motivate the participants to perform all tests to the best of their abilities. Apart from estimated IQ scores, we used the raw scores in all calculations as the models were adjusted for age when justified. Test scores were available for 105 participants, except for the results from the test Stop it! where the scores from six participants needed to be excluded as inaccurate.

4.3.4.1 *Estimated IQ*

To estimate IQ we used two subscales from the Wechsler Adult Intelligence Scales – Fourth Edition (WAIS-IV; Wechsler, 2010) standardized for Scandinavian use. WAIS-IV is the most commonly used instrument for assessing IQ in a clinical context. As a rule, a full-scale IQ is calculated on the base of 10 subscales representing all domains of intelligence functions (i.e. verbal comprehension, perceptual reasoning, working memory, and processing speed).

However, as we needed to have a limited and easily administrated test battery (not only comprising IQ), we chose to estimate IQ based on Block Design and Similarities on the basis that they are the subtests of the respective domains of verbal and performance IQ that are most highly correlated to full-scale IQ (Block Design .76; Similarities .57; Wechsler, 2010).

Block Design is a test of perceptual reasoning, specifically aiming to measure the ability to analyze and synthesize abstract visual stimuli. The participant is asked to use red-and-white blocks to reproduce printed patterns of gradually increasing difficulty.

Similarities is a test of verbal comprehension, specifically aiming to measure verbal concept formation and reasoning. The participant is asked to explain the similarity of two objects or phenomena. The first tasks are on a concrete level (visually or functionally similar), with an increasing abstraction level for each task. The raw score of the respective subtest was transformed to a norm adjusted score. We then calculated the estimated IQ using the mean value of the norm adjusted results transformed to the IQ scale ($M = 100$; $SD = 15$).

4.3.4.2 *Working memory*

Working memory is the ability to actively maintain and manipulate information mentally to produce a result (e.g. a calculation or reasoning procedure). To assess working memory, we used the Digit Span from WAIS-IV. The procedure is that the test administrator reads a series of numbers that the participant is asked to repeat; in the first set of tasks the numbers are to be repeated in the same order, in the second set in the reverse order, and lastly in a numerical order.

4.3.4.3 *Executive functions*

We used Color-Word Interference Test (CWIT) from Delis-Kaplan Executive Function System (Delis, Kaplan, & Kramer, 2007) to assess interference of automated verbal responses as well as cognitive switching. The CWIT is a so-called stroop test, where the idea is that when you are forced to inhibit an automated response, it delays performance on a given task, but there are individual differences in how affected that delay is. The CWIT has four conditions or task variants. In the first condition, the participants are asked to name or read from rows of colors (red, green, or blue) from a sheet of paper as quick as possible without omitting any color or naming the wrong color. In the second condition, the participants are asked to read from a sheet with written color words (naming the same colors) according to the same procedure. These are the control contingencies to make sure the participants master the basic functions that are demanded to perform the test. The third condition is a classic

stroop task. The participant is presented with a sheet of color words, but the catch is that the words are written in a conflicting color (i.e. the word red is written in blue color, blue written in green color) and the instruction is to name the color, not to read the word. As reading is an automated response, the participant needs to inhibit this response, which delays or interferes with the naming of the colors. Condition four is a variant of the classic stroop, which includes a switching component. This time, some of the words are marked with a box, in which case the participant is instructed to read the word instead of naming the color.

We also used a computerized, non-verbal test to assess response inhibition: Stop it! Stop signal task (Verbruggen, Logan, & Stevens, 2008). We administered the test on a laptop, where the test scores were saved in the numerical order. The participants number where noted on a separate protocol that was filed with the test material for later matching of the results to the study ID. The test scores are calculated by the software. The duration of Stop it! is approximately 14 minutes, which includes a trial run and three test runs interrupted by short breaks. The participant is instructed to look at the screen where either a circle or a square is presented, and then to answer as quick as possible when the stimuli is presented by pressing a button to the left (square) or to the right (circle). However, occasionally the stimulus is followed by a signal, and in that case one is should refrain from pushing the button. Sometimes the signal is delayed, making it more difficult to refrain from pressing the button (especially as the main task is to press the button as quickly as possible).

The key measure of Stop it! is stop signal reaction time (SSRT), which is an estimate of how quickly the participants can inhibit the response (by not pressing the button) when cued by the stop signal. SSRT is presented in milliseconds with lower scores representing better performance.

4.4 STATISTICAL METHODS

4.4.1 Study I

In study I we investigated the perceived level of prototypicality by presenting mean values and standard deviations. The differences in male and female prototypicality ratings were investigated using independent samples *t* test, which is a method to compare the mean value of two independent sample groups, evaluating the likelihood that the observed difference is the result of a difference in the true mean values in the populations, rather than a coincidental finding specific to the actual samples. Generally, when making multiple comparisons the recommendation is to correct the statistical significance threshold. However, as previous prototypicality studies did not use this approach, we instead presented the exact *p* values, to facilitate comparisons. Effect sizes (i.e. evaluating the magnitude of the difference) were calculated using Cohen's *d*.

Lastly, we computed summary variables of symptom groups to enable a comparison of the level of prototypicality across models. We then compared the mean values to see if level of prototypicality was gradually increasing across symptom groups (from foil symptoms, to unique borderline symptoms, to overlap symptoms, to psychopathy unique symptoms) and

also if this pattern differed according to gender. To this effect, we calculated a two-way repeated measurement analysis of variance (ANOVA), two-way meaning that we evaluated two independent variables (psychopathy and gender) and repeated meaning that the dependent variables (symptom groups) were drawn from the same sample (we did not compare four groups of separate individuals).

