Validation of the Psychopathy Checklist Short Version in Autistic Adults Detained Under the Mental Health Act, 1983.

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Research Summary

Background and aims: Limited understanding exists regarding the relationship between autism and psychopathy, especially within the criminal justice system. A systematic review was completed which aimed to better understand the relationship between psychopathy and autism, and to describe the clinical manifestation of the two constructs when they co-occur. This highlighted that co-occurring autism and psychopathy leads to additional empathic impairment. However, studies were characterised by measurement difficulties, underscoring the need for improved methods for identifying psychopathic traits in autistic individuals. The Psychopathy Checklist Short Version (PCL:SV) is a brief measure of psychopathy. This study sought to validate the PCL:SV within autistic adults detained under the Mental Health Act, 1983, by examining construct, predictive and convergent validity.

Method: Secondary data analysis was completed using data from 282 autistic adults, detained in secure psychiatric care. Reliability and validity were investigated using regression, receiver operating characteristic curves and correlation analysis.

Results: High reliability and construct validity was found, particularly for PCL:SV Total and Factor 1. Higher PCL:SV scores were associated with a decreased likelihood of discharge and increased likelihood of negative/no change across security wards, which can indicate treatment progress. Predictive validity for aggressive or problematic behaviours was limited, although significant area under the curve results were observed for several specific behaviours. Factor 2 was the strongest predictor of aggressive or problematic behaviours. The measure correlated as expected with other risk assessment tools.

Conclusions: Accurate measurement of psychopathy in autistic adults within forensic pathways will support the development of appropriate care pathways for individuals at risk of committing violent crimes. This study provides preliminary evidence for the use of the PCL:SV with autistic adults detained under the Mental Health Act, 1983, but caution is warranted until further research is completed, including confirmatory factor analysis and Rasch analysis.

Chapter 1: Introduction

Overview

The focus of this research is upon both autism and psychopathy. To start, an overview of these two conditions, their aetiology, and how they relate to offending behaviour is provided. The 'double hit' hypothesis is introduced which posits that when a person presents with both conditions their behaviour phenotype is altered. A systematic review is then presented which aimed to explore the existing research and better understand the relationship between psychopathy and autism. The focus was upon empathy as both autism and psychopathy are associated with disordered empathy. Specifically, the aim of the systematic review was to: (a) better understand the relationship between these two constructs, and (b) describe the clinical manifestation of the two conditions when they co-occur. The systematic review results highlighted gaps in our understanding of both autism and psychopathy when they co-occur and the need for studies investigating the validity of the psychopathy screening measures, such as the Psychopathy Checklist, Short Version (PCL:SV), with autistic adults. Lastly, the chapter outlined the research aims which are based upon the results of the systematic review.

Autism

Autistic spectrum disorder (ASD) is a neurodevelopmental disorder characterised by deficits in social communication skills and restricted or repetitive patterns of behaviour or interests, present since the early developmental period (World Health Organisation (WHO), 2022). The International Classification of Diseases (ICD-11) outlines how deficits in social communication skills may present as limitations in verbal or nonverbal communication (WHO, 2022). For example, impaired verbal communication may include a reduced ability to initiate or sustain reciprocal conversation, whilst impaired non-verbal communication may present as reduced eye contact, fewer gestures, limited facial expressions and body language. Other symptoms listed in this category include a lack of shared interests with others and difficulty imagining or responding to the emotional states of others. The ICD-11 outlines numerous ways in which restricted or repetitive behaviours or interests may present, including as an inability to adapt to new experiences, inflexible adherence to routines and

rules, ritualised patterns of behaviours (such as a pre-occupation with lining up objects in a specific way), repetitive or stereotyped movements (such as rocking or hand flapping) and persistent pre-occupation with one or more special interests (WHO, 2022). Additionally, autistic individuals may experience hyper or hyposensitivity to sensory stimuli.

Autism prevalence in the general population is currently estimated as one in 100 (Zeidan et al., 2022), although there is some suggestion that rates are rising, perhaps due to changes in diagnostic criteria as knowledge of autism continues to develop, and case recognition improves (Yates & Le Couteur, 2016). Autism has traditionally been viewed as a predominantly male condition, although trends suggest decreasing male predominance (Lai et al., 2015). Whilst the male to female ratio has previously been estimated at 4:1, a meta-analysis found a male to female ratio closer to 3:1 in autistic children, noting a diagnostic gender bias as potential a contributory factor (Loomes et al., 2017). Autism occurs in all racial, ethnic, and socioeconomic groups but identification varies across race and ethnicity, and white children are consistently identified as having autism more frequently than black or Hispanic children (Baio et al., 2018). Improved outreach work has resulted in decreasing discrepancies but stigma and lack of access to appropriate healthcare services remain as likely barriers to accurate identification of autism in minority ethnicities.

Autism is a highly variable disorder with symptoms presenting differently in everyone (Masi et al., 2017). In early versions of the ICD, autism was characterised as a pervasive developmental disorder including 'childhood autism', 'Asperger syndrome' and 'atypical autism' (WHO, 1993). However, this was changed to ASD with or without language delay or intellectual disability within ICD-11 to capture the spectrum nature of the disorder (WHO, 2022). As a spectrum disorder, autistic people exhibit a full range of intellectual functioning and ability. Prevalence studies suggest approximately 31% of children with ASD have co-morbid intellectual disability (IQ <70) and a further 25% have an IQ in the borderline range (IQ 71 to 85) (Baio et al., 2018). Additionally, autistic traits can be viewed across a continuum from subclinical (typically developing individuals in the general population) to clinical, with individuals at the extreme end of the spectrum representing 'disordered functioning' (Abu-Akel et al., 2019). For diagnosis, deficits must be severe enough to cause impairments across domains such as family, personal, social, educational, occupational or other important areas (WHO, 2022). Although symptoms must be present from the developmental period, symptoms may not become apparent until later in life when

the social demands exceed an individual's capabilities (WHO, 2022). There are a range of diagnostic tools available, but the Autism Diagnostic Observation Schedule (ADOS) (Lord et al., 2021) and Autism Diagnostic Interview-Revised (ADI-R) (Rutter, Le Couteur, et al., 2003) are generally considered the gold standard tools and are typically used in conjunction with one another (Falkmer et al., 2013).

Autism is commonly associated with comorbid psychiatric problems which can lead to impaired quality of life (Lai et al., 2019). Pooled prevalence estimates in a meta-analysis found comorbidity rates of 28% for attention-deficit hyperactivity disorder (ADHD), 20% for anxiety disorders, 13% for sleep disorders, 12% for disruptive, impulse control and conduct disorders, 11% for depressive disorders, 9% for obsessive compulsive disorder (OCD) and 5% for bipolar disorders (Lai et al., 2019). Russell et al. (2016) found 58% of autistic adults also met criteria for one or more comorbid psychiatric diagnoses, which exceeded general population rates for multiple conditions, including psychosis, and anxiety disorders. This highlights the need for comprehensive assessment of autistic people, paired with evidenced based practice to meet their needs.

Aetiology of Autism

Some of the first descriptions of autism were detailed by Leo Kanner in 1943, based upon his observations of 11 young children who presented in his clinic. He documented their difficulty in forming relationships with preference for solitude, unusual language development marked by difficulties in learning communicative aspects of speech, echolalia, literal interpretation, as well as repetitive behaviours with insistence on routines and sensory sensitivities. Around the same time, Hans Asperger (1944) described some of his original patients using the term 'autistic psychopathy'. Like Kanner's (1943) work, Asperger (1944) documented difficulties in social understanding and communication; however, his focus was on older children with a broader range of intelligence. Perhaps because it was published in German at the time of World War Two, Asperger's (1944) work was not widely read at the time of publication and only became widely read after Lorna Wing redefined this work in 1981, naming it 'Asperger Syndrome', removing the association with psychopathy (Masi et al., 2017).

Within his early work Kanner (1943) observed a lack of 'warmheartedness' in the family relationships and parenting of his patients, although this was described merely as an observation without placing blame on any aspect of parenting. The echoes of this observation resurfaced in one of the earliest theories of autism, presented by Bruno Bettelheim (1967). Bettelheim (1967, as cited in Cook & Willmerdinger, 2015) suggested that emotionally cold parenting, particularly by mothers, was the primary cause of autism, theorising that lack of emotional warmth and attachment during early childhood led to a child's withdrawal into a self-enclosed world. This was known as the 'refrigerator mother' theory, placing blame for autism largely upon mothers (Cook & Willmerdinger, 2015).

Bettelheim's (1967) work has since been widely discredited (Cleary et al., 2023) and research into the cause of autism has been ongoing since these early descriptions were published. Although many theories exist, there is currently no single agreed upon cause. Genetic factors play a role in the development of autism as evidenced by twin studies and family studies showing that siblings of autistic people are at increased risk of diagnosis, with diagnosis rates of 12.9%, compared to 1.2% amongst those whose siblings did not have autism (Sandin et al., 2014). Sandin et al. (2014) found that risk of autism diagnosis increased with increasing genetic relatedness, with heritability of autism estimated at 50%, suggesting that genetic factors explain half of the risk for autism. Neuroimaging studies have also found abnormalities in brain functioning in autistic individuals, for example, Baron-Cohen et al. (2000) used functional magnetic resonance imaging (fMRI) to show differences in amygdala (commonly associated with social functioning) activation in autistic and non-autistic individuals during a mentalisation task.

Additionally, there are many cognitive theories of autism which attempt to explain the presence of symptoms. One of the first suggested cognitive theories of autism, the 'mindblindness theory' proposed that autistic children have delayed theory of mind (ToM) development (Baron-Cohen, 1995). Theory of mind refers to the capacity to identify and attribute mental states in others, enabling effective social communication. Autistic individuals may struggle with this skill, leading to difficulties understanding other people's behaviour and potentially causing deficits in empathy. Whilst this theory makes sense of the social and communication difficulties in autism, it does not account for the non-social features. To account for this shortcoming, the 'empathising-systemising' theory was developed (Baron-Cohen, 2009). According to this theory, social and communication deficits in autistic

individuals are due to a low tendency to emphasise, whilst the restrictive or repetitive patterns of behaviour are driven by high tendency to systemise. Systemising refers to the drive to identify patterns, rules or regularities that govern a system, to understand how the system works and predict what it will do (Baron-Cohen & Lombardo, 2017). Other theories of autism include the 'weak central coherence' theory (Frith & Happe, 1994) and 'executive functioning disorder' hypothesis (Pennington & Ozonoff, 1996). The 'weak central coherence' theory suggests that autistic people struggle to draw together diverse information to construct high level meaning, instead becoming fixated on details. The 'executive functioning theory' proposed that autistic people have difficulty with executive functioning skills such as planning, organising, and inhibiting responses. Research into the causes of autism remains ongoing.

Autism and Offending Behaviour

Prevalence of autism within the criminal justice system (CJS) is debated. In their recent systematic review, Collins et al. (2022) reported that criminality rates amongst those with autism ranged from 0.2% (Newman et al., 2015) to 62.8% (Bleil Walters et al., 2013) depending on the country, setting, age and type of offence. Whilst these figures indicated an overrepresentation of autism amongst offenders, they concluded that actual prevalence remains unknown due to methodological limitations and biased samples impacting the reliability of conclusions (Collins et al., 2022). Other studies have shown that autism is not overrepresented in forensic populations across both adult (Underwood et al., 2016) and youth populations (Yu et al., 2021).

Regarding offence type, Collins et al. (2022) reported that autistic people committed varied offences including arson, property crime, sexual offending, drug offences, stalking, theft, and robbery; however, they were less likely to have a lifetime history of violence or sexually inappropriate behaviour, less likely to have a forensic history, and had fewer previous convictions than non-autistic offenders. Risk factors for offending in autistic individuals included being male, single, not having children, poor educational attainment, unemployed, poor social networks, substance misuse and victimisation, but it is unclear if this differs to non-autistic offenders as few studies used comparison groups to explore this (Collins et al., 2022).

Research focusing on high security psychiatric hospitals (HSPH) has shown increased prevalence of autism (Murphy, 2020). High security psychiatric hospitals represent the highest level of secure psychiatric care available in the UK, providing treatment for adults with a range of mental disorders including and including those with intellectual disability and autism. Within HSPH in England, previous prevalence rates of autism have been estimated at 2.3-2.4% (Hare et al., 1999; Scragg & Shah, 1994), notably higher than in the general population. Slightly increased prevalence rates of autism in offenders have been identified in maximum security prisons elsewhere, for example, 2.97% in Portugal (Loureiro et al., 2018) and 4% in America (Fazio et al., 2012). When looking specifically at violent crimes, Allely et al. (2017) reviewed mass shootings in USA and found that eight percent of perpetrators had autistic traits. Findings such as this can make it easy to assume a causal link between autism and violence. However, findings must be interpreted with caution as studies often use screening tools to look at traits of autism which does not equate to a diagnosis (such as in Fazio et al., 2012). Similarly, the review by Allely et al. (2017) was conducted based on evidence from a flawed partial database of mass shootings, which they note as a substantial limitation to the study. Crucially, cross sectional studies cannot establish causal relationships.

Whilst acknowledging the constraints of their dataset, Allely et al. (2017) suggested the importance of considering which other variables may play a role in the link between autism and violence. They concluded that autism may influence, but is unlikely to cause, involvement in violence; however, there may be a small subgroup of autistic people at increased risk of committing serious crime (Allely et al., 2017). Given that most autistic people do not act violently, it is important to consider which factors may have a contributing role. For example, Långström et al. (2009) reported that autistic individuals who had committed violent crimes were more likely to have comorbid psychosis, substance misuse and personality disorder. Autistic people within the CJS are clearly a very highly heterogeneous group and understanding the relationship between autism and violent or offending behaviour is a complex and sensitive task. There is a growing body of research that now focused upon autism and psychopathy which may offer greater insight into this area.

Psychopathy

One of the earliest descriptions of psychopathy came from Cleckley, (1941), in his seminal work, 'The Mask of Sanity', which presented a series of case studies of institutionalised males. Cleckley described the clinical profile of psychopathy as a combination of interpersonal, affective, and behavioural characteristics. Interpersonal characteristics included good intelligence, egocentricity, and superficial charm. Affective characteristics included an inability to experience genuine emotions (despite appearing to react with normal emotions), absence of anxiety, and lack of remorse or shame. Behavioural characteristics included unreliability and antisocial behaviour. Much of this original description remains relevant today, although much of the research expanding on this construct has come from Robert Hare.

Hare (1993) developed Cleckley's (1941) work further and presented 20 features of psychopathy, classified into either interpersonal and affective traits (Factor 1) or antisocial behaviours (Factor 2). He has since described psychopathy as a developmental disorder characterised by callousness, a diminished capacity for remorse and poor behavioural control (Hare, 2016). Like Cleckley's (1941) description, it involves emotional dysfunction, lack of empathy and poor attachments, paired with antisocial behaviour and the persistent violation of social norms. Behaviours may include egocentricity, impulsivity, pathological lying and the use charm, manipulation, violence, and intimidation to control others and satisfy own needs. It was previously suggested that less than one percent of the general population meet the diagnostic criteria for psychopathy (Coid et al, 2009), although figures in the prison population are considered to be much higher – approximately 15-25% (Hare, 1996). More recently, Sanz-García et al. (2021) have estimated prevalence in the general population at 4.5% in their meta-analyses, although they note that this figure lowers to 1.2% when looking specifically at the application of gold standard diagnostic tools. Gender differences in prevalence have also been observed, with males more likely to meet criteria for psychopathy than females in offender (Coid et al., 2009a) and non-offender populations (Coid et al., 2009). Sanz-García et al. (2021) reported that psychopathy prevalence was more than doubled in males (7.9%) compared to females (2.9%).

The development of the Psychopathy Checklist (PCL) (Hare, 1980) and its revised version, the PCL-R (Hare, 1991), has enabled psychopathy to become a distinct and measurable construct. Despite this, psychopathy is not listed as a formal diagnosis in either of

the major classification systems – the ICD-11 (WHO, 2022) or the 'Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision' (DSM-5-TR) (American Psychiatric Association (APA), 2022). Anti-social personality disorder (ASPD) is listed in the DSM-5-TR, with criteria consisting of a pervasive pattern of disregard for, and violation of the rights of others in adults with a history of conduct disorder pre 15 years of age (APA, 2022). This is typically considered as the closest diagnostic category to psychopathy, which is also considered to be a disorder of personality (Ogloff, 2006).

Some research suggests that psychopathy is at the extreme end of ASPD (Coid & Ullrich, 2010) and Hare (1996) acknowledged that whilst most psychopaths will meet diagnostic criteria for ASPD, most individuals with ASPD are not psychopaths. However, Hare, (1996) cautioned against failure to differentiate between the two constructs, stating the need to also consider the affective and interpersonal traits which are critical in conceptualising psychopathy. Specifically, he cautioned paying attention to traits such as egocentricity, deceit, shallow affect, manipulativeness, selfishness and lack of empathy, guilt, or remorse. Hare (1996) argued that some 'construct drift' occurred between ASPD and psychopathy as the personality traits critical to psychopathy conceptualisation are difficult to reliably measure, whilst it is easier to agree on a set of displayed behaviours such as those listed in the diagnostic criteria for ASPD.

Psychopathy is a construct only applied to adults; however, it is considered a developmental disorder and there is a strong link between callous unemotional traits (CUTs) in childhood and adult psychopathy (Frick & White, 2008; Viding & McCrory, 2018). Callous unemotional traits are identified by limited or absent empathy, remorse, shame or guilt, limited concern over poor or problematic performance in important areas such as schooling and shallow expression of emotions (for example, appearing superficial or insincere) (WHO, 2022). These symptoms are closely related to the interpersonal-affective dimension of adult psychopathy (Hare, 1991). Callous unemotional traits in children are increasingly being considered as a developmental pre-cursor to adult psychopathy, with research focused upon this area in efforts to determine appropriate risk assessment and options for early intervention (Viding & McCrory, 2018).

Aetiology of Psychopathy

As with autism, there are multiple theories proposed to explain the development of psychopathy. Research has consistently demonstrated that psychopathic traits are highly heritable, placing some individuals at increased risk of developing psychopathy (see Dhanani et al. (2018) and Mariz et al. (2022) for systematic reviews on this topic). For example, in their large-scale twin study, Viding et al. (2005) reported that CUTs exhibited strong genetic influence. When separating the group to those with high or low CUTs paired with antisocial behaviour, children with antisocial behaviour and low CUTs showed moderate genetic and shared environmental influence, whereas those with high CUTs and antisocial behaviour were found to have strong genetic influence with minimal shared environmental influence (Viding et al., 2005).