4.4.2 Study II

To investigate internal consistency, we used Cronbach's alpha. We calculated Pearson's correlation coefficients, that is an estimate of the covariation of two continuous variables, to investigate the interrelatedness of the TriPM subscales as well as the associations with the PCL-R, self-rated normal personality traits, and self-report measures of other variables relevant to psychopathy (i.e. BIS, IRI). We then calculated multiple linear regression analyses to further examine the association of TriPM and other measures. Regression analysis is a method for studying associations, but compared to correlations, you can investigate multiple variables concurrently and also adjust for their co-variation. A regression analysis yields an estimate of the slope and direction of the association (signified by the β values), and also an estimate of the amount of variance in the dependent variable that is explained by the variance of the independent variable/variables (signified by R square). We used three independent variables in the regression models (Boldness, Meanness, and Disinhibition) and therefore present adjusted R square values. Adjusting for age did not significantly affect the results. Accordingly, age was not included in the final regression models.

4.4.3 Study III

Again, we used Pearson's correlation coefficients to investigate the associations between psychopathy scores, ASRS and neuropsychological tests. Based on the correlation calculations, we determined which variables showed significant zero order correlations for further evaluation in a path analysis. A path analysis is a variant of regression analysis where the associations of multiple independent variables can be investigated simultaneously, investigating both direct and indirect effects. As we tested multiple variables, the significance level for inclusion in the path models was set at .01 (two-tailed). In the path analysis we investigated the associations of PCL-R and TriPM with ADHD symptoms and cognitive functioning, treated first as unidimensional (using the total score of the respective psychopathy model) and then as multidimensional constructs (using the facet/domain scores), controlling for age.

4.4.4 Study IV

In study IV we investigated the distribution of COMT Val158Met genotype variants in our sample. Allelic and genotype frequencies were assessed by counting. We analyzed deviation from Hardy-Weinberg equilibrium using Chi-square test, that is we compared expected versus observed genotype frequencies according to principles of evolution (is the observed distribution evolutionary plausible). Secondly, observed allelic and genotype distribution were compared to those in the SweGen reference cohort, which is a genome-wide collection

of genetic variant frequencies in the Swedish population ($n = 1000$; Ameer et al., 2017). We compared our sample both to the full sample of mixed gender, as well as to the 505 male subjects as being more representative for our all-male sample.

In the next step we compared group differences in our sample (Val/Val, Val/Met vs. Met/Met) of measures of psychopathy, symptoms of ADHD and cognitive functions using Spearman's rank order correlation (as genotype identification is an ordinal variable). We then compared the groups using both parametric and non-parametric methods, to make sure the lack of significant findings were not due to violations of normality observed for several of the dependent variables. We calculated one-way independent measurement ANOVA models with genotype as a factor comparing the mean values of the groups regarding the variables mentioned above. We also employed Kruskal Wallis tests, which are based on ranked data (median values).

5 RESULTS AND DISCUSSION

5.1 STUDY I: GENDERED EXPRESSIONS OF PSYCHOPATHY: CORRECTIONAL STAFFS' PERCEPTIONS OF THE CAPP AND CABP MODELS

5.1.1 Results

In the first study we examined to what degree correctional staff perceived the symptoms of the CAPP and the CABP models to be indicative of psychopathy in men and women. We found that 28 of the 33 CAPP symptoms were rated as highly typical ($M > 5$) or moderately typical ($M = 4-5$) of psychopathy. Surprisingly, one of the foil symptoms, *Perfectionistic*, was rated as highly typical of psychopathy. *Strange*, also a foil symptom, was rated as moderately typical. Five of the CAPP symptoms were not rated as typical of psychopathy ($M \leq 4$); three symptoms unique for psychopathy: *Lacks pleasure*, *Lacks perseverance*, and *Lacks concentration* and two symptoms included in both models: *Unstable self-concept*, and *Lacks planfulness*.

When comparing the prototypicality ratings of female ($n = 37$) and male ($n = 50$) psychopathy, the mean values of 12 symptoms differed significantly (see Table 3).

Table 3. Items that differed in prototypicality according to gender.

Items more typical for men	Men ¹ <i>M (SD)</i>	Women <i>M (SD)</i>	<i>t (df)</i>	<i>p</i>	<i>d</i>
P: Garrulous (D)	6.18 (1.10)	5.05 (1.67)	3.79 (58.54)*	.001	0.80
P: Uncaring (A)	5.98 (0.89)	5.22 (1.42)	2.88 (56.63)*	.006	0.64
B: Emotionally expressive (E)	5.13 (1.28)	4.05 (1.53)	3.51 (83)	.001	0.77
P: Unreliable (B)	5.26 (1.50)	4.14 (1.53)	3.37 (82)	.001	0.74
P: Self-aggrandizing (S)	6.40 (0.93)	5.81 (1.00)	2.84 (85)	.006	0.61
O: Reckless (B)	4.80 (1.89)	3.81 (1.73)	2.48 (84)	.015	0.55
P: Sense of invulnerability (S)	6.18 (1.08)	5.54 (1.30)	2.50 (85)	.014	0.83
B: Idealizing (A)	4.94 (1.66)	4.14 (1.64)	2.23 (84)	.028	0.48
P: Sense of uniqueness (S)	6.66 (0.94)	6.30 (0.62)	2.04 (85)	.044	0.45
P: Uncommitted (A)	5.30 (1.56)	4.59 (1.66)	2.03 (85)	.045	0.44
Items more typical for women					
P: Lacks pleasure (E)	2.81 (1.36)	3.73 (1.56)	2.89 (82)	.005	0.63
O: Detached (A)	4.73 (1.58)	5.57 (1.30)	2.61 (83)	.011	0.58

Note: Symptom groups are identified by P (unique CAPP symptoms), O (overlapping symptoms included in both models, and B (unique CABP symptoms). Domains are identified by A (Attachment), B (Behavior), C (Cognitive), D (Dominance), E (Emotional), and S (Self). * equal variance not assumed.

We also evaluated if symptoms of psychopathy, as defined by the CAPP, were differentiated from symptoms of borderline personality, as defined by the CABP. As expected, the mean values were highest for the CAPP unique symptoms and lowest for the foil symptoms (see Figure 2 in the article). There was a considerable overlap in mean prototypicality ratings between symptom groups, and also a large range of symptom mean values within groups. Levels of prototypicality differed gradually by symptom group. Although there was no significant gender effect on level of prototypicality, there was a specific effect regarding CAPP unique symptoms, that were rated as significantly more typical of men than of women.

5.1.2 Discussion

The results indicated that the CAPP model is a comprehensible conceptualization of psychopathy and that most of the CAPP symptoms were perceived as indicative of psychopathy. Previous prototypicality studies have mainly focused on expert ratings. Our study demonstrates that correctional staff have similar perceptions of psychopathy to that of mental health experts, at least when evaluating the model vis-à-vis their inner model of a prototypically psychopathic person.

Although there was no overall effect of target gender on how typical the symptom groups were perceived to be, results indicated that the unique or core features of psychopathy were perceived as more indicative of psychopathic men. This might mean that even though the CAPP model seems to be relatively gender-neutral, it still captures the male expression of psychopathy slightly better. However, it might also mean that men are actually more psychopathic than women. As psychopathy in women is still understudied and as the PCL-R, the most commonly used assessment instrument of psychopathy, has been demonstrated to be less representative of psychopathy in women (Beryl, Chou, & Völlm, 2014; Dolan & Völlm, 2009), this remains to be seen.

We found support for the view that BDP and psychopathy have overlapping features, meaning that some symptoms might be common for both conditions. We expected to see an effect of gender regarding borderline symptoms, that is that psychopathic women would be regarded as more emotionally unstable than men. This was confirmed in our results. However, it is important to note that this does not necessarily mean that psychopathic women might be misconstrued as emotionally unstable. In this study, we asked the participants to think about their image of a psychopathic woman, therefore prompting them to take note of psychopathic traits and not symptoms of BPD. It is likely that it is more difficult to not let yourself be steered by your preconceptions and prejudices when presented with an actual client, whether you are a mental health expert or a lay person.

5.2 STUDY II: INVESTIGATING THE VALIDITY EVIDENCE OF THE SWEDISH TRIPM IN HIGH SECURITY PRISONERS USING THE PCL-R AND NEO-FFI

5.2.1 Results

In study II we examined the psychometric properties of the Swedish TriPM version. The Meanness and Disinhibition scales demonstrated a strong correlation ($r = .73$), followed by Meanness and Boldness that was moderately correlated ($r = .31$). Boldness and Disinhibition was not significantly correlated. All scales were significantly correlated to TriPM total score (Boldness $r = .48$, Meanness $r = .93$, and Disinhibition $r = .86$).

The TriPM and the PCL-R scores generally showed expected association patterns. Focusing on the results from the regression models, the Disinhibition scale was most strongly associated with PCL-R total score, followed by Boldness, while Meanness, unexpectedly, demonstrated no significant association. On the facet level, Boldness was the only scale that was significantly associated with Facet 1 (interpersonal functioning) and also showed an association to Facet 4 (antisocial behavior), albeit small. Meanness was the only scale associated with Facet 2 (affective functioning), but showed no associations to the other facets, beyond the variance shared with the other scales. The Disinhibition scale showed a unique association to Facet 3 (impulsive behavior) and was also the scale that demonstrated the strongest association to Facet 4.

When investigating the associations with FFM personality traits, empathy and impulsivity, again focusing on the regression models (that is partialling out the variance shared with the other domains), we found that all domains showed distinct patterns of association. Boldness level was primarily associated with low neuroticism (i.e. demonstrating emotional stability) and high extraversion. The Meanness scale was associated with low scores on both empathy and agreeableness (i.e. being antagonistic). Disinhibition level was most strongly associated with high impulsivity and neuroticism, as well as low conscientiousness. In addition to these general association patterns, results also revealed that Meanness and Disinhibition showed similar association patterns (e.g. both were significantly associated with low empathy and high impulsivity, but not equally strongly). The Boldness scale on the other hand generally showed a reversed pattern (e.g. negatively associated with impulsivity). However, all domains were to some extent associated with agreeableness.

5.2.2 Discussion

There are to date a fair amount of studies using the TriPM, but few of them focus on correctional samples, meaning that in most studies the participants generally demonstrate low levels of psychopathic traits and few, if any, would probably be regarded as having a psychopathic personality disorder, clinically speaking. The real strength of this study is therefore that we demonstrate results that are generally similar to previous research in our sample of offenders, in terms of expected patterns of associations evidence, as well as general support for the theoretical framework of the triarchic model. However, we also found some of

the results to be problematic in terms of the usefulness of the TriPM as an assessment instrument of psychopathy.

Both the results from the current study, as well as other studies (Roy et al., 2020; Shou et al., 2018; Sleep et al., 2019), indicate that there are some psychometric issues that need to be addressed. The Disinhibition and Meanness scales seem to be highly overlapping, indicating that they do not measure two distinct constructs. Furthermore, the assumption that the construct of meanness is vital to psychopathy in offender samples (Patrick et al., 2009) might not be supported by the results. Even though the Meanness score was associated with the affective deficiencies captured in the PCL-R model, when predicting the total PCL-R score, the Meanness score was not contributing, beyond the variance explained by Boldness and Disinhibition. Although we did find some specific associations patterns regarding the residual scales (i.e. the unique variance of each scale), particularly regarding neuroticism and empathy, the results point to a need to improve the psychometric properties of the scales.