In addition to investigating the heritability of psychopathy, research has considered neurological explanations of psychopathy. Neuroimaging studies have paid specific attention to the amygdala due to its association with experience of and perception of emotions, particularly fear and sadness, as well as empathy and conditioned fear acquisition (Marsh, 2016). Other areas of focus have included the ventromedial prefrontal cortex (vmPFC). The vmPFC is critical for reward and value-based decision making and the generation and regulation of negative emotions through its interactions with other brain regions including the amygdala (Hiser & Koenigs, 2018). It also plays a role in multiple aspects of social cognition such as emotion recognition and theory of mind (Hiser & Koenigs, 2018). Blair (2007, 2017) argued that the emergence of psychopathy is linked to impairment across these brain regions due to their role in stimulus-reinforcement learning. Stimulus-reinforcement learning shapes our understanding of 'good' and 'bad' actions, enabling the development of morality based upon other people's responses to our actions. For example, fearfulness in others acts as a powerful reinforcer and stimuli associated with this response is learnt to be avoided. Reduced responsivity to thoughts of causing harm to others or to the response of others may enable psychopathic individuals to make impulsive or manipulative choices without feeling guilt or remorse.

A systematic review of neuroimaging studies by Blair, (2010) demonstrated abnormalities in amygdala functioning in psychopathic individuals and reduced activation of these brain areas has been shown (Glenn et al., 2009; Motzkin et al., 2011; White et al., 2012), along with deficits in processing other's distress (Dadds et al., 2006; Hastings et al.,

2008), and experiencing less personal distress (Jones et al., 2010). Metanalyses have also confirmed that psychopathy impairs the ability to recognise fear in others (Marsh & Blair, 2008; Wilson et al., 2011), as well as reporting that emotion recognition deficits may extend further than this (Dawel et al., 2012). Additionally, impaired affective empathy has been evidenced in psychopathic individuals or those with high psychopathic traits in adults (Lockwood et al., 2013) and children (Jones et al., 2010a).

Results from a systematic review by Johanson et al. (2020) have also implicated many other areas of neural abnormality associated with psychopathy, including reduced grey matter volume and decreased activity in the frontotemporal, cerebellar, limbic and paralimbic regions, prefrontal cortex and temporal gyri. They observed that structurally and functionally, most aberrancies were found in the frontotemporal regions, limbic and paralimbic structures. This may explain aberrant psychopathic behaviour as these areas are commonly associated with executive functioning skills such as self-awareness (Kjaer et al., 2002), emotional regulation and moral judgement (Garrigan et al., 2016, 2017), although a comprehensive understanding of the connectedness of these brain areas and how they impact psychopathy has yet to be firmly established (Johanson et al., 2020).

Early theorists such as Karpman, (1941) proposed that psychopathy can be further categorised into two subgroups – primary and secondary psychopathy. Primary psychopathy is thought to result from largely genetic and biological influences, whilst secondary psychopathy is thought to be more related to adverse environmental factors (such as developmental trauma/maltreatment), suggesting that this is more of an acquired disorder (Yildirim & Derksen, 2015). Although they overlap in personality traits, primary psychopathy is associated with greater emotional deficiency and planned aggression and secondary psychopathy is associated with greater emotional disturbance (in particular anxiety), involving more reactive aggression and impulsivity (Yildirim & Derksen, 2015). This longstanding hypothesis of subtypes defined by differences in emotional states and origins has a growing body of supporting evidence which has been collated into systematic reviews in both adults (Moreira et al., 2020) and children (Craig et al., 2021).

Psychopathy and Offending Behaviour

Although psychopathy is rare in the general population (estimated as up to 4.5%), there is a much higher rate amongst offenders (Sanz-García et al., 2021). Prevalence rates range from 1.9% in female offenders and 7.7% in male offenders (Coid et al., 2009) to over 21% in individuals who commit homicide (Fox & DeLisi, 2019). Psychopathy has long been associated with criminal and violent behaviour and is a key predictor of recidivism (Hare, 1999). Offenders with psychopathy are more likely to commit instrumental crimes; crimes conducted for explicit, future goals, typically lacking victim provocation, and less emotionally driven (Azevedo et al., 2020; Woodworth & Porter, 2002). Psychopathy is also associated with chronic offending (Piquero et al., 2012) and those who engage in criminality at a younger age tend to exhibit higher psychopathy scores (Pechorro et al., 2014). Additionally, psychopathic individuals tend to have a longer offending trajectory of both nonviolent and violent crimes and are at higher risk of re-institutionalisation after release from prison (Porter et al., 1999).

Although convicted for a range of offences from petty crimes to homicide, psychopathic offenders are typically held in high security settings due to the behaviour exhibited once incarcerated (Coid, et al., 2009). For example, psychopathy is associated with intimidation, victimisation and aggressive behaviour towards other prisoners (Coid, 1998) and psychopathic offenders held in institutions are more likely to instigate violent altercations on their peers than non-psychopathic offenders (Thomson et al., 2019). One theory suggests that as psychopathic individuals are both impulsive and require high stimulation, they struggle with the mundane prison environments, becoming bored easily and tend to 'make things happen' (Kiehl et al., 2011). The PCL-R (Hare, 1991), while developed to measure a clinical construct, is widely used as a risk assessment tool, and is particularly useful within the CJS when considering sentencing, placement, treatment options and risk management and monitoring (Hare, 2016).

The relationship between autism and psychopathy

Psychopathy and autism are two distinct clinical constructs however they may share some phenotypical similarities, and both are associated with disordered empathy (Blair, 2005, 2008). Little is known about the co-existence of autism and psychopathy, but considering the

two when they co-occur may enhance our understanding of why some autistic individuals commit aggressive or violent acts. Rogers et al. (2006) found that psychopathic tendencies in autistic boys were not explained by their diagnosis of autism, severity of autistic symptoms, or the core deficits in executive functioning or mentalising. Rather, there can be a representation of both disorders in some people, known as 'the double hit' hypothesis. Individuals with a 'double hit' are likely to have very different needs to those with either autism or psychopathy, rather than both. There is limited research on the differences of autistic people in forensic pathways, making it challenging to consider the most appropriate care pathways for this heterogenous group (Langdon, 2015). Those with autism who present with comorbid psychopathy are a group who may not respond to traditional attempts at rehabilitation and require substantial additional support (Alexander et al., 2016). The relationship between autism and psychopathy will be further explored in the systemic review that follows.

The relationship between psychopathy and autism: a systematic review and narrative synthesis.

Abstract

Background and methods: The aim of this systematic review was to synthesise research examining the relationship between autism and psychopathy to: (a) better understand the relationship between these two constructs, and (b) describe the clinical manifestation of the two when they co-occur. A systematic search of the literature returned 36 studies.

Results: Across all ages, autistic individuals, and those with elevated autistic traits but no autistic diagnoses appeared to have increased CUTs or psychopathy relative to the general population. Several studies evidenced that although both constructs are associated with empathetic dysfunction, the underlying mechanisms differ. In adults, psychopathy/psychopathic traits were associated with diminished affective empathy and intact cognitive empathy, whilst the opposite was seen autistic adults and those with elevated autistic traits. In children, those with autistic traits or a diagnosis of autism had diminished cognitive empathy, but not affective empathy, while the relationship between CUTs/psychopathy and empathy amongst children was less clear. The co-occurrence of autism and psychopathy was seen to lead to additional empathic and cognitive impairment, but findings were mixed making it challenging to clearly describe the clinical manifestation.

Conclusion: There remains a paucity of research investigating the interaction between autism and psychopathy and included studies were characterised by multiple measurement difficulties. Attention should be directed toward developing better methods for identifying psychopathic traits in autistic individuals to advance our understanding of the relationship between autism and psychopathy to allow for the development of appropriate care pathways for this population.

Introduction

Autism, Psychopathy and Criminality

Autism is a neurodevelopmental disorder characterised by social and communication deficits and restricted or repetitive patterns of behaviour (WHO, 2022), with prevalence currently estimated as one in 100 (Zeidan et al., 2022). Aggression is not a core symptom of autism but rates of aggression in autistic children and adolescents range from 25% (Hill et al., 2014) to 53% (Mazurek et al., 2013). This aspect of autism has been growing in interest with research increasingly focusing on the relationship between autism and psychopathy.

Psychopathy is characterised by shallow emotional response, a diminished capacity for empathy or remorse, callousness, and poor behavioural control (Cleckley, 1941; Hare, 1991). Prevalence in the general population is estimated at 4.5%, with a higher prevalence among offenders (Sanz-García et al., 2021). It has long been associated with criminal and violent behaviour and is a key predictor of recidivism (Hare, 1999). Psychopathy can be categorised into primary and secondary psychopathy; primary psychopathy results from largely genetic and biological influences, and secondary psychopathy is related to adverse environmental factors (such as developmental trauma/maltreatment) (Yildirim & Derksen, 2015). Primary psychopathy is associated with increased emotionally stability, fearlessness, and being more self-assured than secondary psychopathy, which is often associated with greater psychopathology. As children and young people are still developing, they are not considered capable of presenting with psychopathy; instead, a precursor is observed, referred to as CUTs (Cardinale & Marsh, 2020).

Whilst the link between psychopathy and criminality is well evidenced (Tharshini et al., 2021), the relationship between autism and criminality is less clear. Collins et al. (2022) reported that criminality rates amongst those with autism ranged from .2% (Newman et al., 2015) to 62.8% (Bleil Walters et al., 2013) within their systematic review, indicating an overrepresentation of autism amongst offenders. Despite this, the review suggested that there is little evidence that autistic individuals have an increased risk of committing crimes, highlighting methodological limitations which impacted the reliability of conclusions. It was hypothesised that social communication difficulties may make autistic individuals more likely to be viewed as risky, encounter the CJS, and receive custodial sentences.

The Role of Empathy

Autism and psychopathy are both characterised by empathic dysfunction which plays a role in their behavioural phenotypes, and whilst they may appear to share surface similarities, the underlying difficulties may differ (Blair, 2008). Empathy involves understanding and sharing others' emotions, thoughts or feelings and can be divided into cognitive (understanding thoughts and feelings) and affective (sharing emotional experiences) empathy (Blair, 2008). It has been proposed that autistic people struggle with cognitive empathy but not affective empathy, whereas the opposite is found within psychopathy (Jones et al., 2010; Lockwood et al., 2013; Schwenck et al., 2012).

Cognitive empathy requires ToM/perspective taking skills, and together with affective empathy both are required when making moral decisions (Garrigan et al., 2018). Autistic people who have difficulties with cognitive empathy may inadvertently cause harm to others due to difficulty interpreting the behaviour of others (Baron-Cohen & Wheelwright, 2004), while individuals with psychopathy are more likely to engage in criminality and have difficulties with affective empathy and emotion recognition, but present with intact ToM skills (Blair et al., 1996; Blair, 2008). Those with psychopathy are thought to have difficulties with recognising aversive emotions in others (e.g., fear and sadness) resulting from deficits in amygdala and orbital/ventrolateral frontal cortex function (Blair et al., 2006) and these difficulties interfere with learning and subsequent avoidance. For example, fearfulness is aversive, and if attenuated, an individual may behave in self-gratifying manner without concern about the consequence as they experience no fear of negative consequences for themselves or others. There is also evidence of difficulties with recognising non-aversive emotions (Dawel et al., 2012) which may be related to difficulties with attention allocation to the eyes of others (Dadds et al., 2011). Diminished affective empathy, paired with the ability to mentalise, enables psychopaths to successfully manipulate others for personal gain (Blair, 2008). This contrasts with autistic individuals who experience aversive emotions if they believe they have caused harm (Baron-Cohen & Wheelwright, 2004). Therefore, although both autism and psychopathy are characterised by empathic dysfunction, behaviour and decision-making are very different and driven by distinct empathetic pathways.

Aims and Rationale

Little is known about the co-existence of autism and psychopathy. Rogers et al. (2006), proposed the 'double hit' hypothesis, whereby autistic individuals may also show additional impairments in empathy, best explained by the presence of psychopathy as a distinct and additional disorder. However, research in this area is limited. Therefore, the aim of the current study was to systematically review the literature to: (a) understand the relationship between psychopathy and autism, and (b) to describe the clinical manifestation of the two constructs when they co-occur. Studies examining this relationship are critical in furthering our knowledge of this small but clinically significant population group and may help to inform the types of interventions appropriate for those who meet the criteria for both constructs, and especially those who encounter the CJS as a consequence of their behaviour. The review will encompass traits of each disorder to reflect the spectrum nature of both constructs. Research on children with CUTs (considered a pre-cursor to adult psychopathy) will be included because early identification can help prevent serious risk through successful early intervention.

Method

This systematic review was conducted according to PRISMA guidelines (Moher et al., 2009) and was registered with PROSPERO (registration number CRD42023413672).

Search strategy

Relevant studies were identified by systematic searching of the following databases: PsychINFO; CINAHL Ultimate; Medline Ultimate. Google Scholar was also searched and backward searching of identified papers was completed. Grey literature was searched through www.opengrey.eu. Initial searches were undertaken in March 2023 and completed in April 2023. Key terms were searched using English and American terminology, spelling, and truncation to ensure that all variant word endings were identified. Search terms were combined using the term *'AND'*, Table 1.

Table 1

Summary of Search Terms

Search Category	Summary of terms
Autism	*Autism Spectrum Disorder OR Autis* OR ASD OR ASC OR Asperger* OR 'Pervasive Developmental Disorder/ condition' OR 'neurodevelopmental disorder' OR Kanner**
Psychopathy	*psychopathy, OR psychopathic OR psychopath* OR CU traits OR callous unemotional*

To ensure searches produced relevant results only, the above search terms were restricted to title only and a further specified term of *'NOT psychopathology'* was included within the title or abstract. This was because initial searches without this clarification produced multiple inapplicable results. Searches were restricted to English language and academic journals or dissertations, in line with the eligibility criteria below, Table 2.

Table 2

Eligibility Criteria

Inclusion criteria	Exclusion criteria
1.Studies investigating the relationship (similarities, differences, shared variance or overlap) between symptoms, traits or characteristics of psychopathy/ CUTs and ASD 2.Clinical or non-clinical sample (for example, traits of ASD and psychopathy/ CU traits and not just formal diagnoses) 3. Articles written in English 4.Articles published in peer reviewed journals and/or grey matter	1.Review articles, editorial/ opinion pieces, book chapters 2.Articles focusing on Antisocial Personality Disorder/ Conduct Disorder or Oppositional Defiance Disorder that do not consider CUTs or psychopathy or a relationship to ASD

Due to limited research in this area, no limiters or restrictions were placed upon study design or study date.

Screening and Article Selection

Article selection was completed by author KM, with 30% of search results also screened by an independent, masked, second rater, with an interrater agreement of 100%. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009) guidance was used to refine studies and can be seen in Figure 1 which details article selection. First, duplicates were electronically removed using EBSCO. Abstracts were then screened against the eligibility criteria and results were rejected which did not meet criteria. This included book chapters or papers not specifically looking at both autism and psychopathy in some manner. Full text screening of remaining articles was then completed.

Analysis

Data Extraction

The following data were extracted from each paper: author and country, study population and participant characteristics, measure of autism/ psychopathy/ CUTs administered and main findings. These data were considered relevant to either quality appraisal of the studies or relevant for synthesis of findings in relation research question. Thirty percent of papers were checked by a second rater, with an inter-rater agreement of 88%. All disagreements were resolved through discussion.

Quality Appraisal

Prior to evidence synthesis, a critical appraisal of the literature is required to enable a judgement about bias and subsequent effectiveness. Study quality was assessed using the 'Checklist for Analytical Cross-Sectional Studies' (Joanna Briggs Institute, 2020a). This tool is used to assess the methodological quality of each included study and assess sources of bias. One included study (Bedford et al., 2019) was a longitudinal cohort study and therefore the 'Checklist for Cohort Studies' was used instead (Joanna Briggs Institute, 2020b). These tools are recognised as a reliable tool for use in systematic reviews to evaluate variation in study designs and methodology (Buccheri & Sharifi, 2017). Again, 30% of papers were checked by a second rater, with an inter-rater agreement of 82% and disagreements resolved through

discussion.

Synthesis

A narrative synthesis approach was adopted due to the broad spectrum of included research. This was conducted in line with guidance by Popay et al. (2006), who describe this technique as a synthesis of studies relying on the use of words to summarise and explain findings.

Results

Study Settings and Sample Size

Of the 214 papers identified during initial searches, 92 duplicates were removed, 71 were not relevant and 13 were reviews or editorial pieces. The full text article was unavailable for one paper, and another was theoretical only, leaving 36 studies that met the eligibility criteria and were included, Figure 1. Table 3 shows 22 studies that recruited children and Table 4 shows 14 studies that included adult participants.