Our results indicate that Boldness score had a unique value in predicting the PCL-R score, and as expected, it was associated with the interpersonal deficiencies targeted in the PCL-R, but also with antisocial behavior. However, the results of this study also need to be interpreted in view of other studies, that indicate that boldness has limited value in predicting antisocial behavior (Gatner, Douglas, & Hart, 2016; Hanniball, Gatner, Douglas, Viljoen, & Aknin, 2019; Miller, Crowe, Weiss, Maples-Keller, & Lynam, 2017; Vize, Lynam, Lamkin, Miller, & Pardini, 2016). In one of only two previous studies using the TriPM in conjunction with the PCL-R, Wall and colleagues (2015) concluded that the Boldness score did not predict Facet 4 beyond the variance explained by ASPD. Being an offender sample, we had a high prevalence of ASPD, suggesting that the association of Boldness level and antisocial behavior might be an artefact of the sample characteristics. However, adjusting for this would be complicated, as ASPD and psychopathy are not distinct and separable conditions, but rather different definitions of a common target group.

5.3 STUDY III: ASSESSING THE RELEVANCE OF SELF-REPORTED ADHD SYMPTOMS AND COGNITIVE FUNCTIONING FOR PSYCHOPATHY USING THE PCL-R AND THE TRIPM

5.3.1 Results

In the third study we investigated if self-reported ADHD symptoms and cognitive functioning could predict specific subcomponents of psychopathy. Zero-order correlations demonstrated that of the variables of interest, only age, self-rated ADHD (ASRS) and IQ were significantly correlated to psychopathy. We therefore excluded the other variables of cognitive functioning from the subsequent path models.

Against our expectations, the results of the path analysis (see Figure 5) showed that IQ did not contribute significantly in predicting the psychopathy scores in any of the models. However, ASRS demonstrated to be a strong predictor of psychopathy in our sample, specifically regarding both total scores as well as impulsive lifestyle (Facet 3), antisocial

behavior (Facet 4) and TriPM Meanness and Disinhibition. Interestingly, ASRS did not demonstrate any significant associations to interpersonal (Facet 1) or affective functioning (Facet 2), nor to TriPM Boldness.

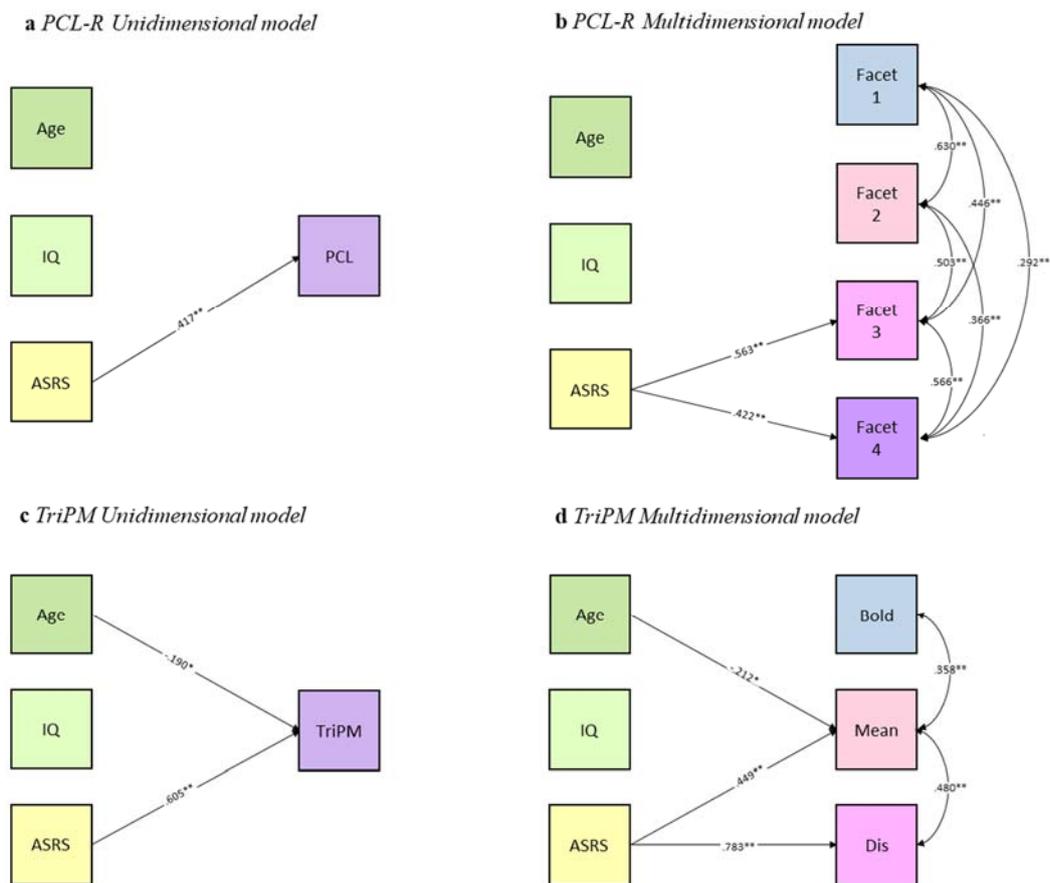


Figure 5. Standardized path-analytic model results showing significant estimates of the associations of psychopathy with ASRS and IQ using age as a control variable.

5.3.2 Discussion

In accordance with the main hypothesis of this study, we found that self-reported ADHD symptoms were associated with PCL-R impulsive lifestyle and antisocial behavior as well as TriPM Disinhibition scale. Unexpectedly, we also found that TriPM Meanness was associated with ASRS. Nevertheless, the same finding was found in one previous study (Machado, Rafaela, Silva, Veigas, & Cerejeira, 2017). It is possible that impulsivity and hyperactivity not only increase the risk of antisocial behavior, but that it can also increase the risk of cruel and reckless behavior. Furthermore, we expected cognitive functions to be associated with psychopathy. This was not supported in the results. Although IQ was significantly correlated both to PCL-R total score and Facets 3 and 4, as well as TriPM total score, Disinhibition and Meanness, the path analytic models showed that IQ was not associated with psychopathy when accounting for ADHD symptom load.

Surprisingly, we found that ADHD symptoms were not associated with cognitive functioning in our sample, meaning that those who rated themselves as having a large ADHD symptom

burden, did not perform worse on the cognitive tests compared to the rest of the group. The explanation for this might be that the participants that demonstrated symptoms of ADHD are not representative of ADHD patients in general, but that they constitute a subgroup of antisocial individuals high on impulsivity and hyperactivity, but with less problems with attention. That said, the high covariation of self-rated ADHD symptoms and measures of psychopathy, as demonstrated in this study, is problematic. Even though ADHD and psychopathy seem to share a common underpinning of impulsivity (Retz et al., 2013), it does not seem clinically useful that instruments supposedly measuring separate constructs, actually demonstrate a sizeable shared variance.

5.4 STUDY IV: EXPLORING THE RELATION BETWEEN HIGH-ACTIVITY COMT VAL158MET GENOTYPE AND PSYCHOPATHY IN MALE OFFENDERS

5.4.1 Results

In the fourth and last study we investigated if COMT genotype could be identified as significant in the risk pathway of ADHD and antisocial behavior in our sample. When comparing the allelic frequency in our study sample with a cross-section of the Swedish population through the SweGen dataset we found no significant differences, meaning that we found no evidence that Val homozygosity (high-activity COMT genotype) was overrepresented in our sample. Neither did we find any significant differences regarding psychopathy, ADHD symptoms or cognitive functions when comparing the genotype groups in our sample. We therefore did not proceed to investigate possible mediating pathways.

5.4.2 Discussion

We found no support in our sample for the findings from other studies that Val homozygosity might be a risk factor for antisocial behavior in ADHD (Caspi et al., 2008; Langley et al., 2010; Monuteaux et al., 2009; Qian et al., 2009; Salatino-Oliveira et al., 2012; Thapar et al., 2005) nor for psychopathy (Fowler, Langley, Rice, van den Bree, et al., 2009). Neither did we find support for the observation that it might instead be the low-activity Met allele that is of interest in offender populations (Cuartas Arias et al., 2011; DeYoung et al., 2010). However, the lack of evidence for these findings in our sample might be due to the fact that our sample was not constituted of ADHD patients (i.e. the prevalence of ADHD was too low to detect an effect) and also, the use of self-rated ADHD symptoms might be a too unspecific measure. In addition, as the effect of a single SNP is likely to be low (Chabris et al., 2015), it is probable that we had too limited power. That said, the results indicate that it is doubtful that psychopathic personality traits can elucidate the risk path way of Val homozygosity, ADHD and antisocial behavior.

6 GENERAL DISCUSSION

The overall aim of this doctoral project was to contribute to enhanced assessment methods of psychopathic personality and add to the knowledge of the construct of psychopathy. As implied by the title of the thesis: *Delineating the construct of psychopathy: psychometric evidence of alternative models of psychopathy*, my main interest has been to investigate the content and outer boundaries of the psychopathy construct, and also to learn more about what is needed to find reliable and useful measures.

The idea of what psychopathy is, and what it is not, differs from scholar to scholar, contributing to a sometimes rather infected debate. The CAPP and the triarchic models are both examples of attempts to reconcile different view-points and conflicting ideas. However, my impression is that they work in two traditions. The developers of the CAPP work in a clinical tradition, with the starting point of psychopathy as a personality disorder, albeit a dimensional construct. The developers of the TriPM, on the other hand, seem to take on a more experimental tradition, often using community populations (i.e. mainly student samples).

Outlining the conflicting perspectives on psychopathy, is the debate around the construct of boldness (cf. Lilienfeld et al., 2012; Lynam & Miller, 2012; Marcus, Fulton, & Edens, 2013; Miller & Lynam, 2012) and the corresponding construct of fearless dominance (FD; Lilienfeld & Andrews, 1996). Some authors argue that boldness encompasses adaptive features such as social assertiveness and emotional resilience, that are important for distinguishing psychopathy from antisocial personality disorder, and that it is in the combination of boldness, with the adaptive traits of disinhibition and/or meanness that the full clinical picture emerges (Lilienfeld et al., 2012; Patrick, 2018). However, other authors discuss that it is difficult to reconcile the idea of an adaptive component as essential to a construct that is targeting a fundamentally disabling condition (i.e. personality disorder; Lynam & Miller, 2012; Miller & Lynam, 2012) and conclude that boldness is neither essential nor sufficient for psychopathy, but might be thought of as a diagnostic specifier.

Patrick (2018) argues that high disinhibition might be sufficient to explain a clinical manifestation akin to secondary psychopathy, but that boldness is key to understanding the paradox of a superficial veneer of functionality (masked psychopathology) described by Cleckley (1941/1955). This means that high boldness, when combined with high disinhibition, results in a clinical profile of externalizing behavior problems (i.e. impulsivity, substance abuse, and antisocial behavior), but with the absence of anxious-depressive tendencies, contrasting to most individuals with these behavioral problems (e.g. ASPD, secondary psychopathy).