Figure 1

PRISMA diagram showing screening and identification of eligible studies (Page et al., 2021).
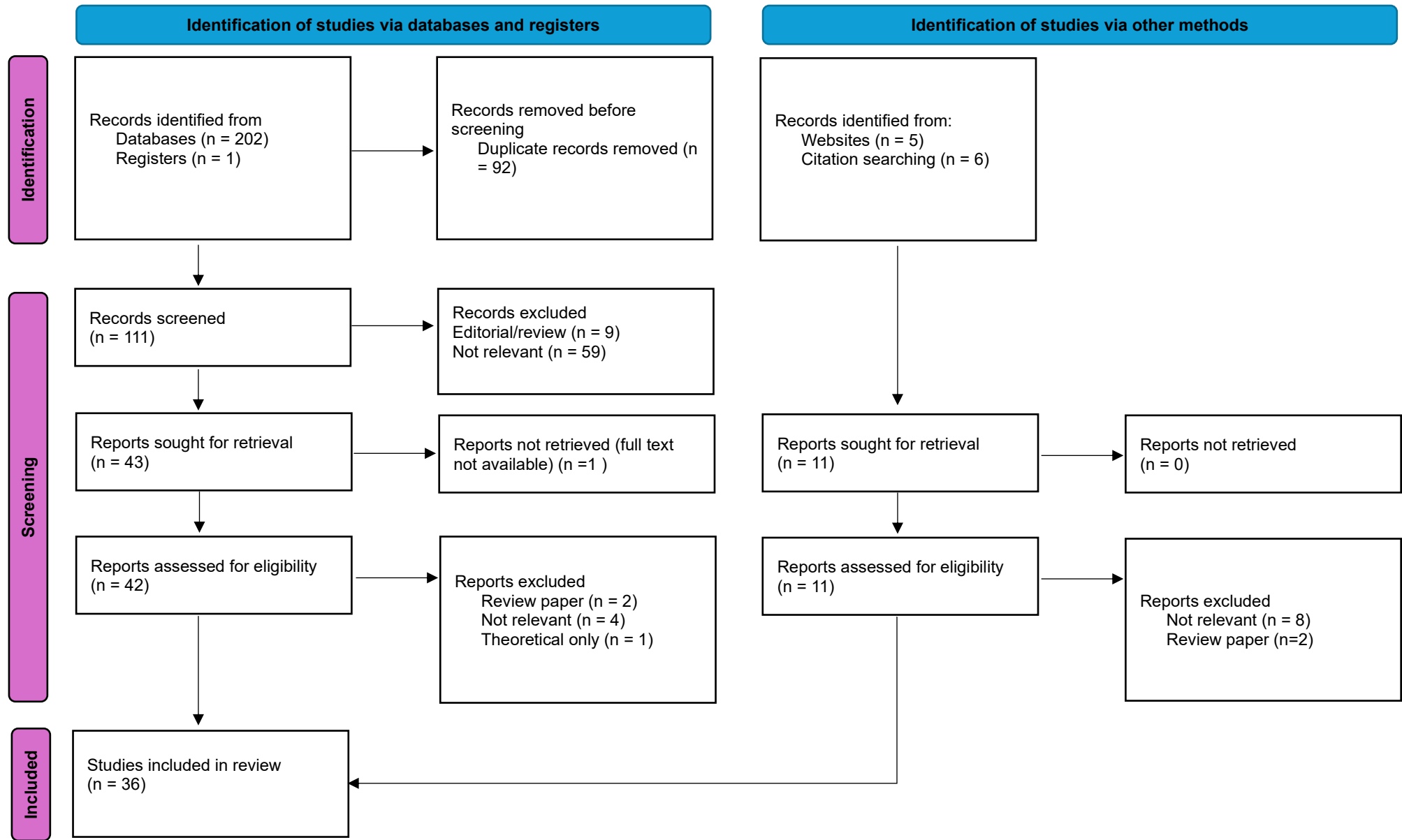
Table 3

Studies Investigating the Relationship Between Psychopathy/ Callous Unemotional Traits and Autism/ Autistic Traits in Children

Author, country	Aim of study	Study population	Participant characteristics	Measures of Autism, Psychopathy and/or CUTs	Main Findings	Quality Rating
Bedford et al., (2021). UK	1. Examine emotion recognition in children with high CUTs (for static and dynamic facial expressions) and if this is moderated by gaze direction. 2. Assess the impact of co-occurring autistic traits on relationship between CUTs and emotion recognition.	Sample taken from existing cohort study - Wirral Child Health and Development Study.	N = 292 (152M, 140F) Mean age – 7.25	SCQ – current (parent rated) ICU (parent rated)	- ASD and CUTs significantly positively correlated (r = .396, p < .001). - High CUTs associated with reduced emotion recognition for static angry and happy facial expressions but no impairment for sad or scared faces and no link for dynamic expressions. -Association was non-significant after controlling for autistic traits, suggesting that emotion recognition difficulties in CUT group may be partly due to autistic traits and not CUTs. -No association between CUTs and looking to the eyes. - Reduced emotion recognition accuracy associated with higher autistic traits in static and dynamic expressions, with reduced looking to eyes for static expressions only.	7/8
Bedford et al., (2019). UK	1. Examine if atypicality in infant regulatory functioning is specific to traits of ASD/ ADHD/ CUTs or a common shared factor. 2.Test if infant regulatory functioning moderates the association between known infant markers of ASD/ADHD and later disorder traits.	Sample taken from existing longitudinal cohort study of infants at familial risk of autism – British Autism Study of Infant Siblings. Low risk group recruited from volunteer database.	N = 104 High familial risk of ASD (N=54, 21M, 33F) Low familial risk of ASD (N =50, 21M, 29F) Age at time point 1: 7 - 14 months	AOSI ADOS-2, ADI-R SRS-2 (parent rated) ICU (parent rated)	-Reduced infant regulatory function associated with later traits of ASD and ADHD but not CUTs. As infant regulatory functioning is precursor to EF, this suggests that EF do not appear to be impaired in CUTs.	10/11

			Age at time point: 2 – 7 years			
Bours et al., (2018). Netherlands	1.Examine common and unique eye tracking patterns of emotional face processing in individuals with either ASD or ODD/CD in comparison to TD individuals and explore possible modulatory role of CUTs, psychopathic traits and subtypes of aggression.	Recruited from institutes for juvenile psychiatry problems/ behaviour problems, via Dutch federation of autism and leaflets in community.	N = 122 (M) Mean age = 15.4 Age range = 12-19 ASD, N = 50 ODD/CD, N = 44 TD, N = 28	ASD – relied on existing diagnosis, with some checked with ADOS and ADI SCQ (carer completed) ICU (parent and self rated) YPI (self rated)	-ODD/CD group scored higher on CUTs and aggressive behaviours than ASD and TD groups. -ASD and ODD/CD groups both fixated less on eye regions of emotional faces (except sadness) compared to TD group. -ASD and ODD/CD groups both took longer to first fixate on eyes of fearful faces compared to TD group, but nominal significance which did not survive multiple comparisons.	7/8
Georgiou et al., (2019). Cyprus	1.Investigate effect of CUTs and/or autistic traits in predicting affective or cognitive empathy. 2. Consider age and genders effects in this relationship.	Recruited from schools and selected based on low or average to high level of empathy.	N = 163 (91M, 72F) Mean age = 7.3 Age range = 3 - 8	ICU (parent rated) SRS (parent rated)	-Positive correlation between CUTs and autistic traits (r= .60, p < .001). -Autistic and CUTs both uniquely negatively associated with cognitive empathy. - CUTs (not autistic traits) also associated with affective empathy deficits (remained after autistic traits controlled for). - Autistic traits moderated relationship between CUTs and affective empathy in girls only; CUTs among girls with high level autistic traits associated with decreased affective empathy. In boys with CUTs, affective empathy deficits only explained by CUTs. -No effect of age and empathy was found.	7/8
Georgiou & Fanti (2021). Cyprus	1.Compare physiological reactivity in response to empathy eliciting or emotional stimuli in children aged 4-10 years, with autistic or CUTs. 2. Investigate interaction of CUTs and autistic traits	Recruited from schools and selected based on low or average to high level of empathy.	N = 109 (61M, 48F) Mean age = 7.3 Age range = 4-10	ICU (parent rated) SRS (parent rated)	-CUTs and autistic traits moderately correlated (r = .51, p < .001) -Boys (only) with high levels of CUTs traits exhibited low skin conductance reactivity during sad and fearful stimuli. - No significant associations for females with high CUTs or autistic trait group.	5/8

	in predicting physiological reactivity. 3. Explore age effects in relationship between CUTs and autistic traits and physiological reactivity.				- CUTs associated with stronger heart rate reactivity to fear stimuli only when autistic traits were low.	
Ibrahim et al., (2019). USA	1.Examine shared and distinct neural signatures of emotional face perception in children with ASD, with and without disruptive behaviours and review amygdala and reactivity and connectivity with prefrontal regions.	ASD groups recruited from clinical setting. TD group recruited from community setting.	N = 57, (46M, 11F) Age range = 8-16 ASD + disruptive behaviour group, N=18 ASD group, N= 20 TD group, N=19	ICU (parent rated) ADI-R ADOS-2	-Children with ASD and disruptive behaviour have reduced amygdala and ventrolateral prefrontal cortex connectivity compared to ASD only group during emotional processing task. -CUTs did not significantly predict amygdala-ventrolateral prefrontal cortex connectivity after controlling for externalising behaviour. - CUTs and externalising behaviour associated with reduced amygdala reactivity to fearful faces in children with ASD after controlling for suppressor effects. - Neural mechanisms of disruptive behaviours in ASD could be distinct from core symptoms of ASD.	7/8
Jones et al., (2010). UK.	1.Compare cognitive and affective empathy profiles in male children with psychopathic traits versus ASD.	Schools – mainstream, emotional and behavioural difficulties schools and ASD settings.	N = 96 (M) Age range = 9 – 16 Psychopathic traits, N = 21 ASD, N = 21 CP, N = 23 TD = 31	ICU (teacher rated) ASD – relied on existing diagnosis	-ASD group showed deficits in cognitive perspective taking but not affective empathy. - Psychopathic trait group showed deficits in affective but not cognitive empathy (evidenced by them caring less about victims' feelings than other groups). - Psychopathic trait group attributed less fear to themselves than other groups.	7/8
Jones et al., (2009). UK	1.Assess extent to which aetiology of psychopathic traits is independent of autistic traits. 2. Study aetiology of emotion attribution ability and its association with	Secondary data from cohort twin study – Twins Early Development Study.	N = 642 twin pairs Mean age = 9 Age range 8-10 98 pairs MZ twin boys,	APSD (parent rated) CAST short version (parent rated)	-Heritability of both psychopathy and autistic traits individually with moderate positive phenotypic association with each other. -Most genetic influences accounting for individual differences in psychopathic tendencies were unique to that domain. - Genetic and non-shared environmental influences related to psychopathy traits were	5/8

	psychopathic tendencies and autistic traits.		89 pairs MZ twin girls, 126 pairs DZ boys, 104 pairs DZ girls, 225 opposite sex twins		unique to each phenotype, although the disorders shared some environmental influences. - Poor emotion attribution associated with higher levels of psychopathy and ASD and these associations were largely explained by common genetic factors.	
Klapwijk et al., (2016). Netherlands	1.Compare neural correlates of processes involved in empathy in youth with ASD, youth with CD and CUT and TD youth.	Recruited from child psychiatric clinics, juvenile detention centres/ forensic psychiatric unit and through local advertising.	N = 79(M) Age range = 15-19 ASD, N =23 (mean age 17 years) CD/CU+, N = 23 (mean age = 16.6) TD, N = 33 (mean age = 17.1).	ADOS ADI-R ICU (self report)	-During emotion recognition task, boys with ASD showed reduced responses in brain areas associated with mentalising compared to other groups, suggesting a deficit in cognitive empathy. -During emotional resonance tasks, both the CD and CUT group and the ASD group showed reduced amygdala responses compared to TD group, suggesting deficits in affective resonance; however, the reduced responses occurred in different brain areas suggesting disorder specific features. - CD and CUT group showed deficits in brain area (left inferior frontal gyrus and interior insula) associated with affective empathy which the ASD group did not show.	8/8
Leno et al., (2021). UK	1.Investigate Prevalence of CUTs in youth with ASD. 2. Investigate whether CUTs are associated with impairment in recognition and reduced looking to eyes for fearful faces in youth with ASD.	Sample recruited from ongoing longitudinal research - QUEST follow up study.	N = 211 (169M, 42F) Mean age – 13.51 Mean IQ – 72.5	Clinical diagnosis of ASD (partially confirmed via ADOS and ADI-R). SCQ (rater unclear) ICU (mix of shortened and full versions) (parent rated)	-22% adolescents with ASD scored above cut off for CUTs (cut off expected to identify top 6% of CUTs scores in general population). - Higher CUTs associated with lower IQ and more severe ASD symptoms. - CUTs are elevated in ASD and result in more higher conduct problems and less prosocial behaviour. - All participants demonstrated impairment in recognition of fearful faces (compared to other emotions) but no effect of ASD severity or CUTs. - CUTs in autistic sample associated with longer reaction times to identify fear and less eye contact during viewing of fearful faces.	6/8

Leno et al., (2015). UK	1.Investigate prevalence of CUTs in adolescents with ASD and test association with behavioural and cognitive measures (EF, emotion recognition and ToM). 2. Investigate association between CUTs and CD in sample of adolescents with ASD 3. Test if fear recognition is associated with CUTs in sample of adolescents with ASD	Sample recruited from ongoing cohort study - Special Needs and Autism Project.	N = 92 (84M, 8F) Mean age = 15.5 Age range = 14.7-16.8 IQ > 50 Mean IQ = 84.7 Autism, N = 48 PDD, N = 44	ADI-R ADOS SRS (parent rated) APSD (parent rated)	-51% scored above cut off for CUTs (cut off expected to identify top 6% of CUT scores in general population). 17% of these had concurrent conduct problems, vs 9% with low CUTs (not significantly different). -ASD and elevated CUTs traits did not show elevated level of conduct problems compared to general population with CUT. - CUTs in ASD associated with specific impairment in fear recognition but not ToM or cognitive flexibility (EF skills).	6/8
Leno et al., (2022). UK	1.Investigate emotion recognition ability and impact of eye gaze in sample of children enriched for social, emotional and behavioural difficulties with either autistic traits or CUTs.	Recruited from schools (including schools for children with social, emotional and behavioural difficulties), social media and charities.	N = 171 (75M, 96F) Mean age = 13.14 Age range = 10-16 ASD, N = 99	Parent reported ASD diagnosis SRS (parent rated) ICU (parent rated)	-Associations between autistic and CUTs and emotion recognition were dependent on gaze cueing. -Higher CUTs associated with lower emotion recognition accuracy (not specific to fear) in the uncued condition. Association was non-significant when controlling for conduct problems. -Fear recognition improved with cued eye gaze in high CUTs group. No improvement in other emotions. -Autistic traits associated with decreased emotion recognition in cued condition only. Association was non-significant when controlling for conduct problems.	7/8
Parys (2016). USA	1.Investigate prevalence of symptoms of ASD and CUTs in adolescents in treatment for sexual offences.	Residential treatment programme for sex offenders.	N = 7(M) Mean age = 16 Age range =14-19	APSD (self rated) ICU (self rated) CARS-2-HF (staff rated) SRS (second edition) (staff rated)	-3 participants met criteria for mild to moderate ASD, within these none met criteria for CUTs on APSD but 2 did on ICU. - 4 participants did not meet ASD criteria, and within these one had CUTs according to APSD and one according to ICU, one on both measures.	2/8

	2. Does measure of CUTs differ for participants with and without autism? 3. Investigate differences in emotion facial recognition for participants with and without autism.				-No significant difference in emotion recognition, or social skills for participants with/ without autistic traits. All participants lacked appropriate sexual knowledge. -Only scores for unemotional factor on ICU were different for ASD vs non-ASD group, with higher score for ASD group.	
Pasilich et al., (2014). Australia	1.Investigate additive and interactive effects of CUTs and autistic traits in relation to cognitive and affective empathy in children with conduct problems.	Recruited from child behaviour research clinic (excluding ASD diagnoses).	N =134 (106M, 28F) Mean age = 5.6 Age range = 3-9	Items combined from SDQ and APSD to assess CUTs (parent and teacher rated SRS (parent rated)	-High autistic traits independently associated with impaired cognitive empathy only. -High CUTs independently associated with impaired affective and cognitive empathy. -Marginal significant interaction found between CUTs and ASD traits and affective empathy – children with high levels of CUTs and ASD traits had most pronounced deficits in affective empathy.	6/8
Pijiper et al., (2016). Netherlands	1.Examine interactive and additive effects of CUTs and autistic symptoms in relation to empathy within boys with ODD/CD.	Recruited via clinical health centres and special educational schools.	N = 49(M) Mean age = 10.28 Age range = 7-12 IQ >70 ODD, N = 32 CD, N = 17	SRS (parent rated) APSD (parent and teacher rated)	-Negative association between CUTs and empathic sadness (as a measure of affective empathy). -Symptoms of autism moderated this relationship with higher levels of autistic traits showing less impaired affective empathy. -Negative association between autistic traits and cognitive empathy.	6/8
Rogers et al., (2006). UK	1.Determine if psychopathic behaviour is expression of ASD or independent. 2. Assess difference between individuals with ASD and high CUTs vs those with ASD and low CUTs. 3. Compare cognitive data from autistic sample with high or low CUTs to	Recruited from specialised residential school (for autistic students with violent or difficult externalising behaviour).	N = 28 (M) Mean age =14	SCQ (parent rated) APSD (teacher rated)	- Psychopathic traits not related to severity of ASD or related to cognitive deficits associated with ASD, e.g., mind reading/ executive functioning skills (low correlation between CUTs and ASD). - Group differences for tasks underlying psychopathy but not ASD. -High CUTs group poorer at moral convention distinction and sadness recognition (no group difference for recognition of fear).	5/8

	previously collected data of young people with psychopathic tendencies.				-ASD and psychopathy different constructs, can occur independently of each other and can be measured independently.	
Schwenck et al., (2012). Germany	1.Compare cognitive and emotional empathy traits in different age groups of children with ASD, CD with elevated or low CUTs (CD+CUT or CD-CUT) and a matched TD comparison group. 2. Investigate age effects of empathy development.	Clinical sample recruited from local psychiatric services, controls recruited from general population via ads.	N = 192 (M) Mean age = 12 years 3 months Age range = 6-17 ASD group, N = 55. CD+CUT. N = 36 CD-CUT, N = 34 TD, N = 67.	ICU (parent rated) ADI-R ADOS SCQ	-Cognitive empathy difficulties in ASD group found, along with a delay in recognition of sad faces. Increased emotional affection compared to CD-CUT group. -CD+CUT group had deficit in affective empathy compared to all other groups but not emotion recognition or cognitive empathy. -All groups performed better with age on all skills (cognitive empathy, emotional empathy, and emotion recognition). However, ASD group showed a decrease in recognition of sad faces.	8/8
Svensson et al., (2018). Sweden	1.Explore association between psychopathic traits and CD in children with and without coexisting ADHD or ASD, in a community sample of twins.	Recruited from ongoing longitudinal twin study – Child and Adolescent Twin Study in Sweden.	N = 8762 (4453M, 4309F) Age 9 (47.8%) or 12 years (52.2%)	CPTI-SV (parent rated) A-TAC (parent rated)	-Weak corelations between measure of ASD and subscales of psychopathy measure (including CUTs) but moderately strong association between ASD and total scores on psychopathy measure (r = .38 for boys, r = .33 for girls).	5/8
Tye et al., (2017). UK	1.Examine association between CUTs and EF skills and moderating effect of CUTs in ASD/ ADHD (population with impaired executive functioning).	Recruited from outpatient neurodevelopmental clinics and local schools.	N = 92 (M), Age range = 8-13 Mean age = 10.8 IQ > 70 ASD, N = 19 ADHD, N = 18 ASD + ADHD, N = 29 TD, N = 26	ADI-R ADOS SCQ (parent rated) ICU (rater unclear)	-TD group had significantly lower CUT than all other groups. ASD and ADHD combined group had significantly higher CUT than ASD only group. - Enhanced conflict monitoring skills in ASD associated with presence of CUT – similar to non-ASD population with psychopathic traits. Heterogeneity in ASD within conflict monitoring group partially accounted for by presence of CUTs. - Suggests there is a form of ASD that co-occurs with high CUTs.	7/8

| Vilas et al., (2021). UK | 1. Compare performance on self-report measure of empathy and on behavioural task of empathy accuracy in adolescents with ASD, adolescents with BD and a TD comparison group. | Recruited from secondary schools and specialised secondary schools (for ASD or behaviour). | N = 71 (37M, 34F) Mean age = 15.26 Age range = 12-17 ASD, N = 27 (23M, 4F) TD, N = 27 (7M, 2-F) BD, N = 17 (7M, 10F) | ASD – relied on existing diagnosis YPT (self reported) ICU (self-report) APSD (self-report) | -Significantly higher levels of CUTs in BD group than ASD and TD groups. - No group differences in affective empathy suggesting this is intact in ASD group. - ASD and BD groups had deficits in cognitive empathy (compared to TD group) with ASD group performing worse across perspective taking abilities (subcomponent of cognitive empathy scale). - BD group performed worse with online simulation (subcomponent of cognitive empathy scale); however this was none significant and may be due to characteristics of the BD group such as age or impulsively instead. | 6/8 |