However, a problem with this line of arguing, in my opinion, is that there is a dearth of studies of psychopathic configurations in individuals actually manifesting psychopathy using the triarchic model (or similar models, e.g. the Psychopathic Personality Inventory; Lilienfeld & Widows, 2005). Instead, the majority of studies use normal population samples, where

there is a low prevalence of psychopathy. Moreover, several recent studies dispute that boldness and similar constructs add to the prediction of externalizing outcomes (e.g. antisocial behavior; Gatner et al., 2016; Hanniball et al., 2019; Miller et al., 2017; Vize et al., 2016). Hanniball and colleagues (2019, p. 349) argue that: “if Boldness does index the so-called adaptive variant of psychopathy, it would seem imperative that the domain interact with the antisocial components of the disorder to predict or intensify maladaptive outcomes. Without such evidence, it is unclear why a constellation of traits that predict healthy adjustment should play a central role in understanding one of the more severe and dangerous personality disorders”. Another viewpoint, however, is that boldness is not an adaptive component in psychopathy, per se, but that individuals high on disinhibition and/or meanness make use of their bold personality traits in making them more apt at conning and deceiving others (Lilienfeld et al., 2019b; South, 2019): “That is, boldness does not become maladaptive, rather the antagonistic and disinhibited person can use boldness to accomplish his or her aims” (South, 2019, p. 638).

Nonetheless, as discussed in Blonigen (2013), traits like assertiveness, charm and grandiosity are important in both classical and contemporary clinical accounts of psychopathy by reason that clinicians see it as an important aspect of what psychopathy is. He argues further that it is essential not only to focus on specific findings of available instruments, but to keep the theoretical constructs that the instruments were supposed to capture in mind. The problem might be that the intended construct is not properly measured – thus it could be ill-advised to refute the importance of boldness due to a lack of evidence from currently available instruments. Moreover, it is possible that the associations between boldness/FD and maladaptive outcomes are curvilinear, meaning that it is in essence an adaptive trait, but only to a certain point (Blonigen, 2013). The results from Study II indicated that the Boldness score had a unique value in predicting the PCL-R score, and as expected, it was associated with the interpersonal deficiencies targeted in the PCL-R, but also with antisocial behavior. This result might indicate that the traits of fearlessness, assertiveness and social poise, although plausibly an adaptive trait in general, might increase the risk of antisocial behavior in certain groups.

Similarly, there is a discussion about whether to treat psychopathy as a syndrome, that is a constellation of observable and subjective signs or symptoms that covary, or a compound trait, that is a configuration of largely independent symptoms that combine to form a malignant condition. If indeed it is a compound trait, as argued by some researchers (cf. Lilienfeld, 2013; Lilienfeld et al., 2016; Marcus, Edens, & Fulton, 2013; Marcus, Fulton, et al., 2013), omitting items on account of lack of convergence may be misguided. A novel proposition that has sprung from this discussion, is that some personality disorders might be more accurately conceptualized as *emergent interpersonal syndromes* (EISs; Lilienfeld et al., 2019a), meaning a constellation of indicators, which when in conjunction, and only then, leads to distinctive effects on other traits or behavioral patterns; in this case the effect that these individuals exert on other people. Emergent refers to that these syndromes are perhaps not reflecting an additive combination of traits, but rather properties that arise from specific

configurations of traits in the sense of statistical interactions. Using only trait-based models will not capture these types of personality disorders. Instead, prototype-based models are needed, as some personality disorders reflect more than the sum of their parts. Lilienfeld et al. (2019a) further argues that it is actually the fact that the specific configuration of these traits is rare in the general population, that results in a particularly problematic clinical manifestation; because of this combination of traits being unexpected it may be confusing or misleading to others. However, others have pointed out that although this proposition has merits, the EISs approach also has its caveats. Judging from available research, possible interactions are likely to explain only a small proportion of variance compared to the main effects of each trait (Benning & Smith, 2019) and furthermore, the empirical support for this thesis is slim (South, 2019).

My viewpoint is that for the psychopathy construct to be of clinical interest, it should capture a clinically meaningful phenomenon, that is essentially a personality disorder of psychopathic type. As Lilienfeld and colleagues discuss: “Psychopathy, like other PDs, is a complex constellation of traits in multidimensional space, and the decision of how we partition this space in accord with differing PD labels is partly a function of the pragmatic purposes these labels serve for us as observers” (Lilienfeld et al., 2019b, p. 647). For me, this leads back to the general criteria of personality disorder, signifying that the personality patterns are dysfunctional and disabling. This means that we cannot simply infer from community samples what psychopathy is and what it results in, but we also need to study this in samples where this disorder is present. However, it does not necessarily mean that the models we use should be categorical (e.g. the DSM-5 model of PD). There is evidence that dimensional models of personality disorder have greater clinical utility (e.g. Bornstein & Natoli, 2019). Furthermore, we should not use these labels to refer to reasonably functional individuals, even if they are unpleasant. So, is your boss a psychopath? No, most probably, he or she is not.

In this thesis, four alternative measurement models of psychopathy have been mentioned. The first is ASPD, although not an explicit measure of psychopathy it is the variant that is recognized in the diagnostic classification systems used in the general psychiatric field. The draw-back of this model is that a categorical and unspecific label of externalizing and antisocial behavior has limited clinical value in the forensic field. The PCL-R was partly developed in response to this. Although initially developed according to psychometric principles (i.e. evaluating the psychometric properties to adjust the instrument), in the following years, as the instrument was established as the standard measurement of psychopathy, the evaluation process has apparently cemented.