Note measures: ADI, Autism Diagnostic Interview (Le Couteur et al., 1989)*; ADI-R, Autism Diagnostic Interview–Revised* (Rutter, Le Couteur et al., 2003)*; ADOS, Autism Diagnostic Observation Scale* (Gotham et al., 2007)*; ADOS-2, Autism Diagnostic Observational Schedule, second edition* (Lord et al., 2021)*; APSD, Antisocial Process Screening Device* (Frick & Hare, 2001)*; AOSI, Autism Observational Scale for Infants* (Bryson et al., 2008)*; A-TAC, Autism-Tics, AD/HD and other Comorbidities Inventory* (Larson, 2013)*; CAST, Childhood Autism Spectrum Test* (Williams et al., 2005)*; CARS-2-HF, Childhood Autism Rating Scale, 2nd edition, High Functioning Version* (Schopler et al., 2010)*;CPTI-SV, Child Problematic Traits Inventory- Short Version* (Colins et al., 2014)*; ICU, Inventory of Callous-Unemotional Traits* (Frick, 2004)*;SCQ, Social Communication Questionnaire* (Rutter, Bailey, et al., 2003)*; SDQ, Strengths and Difficulties Questionnaire* (Goodman, 1997)*; SRS, Social Responsiveness Scale* (Constantino et al., 2003)*; SRS-2 – Social Responsiveness Scale, 2nd edition* (Constantino & Gruber, 2012)*; YPT, Youth Psychopathic Trait Inventory* (Andershed et al., 2012).
Note disorders/ diagnoses: ADHD, Attention Deficit Hyperactivity Disorder; ASD, Autistic Spectrum Disorder; BD – Behavioural difficulties; CD, Conduct Disorder; ODD, Oppositional Defiance Disorder; TD, typically developing.
Note other: EF, executive functioning; ToM, theory of mind.

Table 4

Studies Investigating the Relationship Between Psychopathy/Psychopathic Traits and Autism/Autistic Traits in Adults

Author, country	Aim of study	Study population	Participant characteristics	Measures of ASD, Psychopathy and/or CUTs	Main Findings	Quality Rating
Álvarez-Couto et al., (2023). Spain	1.Analyse the role of CUTs in relation to frequency of behavioural problems in adults with ASD and intellectual disabilities. 2. Study the role of CUTs in relation to behaviour problems less related to social environment (e.g. stereotyped behaviour suck as rocking).	Adults with autism and moderate to profound intellectual disabilities living in community (either with family or community placements).	N = 83 (59M, 24F) Mean age = 38.92 Age range = 18-58 All with ID	DiBAS-R ICU (completed by proxy)	-Significant but weak positive relationship between ASD and CUTs (r = .257, p = .025). -Low level of CUTs in this sample – none met cut off to be considered as exhibiting high CUTs. - CUTs indirectly mediated relationship between ASD severity and frequency of self-injurious behaviour and stereotypies (behaviour exhibited and directed towards individual) but not aggressive behaviour exhibited towards others.	5/8
Barnard-Brak & Richman, (2021). USA	1.Examine association between psychopathic and autistic traits. 2. Examine overlap and differences in psychopathy subscales among individuals with ASD. 3. Examine differences in scales related to ASD and psychopathy among those with ASD, ASD and psychopathic traits and those with neither ASD or psychopathic traits.	Community sample.	N = 723 (364M, 356F, 3 Non binary) Mean age - 48.53 IQ > 70 79% white	AQ10 (self rated) Dirty Dozen Scale (self rated)	- Small to moderate correlation between autistic and psychopathic traits (r = .19, p < .001). - 10% of sample met ASD cut off score (N =74), 12% of sample met cut off to indicate high psychopathic traits (n = 88). - 3% (n=22) met cut off scores for both autistic and psychopathic traits (30% of ASD group). - Individuals with high autistic traits, with or without high psychopathic traits, showed higher levels of impaired social skills. - Individuals with high psychopathy scores had significantly higher sensory sensitivity and restricted/repetitive behaviours than those with high autistic traits. - Individuals with traits of both had similar levels of restrictive/repetitive behaviours	6/8

					and sensory sensitivities to those with autistic traits and no psychopathic traits.	
Gillespie et al., (2017). UK	1.Examine interaction of psychopathic tendencies with autistic traits and the expression of positive psychotic experiences in a non-clinical adult sample whilst performing task to assess cognitive and affective ToM.	University students	N = 55, (16M, 39F) Mean age = 20 Age range =18-37	LSRP (self rated) AQ (self rated)	-Interaction of primary psychopathy traits and high autism traits resulted in decrement in cognitive ToM performance only. - Opposite was seen with interaction in psychosis and primary psychopathy. - Affective ToM negatively associated only with primary psychopathic tendencies.	5/8
Helt et al., (2021). USA	1.Explore susceptibility to contagious yawning and its relationship with eye contact in individuals with high and low levels of autistic traits or psychopathy traits. 2. Explore relationship of each group to self-reported empathy.	University students	N = 97 (47M, 50F) Mean age = 21.48 Age range = 18.75 -24.58	AQ (self rated) PPI-R (self rated)	-High psychopathic individuals less susceptible to contagious yawning and itching, unrelated to eye gaze and negatively correlated with overall levels of empathy. -Individuals high in autistic traits only less susceptible to yawning and this relationship is moderated by eye gaze (participants with greater autistic traits spent less time looking at eyes). -Autistic and psychopathic trait groups have distinct empathy profiles with opposite relationships to personal distress.	6/8
Jameel et al., (2019). UK	1.Compare individuals with high vs low autistic traits and those with high vs low psychopathic traits on counterfactual thinking task involving thinking about others' mistakes and corresponding	University students	Initial screening sample, N = 828 (41.4%M, 58.6%F) Mean age = 20 Subsample selected for final analyses, N = 79.	PPI-SF (self rated) AQ (self rated)	-High autistic trait group blamed characters in story more for their mistakes than low ASD group, suggesting poorer perspective taking ability. -High psychopathy group gave lower ratings for moral judgments of regret and guilt in characters than low psychopathy group. Perhaps due to them not expecting to feel regret or guilt themselves and therefore	6/8

	judgements of regret, guilt, and blame.		High ASD group, N = 20 (10M, 10F) Low ASD group, N = 19 (9M, 10F) High Psychopathic group, N = 21 (11M, 10F), Low Psychopathic group, N = 19 (9M, 10F)		not recognising that others may feel this emotion.	
Leno et al., (2016). USA	1.Uncover common and unique patterns of neural responses to different types of social feedback associated with autistic and psychopathic traits in a sample of TD adults.	Community sample.	N = 31 (11M, 20F) Mean age = 23.35 Age range = 18-52	SRS (adult version) (self rated) SRP-SF (self rated)	-Psychopathy and autistic trait groups both showed atypical feedback processing. - Autistic trait group showed decreased sensitivity to social feedback with preserved feedback to non-social stimuli. -Antisocial domain of psychopathy was associated with overall decreased sensitivity to all types of feedback; however the interpersonal domain of psychopathy showed preserved processing of positive feedback with atypical responses to negatively valanced feedback. No association was found in neural responses to overall level of psychopathic traits. - No significant corelations were found between the SRS and any SRP-4-SF subscales.	8/8
Lockwood et al., (2013). UK	1.Investigate whether psychopathic and autistic traits were differentially related to performance on affective resonance and cognitive perspective taking and whether alexithymia	Recruited from university participant databases and community.	N = 110 (55M, 55F) Mean age = 21.9 Age range = 18 - 33	AQ (self rated) SRP-4-SF (self rated)	-Unique associations between psychopathic traits and reduced affective resonance but not cognitive perspective taking - Unique associations between autistic traits and reduced cognitive perspective taking but not affective resonance. -Alexithymic traits contributed to performance on affective resonance independently to psychopathic traits.	7/8

	contributes to task performance.					
Loureiro et al., (2018). Portugal	1.Investigate if amount of autistic traits in offenders differs from that in the general population (controlling for psychopathy and other confounding variables). 2. Investigate if autistic and psychopathic traits present independently to each other in prison and comparison group.	Forensic and community setting.	N = 211(M) Prison group, N = 101 Mean age = 37.4 Age range = 22-63 Comparison group, N = 111 Mean age = 39.3 Age range =18-63	AQ (self rated) TriPM (self rated)	-Autistic traits higher in prisoners than general population. - No correlations found between autistic and psychopathic traits (in either group) therefore suggestive that the disorders are distinct and that autistic traits are independent risk factor of imprisonment.	8/8
Noppari et al., (2022). Finland	1.Investigate structural brain differences in ASD and psychopathy by comparing regional grey matter volume.	Recruited from prisons and neuropsychiatric clinic, controls – unknown.	N = 58 (M), Age range 20-47 ASD group, N = 20 (mean age = 28) Psychopathy group, N = 19, (mean age = 31) TD, N = 19 (mean age = 29).	PCL-R ADOS-2 AQ (self rated) LSRP (self rated)	- ASD and psychopathy group both have lower GVM in motor areas than control group. -Psychopathy group showed lower grey volume matter in frontotemporal areas (associated with social cognition and emotional aspect of empathy) than ASD group.	8/8
Oliver et al., (2016). UK	1.Determine whether psychopathic and autistic traits are differentially associated with cognitive empathy, empathic concern, and affective sharing performance.	Community sample.	N = 90 (36M, 54F) Mean age = 21.7	PPI-R (focus on cold-heartedness subscale) (self rated) AQ (self rated)	-Psychopathic traits negatively correlated with emotional empathy (empathic concern and affective sharing) and unrelated to cognitive empathy accuracy. - Autistic traits were unrelated to all measures of empathy, including cognitive empathy performance but this may have been impacted by ceiling effects in their test of cognitive empathy.	7/8

	2. Investigate the relationship of trait anxiety on empathy in these groups.				-Autistic traits positively related to trait anxiety levels. No relationship with psychopathy cold heartedness.	
Skjegstad et al., (2022). Switzerland	1.Investigate social cognition in subtypes of psychopathy and determine level of neural overlap in social cognition impairments across psychopathic and autistic traits.	Community sample.	N = 113, (47M, 66F) Mean age 25.59 Age range = 18-40	LSRP (self rated) AQ (self rated)	-Positive correlation between autistic traits and secondary psychopathy only ($r = .356$, $p < .001$). -Secondary psychopathy and autistic traits shared greater commonalities (high neuroticism and trait anxiety, low extraversion) than primary psychopathy and autistic traits (low level of openness only). - Sensory processing deficits common for psychopathic and autistic traits, but in different areas. - Autistic traits associated with deficits in dorsal auditory processing streams used for communication context encoding. - Psychopathic traits associated with hypoactivity in socio-affective processing networks. - Most social processing networks impacted in primary psychopathy, contributing towards decreased affective empathy. -Intact empathic and affective neural processing but deficits in neural mirroring and mentalising in secondary psychopathy.	5/8
Soderstrom et al., (2005). Sweden	1.Investigate extent to which features and problems assessed by the PCL-R correlate with DSM-IV diagnostic definitions of mental and personality disorders to identify unique	Recruited from forensic psychiatry clinic.	N = 100 (92M, 8F) Age range = 17 – 76	PCL-R ASDI	-18% participants met criteria for a form of ASD. - PCL-R scores low, range from 0-27 points. -PCL-R Total, Factor 2 (unemotionality) and Factor 3 (behavioural dyscontrol) significantly correlated with autistic traits. -PCL-R Factor 1 (interpersonal) scores not correlated with autistic traits, suggesting	5/8

	features for psychopathy.				that this factor represents discriminating feature of psychopathy as separate disorder (interpersonal deceitfulness, manipulation, grandiosity).	
Sun et al., (2023). Finland	1.Compare neural responses to emotional communicative signals in TD individuals versus psychopathic offenders and autistic individuals.	Recruited from prisons and neuropsychiatric clinic, controls – unknown.	N = 58 (M), Age range 20-47. ASD group, N = 20 (mean age 27.85), Psychopathy group, N = 19, (mean age 31.16), TD group, N = 19 (mean age 28.53).	PCL-R ADOS-2 AQ (self rated) LSRP (self rated)	-Somatomotor responses to vocal and facial emotional expressions were weakened in psychopathy and ASD groups compared to TD group; however, deficits were most profound in psychopathy group (especially for anger). - Psychopathy associated with reduced somatomotor responses to almost all expressions (except crying) when compared to TD group. In ASD group, lowered brain activation only observed for laughter and disgust. - Reduced somatomotor mirroring seen in Psychopathy and ASD suggests they are less likely to experience emotional contagion, which plays a role in affective empathy and inhibition of violent behaviour.	7/8
Vyas et al., (2017). UK	1. Compare performance on utilitarian decision-making tasks in groups of high and low autistic or psychopathic traits across situations involving extreme physical harm or everyday social harm. 2. Examine experience of discomfort and	Opportunistic sample of university students screened, and then highest and lowest 10% scores on measures of psychopathic and autistic traits recruited.	N = 828 for screening (41.4%M, 58.6%F) Mean age = 20 For task and analysis, N = 80: High ASD group, N = 20 (10M, 10F) Mean age = 20.3 Low ASD group, N = 20 (10M, 10F) Mean age = 20.3	PPI-SF (self rated) AQ (self rated)	-All groups showed greater utilitarian decision making when physical harm vs social harm was involved. - High traits groups both reported less distress making utilitarian decisions compared to their respective low trait groups. - High psychopathy group had lower affective empathy ratings than low psychopathy group, but no difference on cognitive empathy scales. -High vs low autistic trait group comparison on empathy measure gave mixed results.	6/8

reasoning in decision making across groups.	High psychopathy group, N = 21 (11M, 10F) Mean age = 21.15 Low psychopathy group, N = 19 (9M, 10F) Mean age = 21.15	High autistic trait group showed lower ratings in cognitive empathy's 'perspective taking' measure but not in the 'fantasy' measure. In affective empathy, the high autistic trait group had higher ratings in the 'personal distress' subscale of affective empathy than the low autistic trait group, but no differences were found for 'empathic concern' subscale of affective empathy. - High psychopathy group, judged misdemeanours less harshly than low psychopathy group. No group differences in ASD groups. Suggests comprised moral judgement in high psychopathy group but intact in ASD groups.

Note measures: ADOS-2, Autism Diagnostic Observational Schedule, second edition (Lord et al., 2021)*; AQ, Autism Quotient* (Baron-Cohen et al., 2001)*; AQ10, Autism Quotient, 10 item version* (Allison et al., 2012)*; ASDi, Asperger Syndrome Diagnostic Interview* (Viktorinova & McPartland, 2013)*; DiBAS-R, Diagnostic Behavioural Assessment for Autism Spectrum Disorder-Revised* (Sappok et al., 2014)*; Dirty Dozen Scale* (Jonason &Webster, 2010); *ICU, Inventory of Callous-Unemotional Traits* (Frick, 2004)*; LSRP, Levenson Self Report Psychopathy Scale* (Levenson et al., 1995)*; PCL-R, Psychopathy Checklist Revised* (Hare, 1991)*; PPI-R, Psychopathic Personality Inventory -Revised* (Lilienfeld & Widows, 2005); *PPI-SF, Psychopathic Personality Inventory-Short Form* (Lilienfeld & Hess, 2001); *SRP-SF, Self Report Psychopathy Scale – Short Form* (Paulhuss et al., 20014)*; SRS – Social Responsiveness Scale* (Constantino et al., 2003)*; TriPM, Triarchic Model of Psychopathy* (Patrick et al., 2009) .

Note disorders/ diagnoses: ASD, autism spectrum disorder; TD, typically developing.

Note other: GVM, grey volume matter; ToM, Theory of mind.

Studies were conducted in 11 Western countries: UK (17), USA (5), Netherlands (3), Sweden (2), Finland (2), Cyprus (2), Spain (1), Switzerland (1), Germany (1), Portugal (1) and Australia (1). Twenty studies recruited from community settings, including schools and universities, and a further five were recruited from existing cohort/longitudinal studies. Five studies recruited from clinical settings such as child behaviour clinics and six recruited from forensic settings. One study focused specifically on sex offenders (Parys, 2016). Sample sizes ranged from seven (Parys, 2016), in an unpublished thesis, to several thousand in large scale twin studies (O'Nions et al., 2015; Svensson et al., 2018).

Participant Characteristics

A total of 12115 children were recruited, including 6654 males and 5461 females. Of these, 746 had primary diagnoses of autism, autistic traits or were identified as being at familial risk of autism, although many also had co-morbid diagnoses or additional behavioural difficulties. Three hundred and nineteen were considered to have oppositional defiant disorder, conduct disorder/problems, CUTs or psychopathic traits, whilst 11032 were either identified as typically developing or no information was provided. A total of 1888 adults were recruited, including 1133 males, 752 females and 3 people who identified as non-binary. Of these, 163 had diagnoses of autism or had autistic traits, 80 had psychopathic traits and the remaining were either considered typically developing or the information was not provided.

Twenty-four studies included males and females, whereas 12 only recruited males. Participant age ranged from seven months (Bedford et al., 2019) to 63 years (Loureiro et al., 2018). One study included participants with intellectual disability (Álvarez-Couto et al., 2023), and three studies included those with mixed ability levels: Leno et al. (2015) reported a mean IQ of 84.7, Leno et al. (2021) reported a mean IQ of 72.5, and Soderstrom et al. (2005) reported that 17% of participants had an IQ below 70.

Quality appraisal

Quality appraisal ratings are found in Tables 1 and 2. Scores ranged from two to eight, with five fulfilling the full criteria (Klapwijk et al., 2016; Leno et al., 2016; Loureiro et al.,

2018; Noppari et al., 2022; Schwenck et al., 2012). An unpublished thesis (Parys, 2016), scored two out of eight. This low score was due to the small sample size (N=7) meaning that the statistical analysis was judged as inappropriate, whilst there was little information on eligibility criteria, confounding variables or appropriateness of the measures used.

Measurement Tools

Some studies involved administering a gold standard diagnostic tool to participants including the Autism Diagnostic Observation Schedule (ADOS) (Lord et al., 1999) and the Autism Diagnostic Interview-Revised (ADI-R) (Rutter, Le Couteur, et al., 2003), while two studies did not confirm existing diagnoses (Jones et al., 2010; Vilas et al., 2021), although both had large sample sizes, making this a time-consuming exercise. Commonly used measures of autistic traits were the Autism Quotient (AQ), the Social Communication Questionnaire (SCQ), and the Social Responsiveness Scale (SRS). These were considered reliable and valid measures, and appropriate screening tools. Research has shown that screening tools are not entirely predictive of diagnosis (Conner et al., 2019), making it important to differentiate between autistic traits and a formal diagnosis of autism across studies.

There was large variation in the measurement of psychopathy/CUTs. Many studies used the Inventory of Callous Unemotional Traits (ICU) (Frick 2004), which is a 24-item scale designed to measure CUTs in children. Whilst this is a well-researched and validated measure (see Cardinale & Marsh, (2020) for a review), no study has validated its use in autistic children. Several studies used this measure (Álvarez-Couto et al., 2023; Bours et al., 2018; Ibrahim et al., 2019; Leno et al., 2021; Tye et al., 2017). Other researchers (Leno et al., 2015; Jones et al., 2010; Rogers et al., 2006) administered the Antisocial Process Screening Device (APSD) (Frick & Hare, 2001), measuring the wider construct of psychopathy in young people, but again, this has not been validated for use with autistic children. Rogers et al. (2006), acknowledged this and confirmed that the APSD positively correlated with conduct problems as expected, suggesting convergent validity.

The authors of three studies (Noppari et al., 2022; Soderstrom et al., 2005; Sun et al., 2023) administered the Psychopathy Check List-Revised (PCL-R) (Hare, 1991), which is

considered to be a gold standard tool. All other studies relied on self-report measures of psychopathy, which should be viewed critically as psychopathic individuals tend to lack insight into the nature of their psychopathology (Hare & Neumann, 2008). Additionally, using self-report measures with those known to be manipulative and deceptive increases the risk of response bias (Edens et al., 2000). Research about the reliability and validity of self-report measures of psychopathy in autistic people is lacking. There is evidence that self-report personality measures used with autistic children are questionable (Bakhtiari et al., 2021), and three of the included studies used a psychopathy self-report measure with children (Klapwijk et al., 2016; Parys, 2016; Vilas et al., 2021). Vilas et al. (2021) acknowledged the limitations of this and administered multiple measures to circumvent this problem. The use of a single measure of psychopathy is advised against (Hare & Neumann, 2008); however, only five studies administered multiple measures (Bours et al., 2018; Noppari et al., 2022; Parys, 2016; Sun et al., 2023; Vilas et al., 2021).

Autism and Callous and Unemotional Traits in Children

Estimated Prevalence

Leno et al. (2021) reported that 22% of autistic children scored above their designated cut off to indicate the presence of CUTs. However, some participants completed the full ICU measure and others a shortened version. Ideally, prevalence studies should include a representative sample and exclude any possible biases; the full ICU should have been administered to all participants, and their autism diagnosis confirmed. Two groups of researchers administered the ASPD, reporting different rates of CUTs. Leno et al. (2015) reported that 51% of autistic adolescents fell into their category of high CUTs. In contrast, Rogers et al. (2006) reported that their sample had a mean CUT score of 4.77, which is considered an 'average' CUT score. However, methodological differences between these studies make comparison challenging.

Autistic Traits and Callous and Unemotional Traits

Three studies (Bedford et al., 2021; Georgiou et al., 2019; Georgiou & Fanti, 2021) with large, mixed gender samples reported a positive correlation between CUTs and autistic

traits ($r = .40$, $r = .60$ and $r = .51$ respectively) amongst typically developing children. Studies reporting higher correlations recruited participants based upon having either low or high empathy levels which may have inflated the correlation.

Autism and Psychopathy

Three studies made use of samples of those with an existing autism diagnosis (Leno et al., 2021; Rogers et al., 2006; Svensson et al., 2018). Svensson et al. (2018) undertook a large twin study (N = 8762) and administered the Child Problematic Trait Inventory – Short Version to index psychopathy. They reported a significant relationship between psychopathy and autism amongst boys, r = .38, and girls, r = .33, bearing in mind that there may be validity issues with their choice of measure (Colins et al., 2020). Leno et al. (2021) reported that higher CUTs were associated with more severe autistic traits, lower levels of prosocial behaviour and increased conduct problems. In contrast, Rogers et al. (2006) reported no relationship between CUTs or psychopathy and autism and cognitive abilities in a much smaller study of autistic boys.

Empathy

As expected, there was evidence that autism/autistic traits and CUTs/psychopathy in children is associated with distinct empathetic profiles. Children with autistic traits demonstrated deficits in cognitive empathy with intact affective empathy (Georgiou et al., 2019; Pasalich et al., 2014; Pijper et al., 2016), and the same relationship was observed in children with diagnoses of autism (Jones et al., 2010; Klapwijk et al., 2016; Schwenck et al., 2012; Vilas et al., 2021). These results appeared consistent despite the variation in the measurement of empathy and methods across studies. The relationship between CUTs/psychopathy and empathy appeared less clear; some studies reported diminished affective empathy and intact cognitive empathy (Jones et al., 2010; Schwenck et al., 2012), whilst others reported diminished affective and cognitive empathy (Georgiou et al., 2019; Pasalich et al., 2014).

Studies looking at the relationship between CUTs and autistic traits had contradictory results. While Pijper et al. (2016) reported a negative association between CUTs and affective empathy in their sample of 10-year-old boys with conduct disorder as expected, the relationship was moderated by autistic traits; those with higher autistic traits and CUTs

exhibited less impaired affective empathy. In contrast, Pasalich et al. (2014) found that 5-year-old boys and girls with conduct disorder and high levels of both CUTs and autistic traits displayed the most pronounced deficits in affective empathy. These contradictory findings may be explained by: (a) sex differences: there is limited evidence that high CUTs and high autistic traits are associated with decreased affective empathy in girls only (Georgiou et al., 2019) and Pijper et al. (2016) only included a sample of boys, and (b) difficulties with the measurement of empathy: both Georgiou et al. (2019) and Pasalich et al. (2014) used the Griffith Empathy Measure (Dadds et al., 2008) and there is evidence that the affective empathy scale lacks construct validity (Murphy, 2019). Age may also have impacted on these findings as there is evidence of improved performance with age on both types of empathy in all participants (Schwenck et al., 2012), as would be expected, and Pijper et al. (2016) included older children relative to Pasalich et al. (2014). Nonetheless, it's worth noting that another study reported no relationship between age and empathy (Georgiou et al., 2019).

Cognitive Profile

There was some evidence that psychopathy and autism are distinct constructs and the interaction of these may create a distinct cognitive profile. Bedford et al. (2019) reported that reduced infant regulatory function (a precursor to executive functioning) is associated with later autistic traits but not CUTs in their longitudinal study, suggesting the two constructs are associated with differing executive functioning abilities. However, they did not include data for children older than seven years, and thus lacked information about continued development. When exploring the interaction of CUTs and autistic traits, Tye et al. (2017) reported that autistic children with high CUTs exhibited enhanced conflict monitoring skills. Whilst this indicates a potentially advantageous role of CUTs on executive functioning in this group of children, the study was a small-scale preliminary study using a specific task to assess conflict monitoring, which may not be generalisable to other executive functioning skills. Two studies found that CUTs/psychopathic traits in autistic children were unrelated to the executive functioning skills associated with autism (Leno et al., 2015; Rogers et al., 2006).

Emotion Recognition

Nine studies explored emotion recognition. Ibrahim et al. (2019) reported that autistic children with CUTs displayed reduced amygdala activity to fearful faces compared to those with autism only. Conversely, Rogers et al. (2006) found that all autistic children demonstrated fear recognition, regardless of the presence or absence of psychopathic traits, although this study focused on the wider construct of psychopathy (not CUTs). Results for sadness differed, with Rogers et al. (2006) reporting that autistic boys with high psychopathic traits had poorer sadness recognition than those with low psychopathic traits. These studies used morphed faces (Rogers et al., 2006) or still pictures (Ibrahim et al., 2019) which may not accurately reflect how emotions are viewed during in-person social interactions. Bedford et al. (2021) theorised that dynamic expressions are a more accurate representation of social interactions and compared static pictures with short video clips of people performing facial expressions. They reported that CUTs in typically developing children were associated with reduced emotion recognition for static facial expressions depicting anger and happiness. This association was not observed for dynamic facial expressions and disappeared when controlling for autistic traits. In contrast, autistic traits were associated with poorer overall emotion recognition for both static and dynamic expressions. Leno et al. (2021) adapted the emotion recognition stimuli from Bedford et al. (2021) and investigated emotion recognition in autistic adolescents, reporting that all participants demonstrated impairment in recognition of fearful faces with no relationship with autism severity or CUTs.

Several studies investigated the role of eye gaze on emotion recognition (Bedford et al., 2021; Bours et al., 2018; Leno et al., 2021, 2022). Bours et al. (2018) reported that autistic adolescents and adolescents with CUTs both showed reduced fixations of the eye regions compared to typically developing adolescents. When considering the interaction of autism and CUTs, Leno et al. (2021) found that CUTs in autistic adolescents was associated with longer times to identify fear and reduced eye contact during viewing of fearful faces. Leno et al. (2022) then investigated the effect of cueing attention to the eyes in children with either CUTs or autistic traits, finding that this improved fear recognition in children with CUTs (no improvement in other emotions) but had the opposite effect on overall emotion recognition in their autistic trait group, suggesting different underlying mechanisms. However, the relationship between autistic traits, emotion recognition and gaze cueing was non-significant after controlling for conduct problems, emphasising the importance of considering co-occurring psychiatric traits.

Finally, Georgiou & Fanti (2021) investigated the relationship between emotional recognition and physiological reactivity and reported that boys with CUTs exhibited low skin conductance reactivity during sad and fearful stimuli, whilst no associations were found amongst girls with CUTs or children of either gender with autistic traits. CUTs were associated with stronger heart reactivity to fear stimuli amongst children with low levels of autistic traits. They theorised that low skin conductance reflected fearlessness in children with CUTs, whilst stronger heart rate reflected thrill seeking. Unfortunately, the authors did not measure anxiety which may impact physiological responses.

Autism and Psychopathy in Adults

Prevalence

Barnard-Brak & Richman, (2021) looked at the prevalence of autistic and psychopathic traits amongst a community sample (N = 723) without a diagnosis of autism, finding that 10% met screening cut off to indicate autistic traits and 12% met screening cut off to indicate psychopathic traits; 30% of the autistic trait group also meet criteria for psychopathic traits. The study relied on brief self-report measures of autistic (AQ-10; Allison et al., 2012) and psychopathic traits (Dirty Dozen Scale; Jonason & Webster, 2010), which are not diagnostic, and findings should be viewed in the context this limitation.

The Relationship between Autistic and Psychopathic Traits

Several studies commented on the correlation between psychopathy and autism, with wide variation in the source of participants, measures, and methodology and all administering self-reports of psychopathic and autistic traits. In community samples, Barnard-Brak & Richman (2021), reported a weak but significant positive corelation, r = .19, whilst other studies reported no significant correlation (Leno et al., 2016; Loureiro et al., 2018). No correlation was found between autistic and psychopathic traits in a forensic setting (Loureiro et al., 2018).

On the other hand, Soderstrom et al. (2005) recruited violent offenders and administered the gold standard, PCL-R, and reported a significant but small positive correlation between PCL-R Total, Factor 2 (unemotionality), Factor 3 (behavioural dyscontrol) and autistic traits. No correlation between autistic traits and factor one

(interpersonal) was found. Only one study differentiated primary and secondary psychopathy, reporting a positive correlation between autistic traits and secondary psychopathy traits only (Skjegstad et al., 2022). All the aforementioned studies measured autistic traits, and only one study recruited adults with a diagnosis of autism and intellectual disability, observing a small but significant positive relationship between autism and CUTs (Álvarez-Couto et al., 2023).

Empathy

Many studies recruited typically developing individuals without a diagnosis of autism and grouped them according to whether they had high or low autistic or psychopathic traits, drawing comparisons. As expected, findings indicated that psychopathic traits were associated with diminished affective empathy and intact cognitive empathy (Lockwood et al., 2013; Oliver et al., 2016; Vyas et al., 2017) whilst autistic traits are associated with reduced cognitive empathy but not affective empathy (Jameel et al., 2019; Lockwood et al., 2013). Of note, these studies all recruited participants with a mean age of 20-21 years, an age at which the human brain is still developing, and therefore results may not be applicable to older adults. In one study, Oliver et al. (2016) failed to find a relationship between autistic traits and all measures of empathy, but the cognitive empathy test used was subject to ceiling effects, reducing the sensitivity of this task.

Studies of emotional contagion (thought to reflect affective empathy) highlighted impairment in typically developing adults with psychopathic traits and individuals with autistic traits, with greatest impairment observed in those with psychopathic traits (Helt et al., 2021). Helt et al. (2021) observed that individuals with high traits of either autism or psychopathy both showed reduced yawn contagion, but the psychopathic trait group also showed reduced contagion of itching. The relationship between autistic traits and yawn contagion was moderated by eye gaze suggesting that some of the reduced contagion was due to less time spent looking at the eyes. These findings contribute to the evidence that psychopathy is associated with diminished affective empathy to a greater extent than autism. Similar results were found in autistic adults with a diagnosis; Noppari et al. (2022) recruited violent offenders with high psychopathic traits, autistic adults and a typically developing comparison group. They observed weakened somatomotor responses in both their violent offender group and their autistic group (compared to their comparison group), however the most pronounced deficits were observed in the violent offender group.

Only one study investigated the interaction of psychopathic and autistic traits in relation to empathy. Gillespie et al. (2017) measured primary and secondary psychopathy traits and autistic traits amongst university students and observed diminished cognitive ToM performance in students with both high primary psychopathy traits and autistic traits, concluding that people with co-occurring traits of both constructs have additional empathy impairments. No interaction effect was seen for affective ToM, which was uniquely associated with primary psychopathic tendencies. Unfortunately, this was a small-scale study, relying on self-report measures.

Cognitive Profile

As with children, there was evidence that psychopathy and autism have different cognitive profiles and the authors of two studies compared high and low autistic or psychopathic trait groups on cognitive processes. The first group reported that adults with high autistic traits tend to blame vignette characters for their mistakes more so than those with low autistic traits, while those with high psychopathic traits attributed lower regret and guilt to vignette characters (Jameel et al., 2019). The second group investigated moral judgment, reporting that the high psychopathic trait group judged misdemeanours less harshly than the low psychopathy group, with no differences in those with high or low autistic traits, leading them to conclude that moral judgement was only affected by psychopathy (Vyas et al., 2017). Although offering insight into the cognitive profiles of autism and psychopathy, neither study investigated the interaction of the two constructs, and both relied on self-report measures from university students, limiting generalisability.

Two additional studies employed brain imagining techniques in individuals with autistic or psychopathic traits. Leno et al. (2016) investigated neural feedback processing of social and non-social information, reporting atypical neural feedback processing in both trait groups. Autistic traits were associated with decreased sensitivity to social feedback, whilst those with traits of the antisocial domain of psychopathy showed decreased sensitivity to all feedback and those with traits of the interpersonal domain of psychopathy showed attenuated processing of negative feedback only. Skjegstad et al. (2022) reported deficits in both trait groups for socio-affective processing, but again these showed different areas of association; autistic traits were associated with deficits in dorsal auditory processing streams (used for communication context encoding), whilst psychopathic traits were associated with hypoactivity in socio-affective processing networks. This study was exploratory and lacked

an *a priori* power calculation, but both studies suggested distinct neural mechanisms across these constructs. Again, these studies did not investigate the interaction of these traits, failing to shed light on the 'double hit' hypothesis.

Regarding the interaction of psychopathy and autistic traits, (Álvarez-Couto et al., 2023) investigated the mediating role of CUTs in different types of behaviours that challenge in a sample of autistic adults with intellectual disability. They reported that CUTs mediated the relationship between behaviours that challenge directed towards the self, but not aggressive behaviours directed towards others, therefore proposing that CUTs may have a protective role for self-directed behaviours that challenge. However, results must be viewed tentatively as this was a small-scale study that looked only at frequency and not severity of behaviour amongst those with both intellectual disability and autism.

Discussion

This review sought to investigate the relationship between psychopathy and autism and what happens when they co-occur. Thirty-six studies were identified as meeting eligibility criteria, largely published within the last 10 years. The variation in methodologies, study focus, measures and samples recruited, made comparisons difficult, allowing only provisional conclusions to be drawn. Further, few studies investigated the co-occurrence of autism and psychopathy and directly investigated the 'double hit' hypothesis making it difficult to draw clear conclusions.

Across all ages, an increased prevalence of CUTs/psychopathy in autistic individuals or in those with high autistic traits appeared to exist relative to the general population and regardless of methodology used. Prevalence rates ranged from 22%-56%, whilst prevalence of psychopathy in the general population is estimated at 4.5% (Sanz-García et al., 2021). It remains unclear whether autistic children are at risk of developing CUTs and later psychopathy, or whether autism and CUTs/psychopathy are similar constructs and overlap. Multiple limitations were associated with the measures used, drawing urgency to the need to develop measurement tools sensitive enough to untangle this relationship.

Generally, authors reported a positive correlation between autistic and psychopathic traits amongst children (Bedford et al., 2021; Georgiou et al., 2019; Georgiou & Fanti, 2021).