The new models that we used in the current project, the triarchic model and the CAPP, can hopefully contribute to revitalizing the study of psychopathy. However, to my knowledge, the TriPM has not been evaluated according to standard procedures of psychometric evaluation with the aim of presenting a psychometrically sound measure of their theoretical model. There are no studies evaluating the content validity evidence, and few investigating the structure validity. Available studies indicate that the items of antisocial behavior included in

the TriPM should preferably be revised (Roy et al., 2020; Shou et al., 2018; Sleep et al., 2019). In addition, the influence of antisocial behavior patterns, which is generally a poor diagnostic indication for reasons of being too unspecific, might amplify the overlap of the Disinhibition and Meanness scales, while diluting the associations with Boldness.

Similarly, the results from our studies might put in question what the Meanness scale actually measures. Looking to zero-order correlations of TriPM Meanness and PCL-R Facet 2 (affective functioning), the associations were moderate. Even though the regression models demonstrated that there was a unique association of Meanness and Facet 2, these measures seem to capture slightly different constructs. One explanation might be that what Facet 2 measures is not equivalent to meanness. This is supported by the fact that TriPM is more obviously associated with empathy (as measured by IRI) and NEO agreeableness in our sample. Moreover, the PCL-R was initially developed to measure a unidimensional construct, and the facets were derived subsequently from factor analysis of empirical data. That means that the Facet 2 was not explicitly developed to capture a similar construct to meanness and what it measures depends on the available items. Interestingly, as Facet 2 did not correlate very strongly to empathy or agreeableness in our data, it is possible that it is the PCL-R that fails to capture vital aspects of the affective deficiencies associated with psychopathy.

The developers of the CAPP model started from another perspective, evaluating the content of the theoretic model before using the model in clinical studies. Hopefully, they will proceed to use the results of available research to improve the measurement, but as of yet the CAPP model has not been revised. In study I, we found that some of the CAPP symptoms were not considered typical of psychopathy. Possibly, some of the items could be more representative of ADHD (e.g. Lacks concentration, Lacks planfulness) and to my view would be candidates for revision.

On that note, the associations and diagnostic overlap of psychopathy and ADHD have been a recurrent theme in this thesis. Approximately one third of the participants reported that they were diagnosed with ADHD, which is comparable to (although lower than) studies of ADHD prevalence in the Swedish correctional services (Billstedt & Hofvander, 2013; Ginsberg et al., 2010). However, when taking a step back and reviewing the prevalence rate these figures are remarkable, especially compared to an estimated prevalence of 2.5 % in a normal adult population (e.g. Simon et al., 2009). Furthermore, 14 % of our participants had a prescription for central stimulants, compared to the normal population where 1.5 % in the ages 5 to 64 medicated for ADHD according to the Swedish National Board of Health and Welfare (2018). A previous study from the Swedish Probation and Prison Services revealed that 4 % of all inmates in custody and prison were medicated for ADHD (Lundholm, 2014). Although our sample is not representative of all prison inmates in Sweden, the medication level is high compared to what we would expect. One explanation might be that Swedish Probation and Prison Services made an effort to increase the number of ADHD assessments within the services in the years 2013-2016 (Kriminalvården, 2017), which could have resulted in an increase of awareness and improved care of ADHD patients within the services. That is

indeed a good thing, as proper medication has been shown to be beneficial for this groups functioning and well-being (Ginsberg et al., 2012; Ginsberg et al., 2015; Konstenius et al., 2014), as well as lessen the risk of reoffending (Chang, Lichtenstein, Långstrom, Larsson, & Fazel, 2016; Lichtenstein et al., 2012).

Nevertheless, when diagnosing ADHD in a correctional context, where the prevalence of psychopathic traits and substance abuse is high, we need to assess carefully the underlying clinical condition and evaluate the impact of personality problems and substance abuse. Stokkeland and colleagues (2014) found that of prisoners referred for ADHD assessment, although 74 % reported symptoms equivalent to ADHD, only 35 % were considered to meet the full criteria after a comprehensive assessment, including information from collateral sources. This illustrates that we need to have clear definitions of the constructs we want to measure as well as measures capturing the specific clinical mechanisms driving the behavior. That means not simply ticking off a list of broad behavioral indicators, but to make thorough assessments.

6.1 ETHICAL CONSIDERATIONS

The most important ethical concern for this work is the dilemma of conducting research on people in detention. Being incarcerated has a profound effect on one's autonomy, and this can also have an effect on the perceived option of declining participation. Participating in the project was time-consuming but for the most part not associated with any discomfort with the exception of the blood sample for the genetic analysis, which to some could be uncomfortable, however transient. Participating in neuropsychological testing might be perceived as stressful. However, tests were performed by experienced clinical psychologists used to creating a calm and positive atmosphere in the test situation, in which most participants feel rather at ease and perceive it as a positive or at least neutral experience. Participants were given a small compensation for their participation and were allowed to leave their work assignments in order to participate in the study. Even though this is an encouragement for participating, we judge that the compensation was not so large that it would constitute an unduly persuasion for the participants.

It should be mentioned that we only included male participants, which is of ethical concern especially as psychopathy in women is under-studied. The lower prevalence rates of psychopathy in women, and the under-representation of women in correctional services are obstacles for research. Unfortunately, we did not have the time or resources to challenge those obstacles. In study I however, we investigated gender-based perceptions of psychopathy. Even though this was not a clinical study, discussing the psychopathy construct from a gender perspective is an important first step to finding an empirical base for psychopathy in women.

All data are presented on a group-level and no individuals can be identified in the presentation of the results. In terms of data management, all personal and identifiable

information was recoded, and all identifiable data is held in a locked archive room at the National Board of Forensic Medicine, where only members of the project group have access.

All studies have been approved by the Regional Ethical Review Board in Stockholm, reference number 2014/1192-31/1 and amendment reference number 2017/392-32/1.