However, the authors of one study reported no significant correlation between autistic symptoms and CUTs in diagnosed autistic boys (Rogers et al., 2006). In adults, the positive relationship between autistic and psychopathic traits was generally attenuated relative to children (Barnard-Brak & Richman, 2021; Soderstrom et al., 2005) or not found (Leno et al., 2016; Loureiro et al., 2018). This was also observed in adults with autism and intellectual disability (Álvarez-Couto et al., 2023). The relationship between psychopathy and autism amongst adults and children may differ due to issues with the sensitivity of measurement tools and development; autistic and psychopathic traits will likely change with maturation.

Several papers evidenced that although the constructs are both associated with empathy dysfunction, the underlying mechanisms differ. In adults, psychopathy/psychopathic traits were generally found to be associated with diminished affective empathy and intact cognitive empathy, whilst the inverse relationship was seen in autism/autistic traits which is consistent with both theory and other research (Kimhi, 2014;Blair et al., 1996). A recent meta-analysis confirmed that psychopathy is associated with diminished affective empathy (Campos et al., 2022). Research about autism and affective empathy is inconsistent but points towards fewer deficits in this area compared to cognitive empathy (Fatima & Babu, 2023), with some studies reporting intact affective empathy in autistic individuals (Santiesteban et al., 2021).

In children, autism/autistic traits were also associated with difficulties with cognitive empathy but not affective empathy while the results for those with CUTs/psychopathy were inconsistent. Some studies reported deficits in both types of empathy and others reported difficulties with affective empathy only. This inconsistency may be due to developmental maturation throughout childhood (Dorris et al., 2022) or gender, as children of both genders with psychopathic traits had difficulties with cognitive empathy but there was some evidence that males overcame these difficulties during their pubertal years (Dadds et al., 2009). However, the authors of one study reported no relationship between age and empathy (Georgiou et al., 2019), which is unexpected, whilst another reported improved performance with increasing chronological age (Schwenck et al., 2012); however, they included a broader age range (six to 17 years) of boys only with intact cognitive empathy, whereas Georgiou et al. (2019) included younger boys and girls (three to eight years).

In the current review, the findings from studies about emotion recognition were mixed. In adults and children, CUTs/psychopathy was associated with reduced emotion

experience and emotion recognition ability, in particular, recognition of fear and sadness was diminished. These deficits largely remained in the presence of autism, for example, autistic boys with psychopathic traits showed poorer sadness recognition (Rogers et al., 2006), and reduced amygdala activity to fearful faces was observed in autistic children with CUTs (Ibrahim et al., 2019). However, results were inconsistent across studies with one study reporting a non-significant association between CUTs and emotion recognition after controlling for autism (Bedford et al., 2021).

Previous research has indicated that fear recognition deficits in psychopathy are associated with poor attention to the eyes, resulting in blunted affect and impaired processing of affective cues in others (Dadds et al., 2006). This association has been found across many samples, including children with CUTs (Dadds et al., 2006, 2011), community samples (Gillespie et al., 2015) and psychopathic offenders (Dargis et al., 2018; Gehrer et al., 2019), with similar findings in the current review identified by Bours et al., (2018). Regarding the co-occurrence of CUTs and autism, it appears that deficits in eye gaze remain, with autistic children with CUTs taking longer to identify fear and showing reduced eye contact when viewing fearful faces, relative to autistic children with fewer CUTs (Leno et al., 2021).

Cueing to the eyes has been shown to improve fear recognition in children with CUTs (Dadds et al., 2006). This was replicated in a single study identified in the current review, but the converse relationship was found in an autistic trait group who evidenced reduced fear recognition following cueing (Leno et al., 2022). It is possible that autistic individuals view eyes as threatening or over-arousing stimuli, thus avoiding this area and missing social processing cues which then interferes with emotion processing (Kliemann et al., 2010). This may explain why cueing to the eyes reduced fear recognition ability in autistic individuals but not in individuals with CUTs.

With regards to the 'double hit', Rogers et al. (2006) reported that although psychopathy and autism can co-occur, they are not part of the same construct, finding that autistic boys with CUTs have additional impairments in moral convention distinction and sadness recognition. In the current review, two studies reported increased empathy deficits in individuals with traits of both; Pasalich et al. (2014) found that boys with elevated CUTs and autistic traits showed greater impairment in affective empathy and in adults, and Gillespie et al. (2017) found that the interaction of autistic and psychopathic traits was associated with reduced cognitive ToM but not affective ToM. They defined cognitive ToM as the ability to

infer thoughts, intentions and beliefs of another and affective ToM as the ability to understand another's emotions. These studies offer support to the 'double hit' hypothesis, suggesting increased deficits when the constructs co-exist. However, contrasting results were reported by other studies which indicated that the co-occurrence of these constructs offers enhanced skills, including less impaired affective empathy (Pijper et al., 2016) and greater conflict monitoring skills (Tye et al., 2017). Unfortunately, based upon the studies included with the current systematic review, it was difficult to coherently describe the clinical manifestation of co-occurring autism and psychopathy due to some mixed findings. However, our findings offer support to the suggestion that autism and psychopathy are distinct constructs which further alter the empathic ability and cognitive ability of an individual when they co-exist.

Strengths and Limitations

In the current review, the search strategy restricted the search terms to the title only and included the specifier *'NOT psychopathology'*. Although this was done in efforts to screen out inapplicable results, it could have potentially led to the exclusion of some studies. The inclusion of the grey literature was a strength, but only one unpublished thesis was found. It is also important to recognise the wide focus of the review as both a strength and a limitation. Whilst this allowed for inclusion of a broad range of research, the wide focus also made it challenging to draw more specific conclusions, which may have been possible by restricting the eligibility criteria. Psychopathy and autism are highly heterogeneous, and the studies recruited a broad range of participants which is perhaps reflected in the variation of results.

In terms of limitations of the included research, only two studies (Gillespie et al., 2017; Skjegstad et al., 2022) differentiated between primary and secondary psychopathy and none considered the impact of adverse childhood experiences. In psychopathy research, children with CUTs showed strongest deficits in emotion recognition when there was no history of maltreatment, suggesting that this may be a feature of the primary variant only (Dadds et al., 2018). As adverse childhood experiences are common in autistic children (Hoover & Kaufman, 2018), this is an important variable to consider when seeking to determine the relationship between psychopathy and autism.

Clinical Implications

The increased prevalence of CUTs/ psychopathy in autistic individuals underscores the importance of assessing psychopathy as part of the evaluation of autistic offenders or those at risk of offending to better understand their presentation. Understanding this at an early stage could lead to more targeted treatment options. The studies included within this review were characterised by multiple difficulties with measurement, including lack of validated measures for identifying psychopathic traits within autistic individuals, highlighting this as an area requiring attention. There was a lack of intervention studies, however there was some evidence to suggest that interventions to improve eye contact may be a helpful strategy to improve emotion recognition in psychopathic individuals but may have a detrimental impact for autistic individuals (Leno et al., 2022). The impact of such interventions for individuals with both psychopathy and autism is unclear but clinicians should be aware of the different underlying mechanisms and consider this with implementation of any emotion recognition strategies used.

Future Directions

Although research in this area appear to have grown substantially since Rogers et al. (2006) introduced the concept of the 'double hit' hypothesis, clear gaps remain. Firstly, there remains a lack of research focusing on the interaction of both autism and psychopathy which is critical in furthering our understanding of the clinical manifestation of the two constructs when they co-occur. Age and gender remain relatively unexplored variables, with fewer studies focusing on females which may be important given indicated sex differences in psychopathy (Cale & Lilienfeld, 2002). The presentation of primary and secondary psychopathy variants in autistic individuals is unexplored and may be important as autistic individuals experience increased adverse childhood events. Furthermore, future research would benefit from longitudinal studies exploring the developmental trajectory of autism with co-morbid psychopathy or children with CUTs and autism. Finally, to aid research in this area, it is essential to establish the validity of measures of psychopathy within autistic individuals, as well as the validity of measures of autism within psychopathic individuals. These directions will all support better understanding of the relationship between psychopathy and autism and support the development of appropriate care pathways within clinical and forensic systems.

Rationale for the current study: Validation of the PCL:SV within autistic adults detained under the Mental Health Act, 1983.

As highlighted by the results from the systematic review, to further understand and explore this area, it is essential that measurement tools for psychopathy are validated for autistic adults within the CJS. The PCL was first developed by Hare (1980) as a research tool for the assessment of psychopathy in criminals. Prior to this, there was an absence of reliable, valid, and acceptable means of measuring this construct. The PCL enabled the accurate discrimination of inmates who were classified as high or low psychopathic and was considered a helpful but difficult to administer tool (Hart et al., 1992). In 1991, a revised version of this was released, known as the PCL-R (Hare, 1991), which has since been updated again with the release of the PCL-R (2nd ed) (Hare, 2003). This is a 20-item scale completed through a semi structured interview and/or file information. It includes two factors, Factor 1 measures emotional detachment and Factor 2 measures antisocial behaviour. It is considered the gold standard tool for assessment of psychopathy and is a robust predictor of recidivism and violence in criminals and forensic psychiatric patients (Hare, 1998), a view supported by results from a meta-analysis by Salekin et al. (1996). Although offering great value within the CJS, the tool remains lengthy, time consuming and resource heavy. As such, the Psychopathy Checklist Screening Version (PCL:SV) (Hart et al., 1995) has been derived. Whilst it closely mirrors the PCL-R, it is much shorter and less time consuming to administer, containing only 12 items across the two factors. It has been adjusted to capture both forensic and non-forensic populations, widening its use, and can be used in research or applied settings to screen for psychopathy or as a standalone assessment.

The psychometric properties of the PCL:SV remain strong, with item response analysis showing it as an effective short version of the PCL-R (Cooke et al., 1999). It was found to be the strongest predictor of violence in psychiatric inpatient units when compared to other commonly used risk assessment tools – the Historical, Clinical and Risk Management-20 (HCR-20) and the Violence Risk Appraisal Guide (VRAG), with combined use improving predictive validity of other measures (Doyle et al., 2002). Developed and normed in a North American population, construct validity has been supported across cultures including European forensic populations (Douglas et al., 2005; Doyle et al., 2002; Žukauskienė & Laurinavičius, 2010) and Australian violent offenders (Veal, Luebbers, et al.,

2021). It has been evaluated for use with offenders with intellectual disability and found to have equivalent psychometric properties as the PCL-R with strong interrater reliability, and moderate-large effect sizes for predictive validity (Gray et al., 2007; Pouls & Jeandarme, 2014). Currently, little is known about the validity of the PCL:SV in autistic adults within the CJS and research is needed to explore the small but clinically significant forensic population that fall under the constructs of autism and psychopathy.

Research Aims and Objectives

This study aimed to assess validity of the PCL:SV with autistic adults detained under the Mental Health Act, 1983, within England and Wales. Validation of this measure will contribute towards effective risk assessment and improved clinical care pathways for this population. Secondary data analysis was used to explore construct, convergent and predictive validity. Construct validity ensures that a measurement accurately represents the theoretical concept it aims to measure, justified by its relationships with other theoretically related constructs (Strauss & Smith, 2009). Convergent validity examines whether different measures intended to assess the same underlying construct produce consistent results, with strong correlations indicating that these measures effectively capture the intended construct (Chin & Yao, 2014). Predictive validity assesses how effectively a measure can forecast future events or outcomes, indicating its ability to accurately predict outcomes based on available information (Chin & Yao, 2014). In addition to this, internal reliability will be explored and reported to aid future use of the PCL:SV by clinicians working with this population group. Consistent with literature amongst other populations, including those with intellectual disability, the PCL:SV was expected to have adequate reliability and validity in this population.

Research Questions and Hypotheses

1. **How well does the PCL:SV relate to characteristics theoretically associated with psychopathy in autistic adults detained in under the Mental Health Act, 1983?**

There was expected to be significant positive associations between the PCL:SV scores and current length of stay in psychiatric hospital, total time spent across all psychiatric hospital admissions, total current offences, total previous offences, and total number of

violent offences. Positive relationships were also expected between the PCL:SV scores and binary variables of whether an individual had a diagnosis of personality disorder, whether they had a history of contact with the CJS and if they were detained under a forensic or civil section. This is in line with previous research which shows that psychopathy is associated with criminal and violent behaviour (Dhingra & Boduszek, 2013; Hare, 1999), and that psychopathic individuals tend to have a longer offending trajectories and are at higher risk of re-institutionalisation after release from prison than non-psychopathic individuals (Porter et al., 1999). The relationship between higher PCL:SV scores and diagnosis of personality disorder is expected given the close link between psychopathy and ASPD (Ogloff, 2006).

2. **Does the PCL:SV effectively predict moves across wards at a 12 month follow up for autistic individuals detained under the Mental Health Act, 1983?**

Broadly speaking, an individual may be detained within a secure, locked, or open ward and may be moved across these settings depending on a number of factors including level of risk and treatment progress. It was anticipated that higher scores on the PCL:SV would be inversely associated with discharge and would be predictive of negative moves across security levels (for example, moving from an open to a locked or secure ward). This is in line with previous research that indicated that the PCL-R was inversely predictive of treatment response or progress across security levels in offenders with intellectual disability (Morrissey, Mooney, et al., 2007).

3. **What is the predictive validity of the PCL:SV for aggressive or problematic behaviour in a sample of autistic adults detained under the Mental Health Act, 1983?**

Given the link between violence, offending, and psychopathy, it was expected that the PCL:SV would be predictive of aggressive or problematic behaviours in this population. This is in line with previous research that has found that the PCL:SV is the strongest predictor of violence in psychiatric inpatient units when compared to other commonly used risk assessment tools (Doyle et al., 2002).

4. **What is the relationship between the PCL:SV and the HCR-20 and Short Term Assessment of Risk and Treatability (START) measures of clinical risk in a sample of autistic adults detained under the Mental Health Act, 1983?**

Previous research has shown significant positive correlations between the PCL-R and other measures of clinical risk, including the HCR-20, in offenders with intellectual disability (Morrissey et al., 2005), and forensic psychiatric samples (Douglas et al., 2005). Therefore, it is expected that the PCL:SV will show significant positive correlations with the HCR20 and START measures of clinical risk.

Chapter 2: Method

Overview

In the previous chapter, autism and psychopathy were introduced, as well as their relationship to offending behaviour, along with the 'double hit' hypothesis. The relationship between psychopathy and autism was considered within a systematic review. The research aims for the current study were then outlined. The research design and methodology will now be presented, first exploring the philosophical framework, taking into consideration the ontological and epistemological stance and why this was chosen. It will then detail the overall research design, sample and measures used, as well as defending the use of secondary data analysis. It will end by describing the ethical considerations behind this study, summarising the analysis and plans for dissemination of findings.

Research Paradigm

A research paradigm is the philosophical framework that research is based on. It is what the researcher perceives to be as truth, reality, and knowledge, and outlines the values that guide the research design and analysis (Ryan, 2018). It is therefore critical to consider what philosophical stance a researcher takes when designing a study. The research paradigm can be further broken down into ontology, epistemology, and methodology.

Research begins with ontology. Ontology addresses the nature of existence and reality, reflecting researchers' beliefs regarding the nature of reality (Clark et al., 2021). Epistemology explores how we acquire knowledge about reality, asking, 'how do we know what we know?' (Clark et al., 2021). The methodology is then informed by both the ontological and epistemological positions. Although the terms are frequently confused, the methodology differs from the method. The method focuses on the specific procedure in the finished project, defined as the techniques or procedures used to collate and analyse data (Blaike, 2000). The methodology takes into consideration the approaches used and why these have been formed. It considers the logic, limitations, and advantages of research methods to ask 'how can we go about acquiring this knowledge?' (Grix, 2002).

Currently there are three main research paradigms to take into consideration within social science research: Neo-Positivism, Interpretivism and Critical Realism, each taking a different ontological and epistemological perspective (Blaikie & Priest, 2017). Neo-Positivism adopts a 'cautious realist' ontological stance, suggesting that reality exists independently of human perception, but that direct access to it not possible (Blaikie & Priest, 2017). Epistemologically, it embraces 'falsificationism,' whereby knowledge is produced by trial and error, with theories proposed and empirically tested (Blaikie & Priest, 2017). It is considered not possible to know if knowledge is truth, therefore theories are regarded critically and directed towards falsification.

This paradigm adopts a deductive approach, beginning with theory and not data. Researchers with this positioning first outline a phenomenon to ask questions about and apply theory too, before testing this through data collection (Blaikie & Priest, 2019). Data are then critically reviewed to assess how well the theory fits or if alternative explanations should be sought. Theories are all tentative, revisable, and replaceable. Neo-Positivism lends itself well to quantitative methods which are typically deductive in nature and driven by hypothesis testing (Clark et al., 2021).

In contrast, Interpretivism embraces 'idealist' ontological assumptions, asserting that social reality emerges from shared interpretations that individuals construct in daily life (Blaikie & Priest, 2017). Its epistemological stance is that theories should not be imposed from the outside but developed from the inside by considering how people conceptualise and understand their social worlds. Truth and knowledge are considered subjective, influenced by cultural and historical context, and based on people's experiences and understanding of them (Ryan, 2018).

Social researchers with this positioning work reflexively, drawing on six activities; sensitising (reviewing literature to consider matters to be investigated) questioning, exploring, analysing, theorising, and checking (Blaikie & Priest, 2019). Exploring involves eliciting rich accounts of data from participants, whilst analysing involves transforming this data in more abstract and compact units, before applying theory and checking and rechecking the outcome. Throughout the process, the participants and researchers are considered co-producers, aiming to transform everyday experiences into scientific concepts and theories.

Critical Realism sits somewhere in the middle of Neo-Positivism and Interpretivism and bases its ontological assumptions on 'depth realist' (Blaikie & Priest, 2017). This

assumes that social reality is constructed from our experiences of what is observable. However, this differs from the real or scientific world which is unobservable and exists independently to our perceptions. Similarly to Neo-Positivism, Critical Realism acknowledges that scientific observations are fallible as they are shaped by the conceptual frameworks within which the scientists operate and both paradigms adopt a critical stance towards 'factual truth', accepting that reality exists outside of human perception.

Epistemologically, Critical Realism maintains that underlying generative structures are not directly observable but are nonetheless real and identifiable through their observable effects, which may be shaped by our experiences and beliefs (Mcevoy & Richards, 2003). There are many valid methodologies within Critical Realism, but all seek to obtain knowledge about causal mechanisms through retroductive reasoning. This involves working backwards from observed patterns, seeking explanations, and constructing hypothetical models of the mechanisms that might have produced them within that context (Blaikie & Priest, 2019). Put simply, it involves making observations and devising a theory to explain them, through inference of what is the most likely explanation.

A Critical Realist paradigm is congruent with the aims of this study, which through the validation of a measure of psychopathy within a specific population group, seeks to better understand the relationship between psychopathy, autism and aggressive or offending behaviour. The study employed a quantitative methodology with hypothesis testing; however, it is recognised that this study reflects current trends in psychopathy and autism and data collection, analysis and interpretation may be influenced by these. In searching for 'factual truth' and validation of a measure within a specific population, it is recognised that this does not draw a complete picture. While empirical observations are acquired through quantitative analysis, the data are largely gained from fallible indicators of underlying constructs, such as the PCL:SV used to measure the construct of psychopathy.

Design

The current study used secondary data analysis of longitudinal data. Secondary data analysis is a methodology that relies on using pre-existing data and can be used for investigation of new or additional research questions, verification, refutation or refinement of existing research or synthesis of research (for example in a meta-analysis) (Heaton, 2004). It is a well-established method in social sciences and its benefits include saving time and

financial input, sharing of large-scale data that other researcher would not have had the capacity to collect, reduced respondent burden, ease of access to historical data, and increased transparency of research as data sources can be interrogated by others (Cole et al., 2008). It is particularly helpful for longitudinal studies as the research potential of a data set expands as the study matures; however, studying variables over a prolonged period is time consuming and expensive. Secondary data analysis allows for already collected data to be reused to further explore the area, expanding the depth of information gained and contributing further to the existing literature. Without this method, rich data sets may be lost, and researchers miss opportunities of gaining insights into new areas.

To undertake this secondary data analysis, data has been sourced from an existing research project known as the mATCH study (Barnoux et al., 2020; Langdon, 2015). The mATCH study was a three-year project funded through the National Institute of Health and Care Research. It aimed to investigate autistic individuals detained under the Mental Health Act, 1983, to further understand this population and improve clinical care pathways for them. The extensive data collected by this team provides many opportunities for further research to be considered with their consent. For the current study, time and financial constraints would not have allowed for the conduction of primary research in this area. Additionally, the existing data set is rich and detailed and may have placed considerable burden on the participants who contributed to it, particularly given the battery of intense neuropsychological assessments completed. The intensity of these assessments, combined with the vulnerability of the target research population, may have raised ethical questions about the need to harvest primary data instead of using an existing data set that had not reached saturation.

The mATCH study utilised a prospective cohort design with two measurement points. This is a longitudinal design that follows groups of individuals over time to allow for comparisons of differences in a particular outcome. In their research, data were collected from autistic adults detained in hospitals under the Mental Health Act, 1983, at baseline and at 12 months follow up. Data were collected from each participant including the PCL:SV and other measures of risk, clinical and behavioural factors described elsewhere. This type of study design is particularly useful when the condition to be studied is rare (as with psychopathy) and can be used to study incidence, cause, and prognosis (Mann, 2003). With prospective designs, researchers need to be aware of data lost to follow up. The data provided from the mATCH study contained information on this which was taken into consideration during analysis.

Setting

Participants for the mATCH study were originally recruited from 59 inpatient hospitals across 26 NHS Trusts and 7 hospitals from independent healthcare providers in England and Wales. The sites were comprised of 22 low secure units, 13 medium secure units, two high secure units, 11 assessment and treatment units, 12 locked hospital units (for rehabilitation, acute mental health, psychiatric intensive care or step-down services) and six open hospital units (for acute admissions, psychiatric services and specialist residential services).

Participants

The data were taken from 282 participants who at the time of data collection were detained under the Mental Health Act, 1983, or subject to the Mental Capacity Act, 2005. All participants had been identified as having a confirmed diagnosis of autism, including 251 males (89%), 30 females and one transgender person. Age ranged from 18 to 67 years (M = 33.29; SD = 11.70). In terms of ethnicity, 88.6% of participants identified as Caucasian (n = 248), 5% identified as mixed race (n= 15), 4% identified as Black African or Black Caribbean (n = 10), 2% identified as Asian (n = 6), and .4% identified as Chinese (n = 1). At baseline enrolment, most participants were single (n = 276, 98%), 4 were in relationships (1%), 1 participant was divorced (.4%) and the majority did not have any children (n = 277, 98%). Data about marital status was missing for one participant. Just over half the sample had attended special educational needs schools (n = 160, 57%) and 43% were educated in mainstream schools (n = 120). Data about educational status were missing for two participants. Forty-nine percent (n = 137) of the sample also had a diagnosis of intellectual disabilities. With regards to their autism diagnosis, 47% (n = 132) of participants had a diagnosis of childhood autism, 12% (n =35) had a diagnosis of atypical autism, 39% (n =109) had a diagnosis of Asperger syndrome and 2% (n = 5) were diagnosed with pervasive developmental disorder- not otherwise specified. Fifty-one percent (n = 144) of participants were detained under forensic sections, 44% (n = 123) of participants were detained under civil sections and a further 5% (n =14) of participants were under the mental capacity act. Data on section type was missing for one participant.

Eligibility Criteria

Individuals were eligible for inclusion in the study if they were aged 18 years or older, had an ICD-10 diagnosis of ASD made by a Clinical Psychologist, Psychiatrist, or other appropriately qualified professional and were detained within hospital using the Mental Health Act (1983) or subject to the Mental Capacity Act (2005). There were no specified exclusion criteria.

Materials and Measures

The data set provided contained a range of file-based information collated from clinical records and clinical staff working at the inpatient units recruited for data collection. Variable choice for the current study was limited by the available data which was not collected with these research questions in mind, although the data set was rich with 892 variables across time points one and two. The data were screened to see which would be most relevant for the current research study and the below variables were then included:

- Hospital admissions: Information on an individual's current length of stay and total time spent in psychiatric hospital admissions, as well as details about the individual's detention and section of the Mental Health Act, 1983, used to detain them and ward security level (secure, locked, open).
- Behavioural factors: Forensic history (including number and nature of current and previous convictions, cautions, and reprimands) and details of aggressive or problematic behaviour (detailed below).
- Clinical factors: Diagnoses of personality disorders.

Aggressive/ Problematic Behaviour

Information regarding the frequency and type of aggressive or problematic behaviour exhibited by participants was recorded by clinicians working with them over a 12-week period prior to data collection at time point two (12 month follow up). Clinicians were asked

to document all instances of aggression during this period. Recorded data were sorted into eight frequency categories: physical aggression, verbal aggression, sexual behaviour, violence to self, rule breaking, threats of violence, intimidating behaviour, and inappropriate behaviour. These were operationalised as part of the original mATCH study with definitions for each behaviour, Table 5. The data were categorised independently by two researchers and any discrepancies during categorisation were discussed with members of the research team until consensus was reached.

An extra category was added to provide data on the overall presence or absence of all recorded incidents. Additionally, data were collected on whether there was any evidence of clear violent intent exhibited by the participants across these behaviours.

Table 5
Definitions of aggression or problematic behaviour categories.

Physical Aggression	Behaviours that lead to physical harm, such as hitting others.
Verbal Aggression	Behaviours where individuals were verbally aggressive towards others, such as shouting or racial abuse.
Sexual Behaviour	Behaviours deemed inappropriately sexual in nature, such as masturbating in public.
Violence to Self	Behaviours that led to self-injury, such as cutting or head banging.
Rule Breaking	Behaviours that violated rules of the forensic mental health setting, such as absconding.
Threats of Violence/ Aggression	Behaviours where individuals verbally threatened others, such as threatening to kill others.
Intimidating Behaviour	Behaviours where participants were physically threatening others through body language, such as raising fists.
Inappropriate Behaviour	Behaviours not considered socially acceptable behaviours, such as spitting/ public defecation.
Overall Presence	Overall presence of all recorded aggressive/ problematic behaviours (Y/N).
Violent Intent	Was there evidence of clear violent intent for behaviours? (Y/N)

The Psychopathy Checklist: Screening Version

The PCL:SV is an assessment rating scale designed for screening psychopathic traits and behaviours in both forensic and non-forensic populations. It is intended for use in individuals aged 16 or over (Brazil & Forth, 2016). The PCL:SV includes 12 items and is structured to give a total score and two factor scores with each factor containing six items. Factor 1 contains six items that assess the interpersonal and affective features of psychopathy such as deceitfulness, grandiosity and lack of remorse and empathy. Factor 2 contains six items that assess the socially deviant or antisocial behaviour associated with psychopathy such as impulsiveness and poor behavioural control. The PCL:SV factor structure is in line with the factor structure of the PCL-R measure which it is developed from and is highly correlated with (r = .80) (Hart et al., 1995).

The PCL-R measure originally proposed this two-factor structure (affective/ interpersonal traits and antisocial behaviour) and has since gained substantial support from research (Hare et al., 2000). The two concepts are conceptually and statistically different whilst being positively correlated with each other (Guy & Douglas, 2006). Factor 2 in the PCL:SV differs from the PCL-R which was specially designed to focus on forensic populations and therefore contains items more specific to criminal behaviour which were re-evaluated to allow for wider application of the PCL:SV (Brazil & Forth, 2016).

Factor analytic research has since proposed the development of a three-factor model comprised of 'arrogant and deceitful interpersonal style', 'deficient, affective experience' and 'impulsive and irresponsible behavioural style' (Cooke & Michie, 2001). A two factor, four facet hierarchical model where the interpersonal/ affective factor comprises the interpersonal and affective facets and the social deviance factor comprises the lifestyle and antisocial facets has subsequently been developed by Hare (2003). Research to determine the most appropriate factor structure remains ongoing but narrative synthesis' results are initially suggestive that the three or four factor models are better supported within community and psychiatric populations (Veal, Critchley, et al., 2021). Table 6, adapted from (Veal, Critchley, et al., 2021) shows the organisation of the proposed factor models. The current study focuses on the original factor model and seeks to explore the total scores, as well as Factor 1 and Factor 2.

Table 6

Factor Structure and items of the two, three and four factor models of the PCL:SV

Two factor labels	Three/ Four factor labels	Item
Factor 1 (Interpersonal/ Affective)	Factor 1 (Interpersonal)	Superficial
		Grandiose
		Deceitful
	Factor 2 (Affective)	Lacks Remorse
		Lacks Empathy
		Doesn't Accept Responsibility
Factor 2 (Social Deviance)	Factor 3 (Lifestyle)	Impulsive
		Lacks Goals
		Irresponsible
	Factor 4 (Antisocial)	Poor Behavioural Controls
		Adolescent Antisocial Behaviour
		Adult Antisocial Behaviour

Note. Three factor model does not contain Factor 4 (Antisocial)
Table adapted from (Veal, Critchley, et al., 2021)

In the PCL:SV, all items are scored on a three-point scale from 0 to 2 according to lifetime presence and severity of symptoms (0 = absent, 1 = possibly or partially present, and 2 = present). Total scores range from 0 to 24, with total scores for each factor ranging from 0 to 12 in each factor. For clinical and forensic purposes, a cut of score of 18 is suggested, with individuals scoring 18 or over considered as 'psychopathic' and those scoring 13-17 considered 'maybe psychopathic'. The PCL:SV is completed by an appropriately trained individual, through a 30 to 60-minute semi-structured interview and corroboration with file-based information or through file-based information only (Hart et al., 1995).

The PCL:SV has strong psychometric properties, with item response analysis showing it as an effective short version of the PCL-R (Cooke et al., 1999), with interrater reliability scores ranging from .84 to .92 (Hart et al., 1995). It is commonly used as a risk assessment tool and has been found to be the strongest predictor of violence in psychiatric inpatient units when compared to other commonly used risk assessment tools (Doyle et al., 2002). Developed and normed in a North American population, construct validity has been supported across cultures including European forensic populations (Douglas et al., 2005; Doyle et al., 2002; Žukauskienė & Laurinavičius, 2010) and Australian violent offenders

(Veal et al., 2021). It has been evaluated for use with offenders with intellectual disability and found to have equivalent psychometric properties as the PCL-R with strong interrater reliability for total scores (.73 Cronbach's alpha) (Pouls & Jeandarme, 2014). Moderate-large effect sizes for predictive validity of violent (.73 area under curve for total scores) and general reconvictions (.76 area under curve for total scores) at five years follow up for total and factor scores have also been found in offenders with intellectual disability (Gray et al., 2007).

Historical, Clinical and Risk Management Tool

The HCR-20 (Douglas et al., 2013) is a structured tool to assess the risk of violence in 18 to 65-year-olds and is intended to help create risk management plans. It is one of the most used violence risk assessment tools (Singh et al., 2014). First published in 1995 by Webster et al., it has now been revised with the most recent form, version three, released for use in 2013. Version 3 is used in the current study. It consists of 20 items across three subscales – historical (10 items), clinical (5 items) and risk management (5 items). The historical subscale reviews an individual's history of problems including violent attitudes and behaviours, employment and relationship history, substance abuse, mental health disorders and traumatic experiences. The clinical scale focuses on current insight, ideation, mental health disorders, instability, and treatment response. The final scale, risk management, takes into consideration any relevant past, present or future considerations with regards to personal support, living conditions, stress, treatment response and service plans.

Items are scored on a three-point scale from 0 to 2 (0 = absent, 1 = possibly or partially present, and 2 = definitely present). A final summary rating of low, moderate, or high risk for violence is then given using the structured professional judgement model of violence risk assessment and management. This model rejects algorithmic risk estimates and instead employs a narrative approach to risk estimation (Douglas et al., 2014). Evaluators are asked to decide the overall risk rating based on the number and relevance of risk factors present, along with clinical judgement on the anticipated nature and intensity of intervention and management strategies required to mitigate risk. Although no cut off points are provided, it is generally considered that the more risk factors present, the greater the risk. By determining which dynamic risk factors are present, risk management plans can be devised

and shaped over time (Douglas et al., 2014). It is recommended to be re-administered regularly or at any point that dynamic risk factors change.

The HCR-20 (version 2) has been subject to more than 200 empirical validations demonstrating its effectiveness as a risk assessment tool (Douglas et al., 2014). Version 2 and 3 of the HCR-20 are strongly correlated (.69-.90) (Douglas & Belfrage, 2014). Research on version 3 has demonstrated excellent interrater reliability across both institutional and community settings, largely in the good to excellent range (Douglas & Belfrage, 2014). Strong predictive validity for aggression in forensic inpatient settings has been shown, with area under the curve .72 for total scores and .76 for clinical scale, although the historical scale was not predictive (O'shea et al., 2014). In a sperate study, the clinical scale has also demonstrated moderate to large effect sizes for prediction of sexually inappropriate or aggressive behaviour in forensic inpatient settings, whilst the total scores and risk scale scores demonstrated small to moderate effect sizes (O'Shea et al., 2016). Again, the historical scale was not predictive. Predictive validity has also been demonstrated within forensic psychiatric inpatients with intellectual disability (O'Shea et al., 2015).

Short-term Assessment of Risk and Treatability

The START (Webster et al., 2004) is a structured professional judgment tool used to evaluate short term risk of aggression and likely response to treatment. It is intended for use with individuals aged 16 and above with psychiatric disorders across multiple settings, including inpatient, forensic and community psychiatric care. It contains 20 items which focus on dynamic risk factors as well as patient strengths, such as substance abuse, mental state, self-harm, and social skills. These 20 items variables are associated with seven adverse outcomes such as violence, suicide, and self-harm. Items are rated on a three-point scale and coded as a strength or a vulnerability (0 indicates no vulnerability/strength evident, 1 indicates moderate vulnerability/strength and 2 indicates high vulnerability/ strength). Raters are then required to provide an overall risk rating of low, moderate or high for each of the seven undesirable outcomes. Its focus on strengths as well as vulnerabilities makes it a useful tool for informing formulation, treatment, daily management, and decision making (Coulacoglou & Saklofske, 2017). It also provides a framework for periodic risk assessment

to inform clinical progress and progress tracking of individuals (Coulacoglou & Saklofske, 2017).

O'Shea and Dickens (2014) reported high internal consistency (Cronbach's alpha for strength scales ranged from .80 to .95 and from .76 to .95 for vulnerability scales) and significant convergent validity with other established risk assessment tools including the HCR-20 and the PCL:SV in their meta-analysis. They also reported good to excellent interrater reliability. Many studies have demonstrated the predictive validity of the START. However, this varies according to the risk behaviour; for example, Braithwaite et al. (2010) and O'Shea et al. (2016) both found support for the predictive validity of aggression but neither study found support for predictive validity of self-harm, self-neglect, or victimisation. In their meta-analysis, O'Shea & Dickens, (2014) also found that most studies reported the vulnerability scale to have the strongest predictive validity.

Procedure

To facilitate this study, a data sharing agreement was put in place between the University of Kent where the data were originally harvested and the University of Essex to allow the data to be shared for further investigation with new research questions. Once this was in place, along with appropriate ethical approval, anonymised data were shared securely. After this the data were organised and analysed as described below.

Analysis

Data analysis was computed using R statistical software (R Core Team, 2023). A variety of packages were used to ensure accurate data analysis and visualisation including 'Tidyverse' (Wickham et al., 2019) 'DHARMa' (Hartig, 2022) and 'MASS' (Venables & Ripley, 2002). Descriptive statistics were first determined to provide an overview of the data, prior to calculation of structural reliability using ω analysis. All further analyses were run first using PCL:SV Total scores and then using Factor 1 and Factor 2 scores. However, Total and Factor scores were investigated independently due to collinearity. Data were not normally distributed, and therefore alternative tests were run as appropriate. Statistical analyses were performed as below in relation to each research question:

1. **How well does the PCL:SV relate to characteristics theoretically associated with psychopathy in autistic adults detained in under the Mental Health Act, 1983?**

Data were count data which violated the assumptions of linear and Poisson regression due to overdispersion. It was not deemed appropriate to remove outliers as this would likely remove data from psychopathic individuals whose data at the more extreme ends of the scale may reflect their personality traits. Therefore, negative binomial regressions were performed with PCL:SV Total and Factor scores entered as predictor variables and variables theoretically related to psychopathy entered as outcome variables. Logistic regressions showed appropriate model fit and were run with binary outcome variables. Some characteristics such as the total number of days spent in hospital are age dependent; therefore, age was included in the models. The following outcome variables were used: current length of stay in psychiatric hospital (days), total time spent across all psychiatric admissions (days), total current offences (current convictions, cautions, and reprimands), total previous offences (total previous convictions, cautions, and reprimands), total number of violent offences. Binary variables used were diagnosis of personality disorder (yes/no), forensic background (yes/ no) and mental health section (civil/forensic). An individual was considered to have a forensic background if they had a history of contact with the CJS.