6.2 LIMITATIONS

In **Study I** we investigated the content validity using prototype methodology. Although useful for investigating the theoretical content of a model or instrument, it is a descriptive analysis and cannot be used to say what psychopathy is or is not, but to discuss what elements seem to match the perceptions of what is typical for the construct. Furthermore, the participants were correctional officers without special expertise in the psychopathy field.

Study II-IV are based on a cross-sectional material. All participants were men with both parents born in Sweden and limited to high security prisoners. Although this reduces some potential confounding factors (gender and ethnicity), and ascertained that we had an adequate dispersion in relevant variables, this also limits the generalizability of the results. Despite the fact that we had a reasonable participation rate (67 % of all invited to participate), it is possible that there was a selection effect, meaning that those agreeing to participate were not representative of the total group. The sample size was adequate for the planned analyzes in **Study II** and **III**, but for the purposes of **Study IV** it was probably too small to detect an effect of the magnitude that is likely to result from a single SNP.

Regarding the PCL-R, due to limitations in time and resources, we did not use a second rater and could therefore not calculate inter-rater reliability, which is generally expected in the field. The TriPM is a self-rating instrument which limits the usefulness of the measure to what the participants are willing and able to divulge of themselves. As the results of **Study II** demonstrate, the TriPM has some psychometric weaknesses that would preferably need to be addressed. Accordingly, this limits the possibility to draw stringent conclusions from it as a measure of psychopathy, as used in **Study III** and **IV**.

We used ASRS to assess ADHD symptoms and also asked the participants if they had ever been diagnosed with ADHD. Even though this is an indication of the prevalence of ADHD in our sample, we but did not confirm this with either clinical assessments or in file materials or registers. This limits the possibilities to draw firm conclusions of the impact of ADHD in **Study III** and **IV**. In **Study II**, as we used the short version of NEO to measure the FFM, we could not assess the sub-factors of each domain, which would have been of interest.

Lastly, regarding **Study III** and **IV**, only half of the participants were included in neuropsychological testing. In addition, we used a slimmed test battery, estimating IQ from two tests, which is not equivalent to a full-length IQ test. In addition, the choice of using well-known tests developed for clinical use, instead of more experimental and specific cognitive tasks, might have resulted in limited possibilities of capturing relevant deficiencies. As the sample where we had genetic data was even more limited due to technical limitations

of the genetic analysis, we would have needed a larger sample to be able to make the planned comparisons regarding cognitive testing in **Study IV**.

6.3 REFLECTIONS AND FUTURE RESEARCH

It is of great importance to gain more knowledge about psychopathy and associated difficulties. Psychopathic individuals often pose a high strain on society in terms of criminality in general and violence in particular. It is therefore vital that we have a good understanding of how to best define and identify these personality traits, and also if there are other difficulties associated with psychopathy that could be targeted in preventive measures. Furthermore, a better understanding of the associations of psychopathy and ADHD can lead to more reliable differential diagnosis of ADHD in individuals with psychopathic traits, enabling us to give the right treatment to the right person.

Incarcerated individuals are often burdened by multiple problems, such as diverse psychiatric problems and substance abuse, in addition to having trouble adhering to the protocol in normal population studies, and are therefore often excluded from research. It is none the less important to conduct research on the specific problems affecting this group. As psychopathy is a low prevalence disorder, and as these traits entail a higher risk of being excluded, dropping out or being difficult to include in a study conducted in the normal population, it is thus important to conduct these studies in the forensic context, where these individuals are more easily identified and recruited.

For future studies it would be of interest to investigate the CAPP model in clinical samples. Furthermore, regarding the findings from the cross-sectional studies, we used an all-male sample. More knowledge of the psychometric properties of the TriPM, as well as the clinical presentations of psychopathy and ADHD in female samples is still needed. In addition, evidence of the measurement model of the TriPM is sparse. Therefore, I would be curious to pool our data with other clinical samples, to be able to investigate the internal structure. Moreover, with a larger sample at our disposal we would be able to explore if the psychometric properties could be improved by excluding the more problematic items.

Lastly, a point a bit further from the scope of the current work, it would be of clear interest to delve further into the observations of correctional staff regarding psychopathic individuals. We initially planned to use CAPP staff-ratings of the participants psychopathic traits. Although we did obtain an adequate number of ratings, we noted that unreasonably many of them were rated as very low, and were forced to conclude that the ratings were not reliable as a description of the participants. This might indicate that even though correctional staff seem to view the CAPP model as indicative of psychopathy, they might not be identifying these same traits in the inmates they are caring for. If indeed correctional staff are not observant of psychopathic traits in the inmates, they risk being more susceptible to manipulations. Consequently, that might lead to the needs of psychopathic inmates not being met, and it might also jeopardize risk-reducing measures.

6.4 CONCLUSIONS

In conclusion from this work, both from the covered literature and from the studies included in the thesis, I would like to point out some major points:

- Psychopathy is a complex and multifaceted phenomenon and it is still unclear how it should be defined and measured.
- The advantages of the CAPP model are that it is comprehensible and based on personality traits rather than broad behavioral indicators. Furthermore, it is perhaps the currently most promising model for capturing psychopathy in women.
- The advantage of the TriPM is that it is an efficient measure of psychopathy, that might be useful for research and screening purposes. However, the psychometric properties could be improved. Moreover, it might be less useful for the clinical assessment of psychopathy.
- Both the PCL-R and the TriPM are saturated with behavioral indicators of impulsivity and antisocial behavior. That might result in making it more difficult to distinguish psychopathic traits from ADHD in offenders.
- To avoid over-diagnosing ADHD in offenders we need to be sure the diagnosis is based on a thorough assessment, including confirmation from collateral sources and with careful consideration of other possible disorders that could possibly explain the clinical presentation better.

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