2. **Does the PCL:SV effectively predict moves across wards at a 12 month follow up for autistic individuals detained under the Mental Health Act, 1983?**

First, multinomial logistic regression was conducted to examine the relationship between PCL:SV Total and Factor scores and any changes in ward location at 12 month follow up. The outcome variable 'location' had three levels; no change, transferred, discharge, which were based on any change to an individual's location from baseline measurement. A new variable was then created to investigate treatment progress by investigating positive or negative change across security locations. Positive change was defined as being moved down a security level, for example, from high to medium or low security or from medium to low security, whereas a negative change was defined as a move up a security level, for example, moving from low to medium or high security or moving from medium to high security setting. PCL:SV and follow up data on location within hospitals was available for N = 226 participants. Of these, 51 (23%) had made positive changes, 5 (2%) had made negative changes and 170 (75%) had made no changes and

remained in the same security level as baseline. Due to low numbers in the negative change category making analysis not feasible, the negative change group was further collapsed into the no change category. Grouping these two categories together allowed for a more robust analysis. The final variable therefore had two categories – positive change (n = 51, 23%) and no/negative change (n = 175, 77%). Logistic regression was then run using this data as the outcome variable.

3. What is the predictive validity of the PCL:SV for aggressive or problematic behaviour in a sample of autistic adults detained under the Mental Health Act, 1983?

To complete receiver operating characteristic (ROC) curve analysis, binary variables were first created for each of the aggressive or problematic behaviours, indicating the presence or absence of the specified behaviour. Behaviours were recorded as present if the recorded data showed at least one documented incident of the specified behaviour over the previous 12-week period. Logistic regression and ROC curve analysis were then calculated for each of these binary variables. Receiver operating characteristic curve analysis is used to calculate the area under the curve (AUC), which can be used to examine efficacy of a measurement tool such as the PCL:SV and help determine optimal cut off points. It is recommended as the preferred measure of predictive or diagnostic accuracy in forensic psychiatric fields (Rice & Harris, 2005). Area under the curve values can range from 0, a perfect negative classification, .5, a completely chance outcome to 1, a perfect prediction (Schmidt et al., 2006). The AUC value reflects the likelihood that a randomly chosen individual who has displayed the outcome behaviour will have a higher score on the PCL:SV than an individual who has not displayed the outcome behaviour. In essence, the AUC value quantifies the discriminatory power of the PCL:SV measure in distinguishing between individuals who exhibit the outcome behaviour and those who do not. A higher AUC value indicates greater predictive accuracy of the PCL:SV in identifying individuals at risk for future aggressive behaviours, while a lower value suggests less discriminatory ability. Interpretation of AUC has varied across studies, but generally values less than .70 are considered poor, those between .70 to .80 are moderate, while those higher than .80 to .90 are good, and those higher than .90 are considered excellent (de Hond et al., 2022). Receiver

operating characteristic curve analysis was used to analyse total frequency of each aggressive or problematic behaviours, as well as to review each behavioural category in turn.

4. What is the relationship between the PCL:SV and other measures of clinical risk used in a sample of autistic adults detained under the Mental Health Act, 1983?

Data were not normally distributed and therefore Spearman's rank correlation was used to measure the strength and direction of the relationship between the PCL:SV, HCR20 and START measures.

Missing Data Analysis

A total of 16.6% data was missing across all the variables used in the analysis, Table 7. The largest amount of missing data (38%) comes from the variables looking at problematic or aggressive behaviours at 12 month follow up. Little's multivariate test (Little, 1988) was conducted to establish if data was missing completely at random (MCAR), missing at random (MAR) or not missing at random (NMAR). The result was not significant (p = .99), indicating that data were MCAR and unbiased. To further address missing data, multiple imputation was used to estimate missing values for all variables with missing data > 5%. Multiple imputation works by creating several imputed data sets and then computing the analyses for each imputed data set using the parameter estimates and their standard errors saved for each data set (Schlomer et al., 2010). Final results are then obtained by pooling the imputed data sets and averaging the parameter estimates across these multiple analyses.

Multiple imputation is considered one of the best options for handling missing data as it accounts for the random fluctuations that occur between each imputed analyses and provides accurate standard errors and inferential conclusions (Schlomer et al., 2010). In this study, 30 data sets were imputed, and missing values were replaced by imputed values using multiple imputation by chained equations (MICE) on R (Buuren & Groothuis-Oudshoorn, 2011). Additionally, data on the number of co-morbid physical and mental health conditions, drug use and IQ were included as auxiliary variables to enhance the imputation process. Auxiliary variables are variables that may account for any pattern of missing data or that correlate with missing data (Collins et al., 2001). Including auxiliary variables is encouraged and considered to be beneficial in enhancing the model with few risks (Collins et al., 2001).

Table 7

Percentage of missing data in variables

Variable	Missing Data (%)
PCL:SV Total	9
PCL:SV Factor 1	9
PCL:SV Factor 2	9
Age	0
Current Length of Stay (days)	0
Total Days Spent in Mental Health Hospitals	4
Total Previous Convictions, Cautions and Reprimands	4
Total Current Convictions, Cautions and Reprimands	1
Total Number of Violent Offences	11
Forensic Background	0
Diagnosis of Personality Disorder	0
Mental Health Section	0
Location (at 12 month follow up)	0
Change in Security Level	20
Physical Aggression	38
Verbal Aggression	38
Sexual Behaviour	38
Violence Towards Self	38
Rule Breaking	38
Threats of Aggression	38
Intimidating Behaviour	38
Inappropriate Behaviour	38
Overall Presence	38
Violent Intent	37
HCR20 - Historical Scale	37
HCR20 - Clinical Scale	7
HCR20 - Risk Management Scale	7
HCR20 - Total Score	7

HCR20 - Serious Physical Harm	15
HCR20 - Imminent Violence	16
HCR20 - Future Violence	15
START - Strengths	7
START - Vulnerabilities	7

Ethical considerations

This study was granted approval from the University of Essex research committee (see Appendix A). No data were shared prior to this being granted. The data were already anonymised and no longer contained any personally identifiable information allowing for the continued confidentiality of participants. Using secondary data removes the need for any face-to-face contact thus minimising any risk of harm to participants and researchers. A favourable ethical opinion was granted by NHS Wales Research Ethics Committee 7 and associated Health Research Authority approval (REC Ref: 15-WA-0246; IRAS: 181659), to allow for the original mATCH study (Barnoux et al., 2020; Langdon, 2015) (where data were harvested from) to take place.

Dissemination

It is hoped the results of this study will contribute towards future research in this area and towards the development of improved clinical care pathways for this population, therefore dissemination of the findings is a key element of this project. The final version of this thesis will be stored and accessible through the University of Essex research repository. An overview of the study will be presented at The University of Essex, School of Health and Social Care annual staff and student research conference (June 2025). Findings will also be disseminated to the mATCH team who provided the original data. The systematic review has now been published in 'Frontiers in Psychiatry' (Maguire et al., 2024), full reference: Maguire, K., Warman, H., Blumenfeld, F., & Langdon, P. E. (2024). The relationship between psychopathy and autism: a systematic review and narrative synthesis. *Frontiers in Psychiatry*, *15*. https://doi.org/10.3389/fpsyt.2024.1375170, (see Appendix B for further details). The current study will also be submitted for consideration to relevant journals such as the 'Journal

of Autism and Developmental Disorders', which encourages publications of effective clinical care and mental health research as well as diagnostic reliability and validity research.

Chapter Three: Results

Overview

In the previous chapter, the methods for the study were outlined, going over the research paradigm, study design and setting, participants, materials, and measures used. It also included an overview of the analysis. In this chapter the results of the study are presented, starting with the descriptive statistics and reliability analysis before going through each research question in turn. Results are presented in tables with an overview of the main findings highlighted in the text. Comparison to the imputed values calculated for the missing data analysis is also included.

Descriptive and Reliability Information of the PCL:SV

Descriptive statistics including mean inter-item correlation (MIIC) and reliability statistics for the PCL:SV Total and Factor 1 and 2 are reported in Table 8. The mean score for PCL:SV Total was $M = 10.7$ ($SD = 5.83$, $Min = 0$, $Max = 24$). PCL:SV data were available for 257 participants, and within the sample a total of 13.48% (n = 38) met criteria for psychopathy using the cut off score of ≥ 18; 18.79% (n = 53) met criteria for 'maybe psychopathic' using the cut off score of 13-1; the remaining 58.51% (n = 165) were categorised as 'non psychopathic'.

For the reliability analysis, ω was calculated as this a more robust and optimal measure due to assuming a congeneric model, allowing for factor loadings to vary (Hayes & Coutts, 2020). Structural reliability estimates for PCL:SV Total were highest, $\omega = .97$, followed by Factor 1, $\omega = .93$, and then Factor 2, $\omega = .88$. These suggested excellent to satisfactory reliability. To allow for comparisons to previous research, structural reliability estimates of Cronbach's α are also presented and can be seen to be satisfactory, $\alpha = .80$, for the PCL:SV Total scores, as well as Factor 1, $\alpha = .83$, and Factor 2, $\alpha = .77$ (Bland & Altman, 1997). Reliability estimates using both methods were the lowest for Factor 2, but acceptable, which is similar to other PCL:SV reliability estimates with different populations (Hart et al., 1995; Rogers et al., 2000; Žukauskienė et al., 2010). The MIIC was lowest for PCL:SV Total, followed by Factor 2, with Factor 1 having the highest MIIC. This is again similar to other reports (Douglas et al., 2005; Hart et al., 1995; Žukauskienė et al., 2010).

Table 8

Descriptive Data, Mean Inter-Item Correlations and Cronbach's Alpha for PCL:SV Total, Factor 1 and Factor 2

PCL:SV scale	N	*M*	*SD*	*Min-Max*	*MIIC*	Cronbach's *α* (95% CI)	ω (95% CI)
PCL:SV Total	257	10.70	5.83	0-24	.35	.87 (.84 - .89)	.97 (.93 – 1)
Factor 1	257	4.81	3.23	0-12	.45	.83 (.80 - .86)	.93 (.88 - .98)
Factor 2	256	5.89	3.30	0-12	.36	.77 (.72 - .81)	.88 (.82 - .93)

Note: SD = standard deviation, MIIC = mean inter-item correlation, CI = confidence intervals

Research Question 1: How well does the PCL:SV relate to characteristics theoretically associated with psychopathy in autistic adults detained in under the Mental Health Act, 1983?

This question aimed to investigate the construct validity of the PCL:SV, hypothesising that there would be significant positive associations with variables theoretically associated with psychopathy. Descriptive data for variables is presented in Tables 9 and 10.

Table 9

Descriptive statistics for count variables used in research question 1

	n	*M*	*SD*	*Min - Max*
Current Length of Stay (days)	282	928.00	1534.23	1-17934
Total Days Spent in Mental Health Hospitals	271	2694.07	3332.57	7 - 20805
Total Previous Convictions, Cautions and Reprimands	271	4.46	16.96	0 - 235
Total Current Convictions, Cautions and Reprimands	280	1.94	3.50	0 - 33
Total Number of Violent Offences	251	2.43	4.41	0 - 42

Table 10

Descriptive data for binary variables used in research question 1

	n	Frequency
Forensic Background	281	No – 113
		Yes – 168
Diagnosis of PD	282	No – 228
		Yes – 54
Mental Health Section	267	Forensic – 144
		Civil – 123

First, regression models were used to examine the relationship between the PCL:SV, length of time spent in hospital and criminal offending, Table 11. Controlling for age, PCL:SV Total, Factor 1, and Factor 2 significantly predicted, in the positive direction, current length of stay, total days spent in mental health hospitals, and total previous convictions, cautions and reprimands. However, controlling for age, PCL:SV Total, Factor 1, and Factor 2 did not significantly predict total *current* convictions, cautions and reprimands. The PCL:SV Total and Factor 1 significantly predicted total number of violence offences in the positive direction, while this was not the case for Factor 2. Using imputed data for missing data analysis, similar results were revealed but the significance level between Factor 2 and current length of stay altered from $p < .001$ to $p = .05$, making it only marginally significant (see Appendix C).

Table 11

Negative binomial regression results: The relationship between PCL:SV Total and Factor scores and characteristics theoretically associated with psychopathy

Outcome Variable	Predictor Variable	β	SE	z	*p*	IRR (95% confidence intervals)
	Model 1					
Current Length of Stay (days)	Age	.02	.01	2.86	<.001***	1.02 (1.01 – 1.03)
	PCL:SV Total	.04	.01	3.63	<.01**	1.04 (1.02-1.07)
	Model 2					
	Age	.02	.01	3.11	<.01**	1.02 (1.01 – 1.03)
	Factor 1	.06	.02	2.84	<.01**	1.06 (1.02 – 1.11)
	Model 3					
	Age	.02	.01	2.82	<.01**	1.02 (1.00 – 1.03)
	Factor 2	.07	.02	3.59	<.001***	1.08 (1.03 -1.12)
	Model 1					
Total Days Spent in Mental Health Admissions	Age	.05	.01	10.19	<.001***	1.06 (1.05 – 1.07)
	PCL:SV Total	.04	.01	3.50	<.001***	1.04 (1.02 - 1.06)
	Model 2					
	Age	.06	.01	10.38	<.001***	1.06 (1.05 – 1.07)
	Factor 1	.07	.02	3.67	<.001***	1.07 (1.03 – 1.12)
	Model 3					

	Age	.06	.01	10.28	<.001***	1.06 (1.05 – 1.07)
	Factor 2	.06	.02	3.00	<.01**	1.06 (1.02 – 1.10)
	Model 1					
Total Previous Convictions, Cautions and Reprimands	Age	.03	.01	2.81	<.01**	1.03 (1.01 – 1.06)
	PCL:SV Total	.12	.02	4.95	<.001***	1.12 (1.07 - 1.18)
	Model 2					
	Age	.03	.01	2.35	.02*	1.03 (1.00 – 1.05)
	Factor 1	.21	.04	4.95	<.001**	1.23 (1.13 – 1.34)
	Model 3					
	Age	.04	.01	3.35	<.001***	1.04 (1.02 – 1.07)
	Factor 2	.17	.04	4.08	<.001**	1.19 (1.09 – 1.29)
	Model 1					
Total Current Convictions, Cautions and Reprimands	Age	-.01	.01	-1.80	.07	.99 (.97 – 1.00)
	PCL:SV Total	.01	.02	.72	.47	1.01 (.98 – 1.04)
	Model 2					
	Age	-.01	.01	-1.85	.06	.99 (.97 – 1.00)
	Factor 1	.05	.03	1.78	.07	1.05 (1.00 – 1.11)
	Model 3					
	Age	-.01	.01	-1.87	.06	.99 (.97 – 1.00)

Factor 2	-.01	.03	-.49	.63	.99 (.94 – 1.04)

	Model 1					
Total Number of Violent Offences	Age	.00	.01	.40	.69	1.00 (.99 – 1.02)
	PCL:SV Total	.05	.02	2.57	.01*	1.05 (1.01 – 1.09)
	Model 2					
	Age	.00	.01	.22	.82	1.00 (.98 – 1.02)
	Factor 1	.09	.03	2.51	.01*	1.09 (1.02 – 1.16)
	Model 3					
	Age	.01	.01	.53	.60	1.01 (.99 – 1.02)
	Factor 2	.07	.03	1.94	.05	1.07 (1.00 – 1.14)

Note: Significance level, p* < .05, p ** < .01, p ** < .001***
SE, standard error, IRR, incidence rate ratio

Logistic regression analyses revealed significant positive relationships between forensic background and PCL:SV Total and Factor 1 as was expected, Table 12. A one-point increase in PCL:SV Total significantly increased the chances of having a forensic background by 1.06 times, or 6%, and a one-point increase in Factor 2 significantly increased the chances of having a forensic background by 1.32 times, or 32%. However, the opposite was the case for Factor 2, and the analysis indicated that a one-point increase on Factor 2 was associated with a significant increase in the chances of not having a forensic background by 1.15 times, or 15%. Considering a diagnosis of personality disorder, there was a significant positive relationship with both PCL:SV Total and Factor 1; a one-point increase in PCL:SV Total and Factor 1 significantly increased the chances of having a personality disorder diagnosis by 1.11 times, or 11%, and 1.25 times, or 25%, respectively. Factor 2 was not significantly related to personality disorder diagnosis. Turning to consider type of Mental Health Act section, both Factor 1 and Factor 2 were associated with type of section, but in opposite

directions. A one-point increase in Factor 1 was significantly associated with a 1.25 times (25%) greater chance of being detained under a forensic section, while a one-point increase in Factor 2 was significantly associated with a 1.15 times (15%) chance of being detained under a civil section. All results survived multiple imputation for missing data analysis (see Appendix C).

Table 12

Logistic regression results: PCL:SV Total and factor scores and characteristics theoretically associated with psychopathy

Outcome Variable	Predictor Variable	β	SE	z	*p*	OR (95% confidence intervals)
Forensic Background	PCL:SV Total	.06	.02	2.65	.01*	1.06 (1.02 – 1.11)
	Factor 1	.28	.06	4.64	<.001***	1.32 (1.18 – 1.49)
	Factor 2	-.14	.05	-2.67	.01*	.87 (.78 - .96)
Diagnosis of PD	PCL:SV Total	.11	.03	3.85	<.001***	1.11 (1.06 – 1.18)
	Factor 1	.22	.06	3.48	<.001***	1.25 (1.10 – 1.42)
	Factor 2	-.01	.06	-.15	.88	.99 (.87 – 1.12)
Mental Health Section	PCL:SV Total	-.04	.02	-1.71	.09	.96 (.92 – 1.01)
	Factor 1	-.22	.06	-3.97	.00**	.80 (.71 - .89)
	Factor 2	.14	.05	2.63	.01*	1.15 (1.04 – 1.28)

Note: Significance level, p < .05, p ** < .01, p ** < .001****
PD, personality disorder, SE, standard error, OR, odds ratio
Reference categories: No forensic background, no diagnosis of PD, forensic section

Research Question 2 - Does the PCL:SV effectively predict moves across wards at 12 month follow up for autistic individuals detained under the Mental Health Act, 1983?

This question aimed to investigate the predictive validity of the PCL:SV in relation to changes in ward location at 12 month follow up (no change, transferred or discharged), hypothesising that higher PCL:SV scores would be negatively associated with discharge. Data were available for N = 263 participants, with n = 129 (49%) participants in the no change category, n = 59 (22%) in the transferred category and n = 75 (29%) in the discharged category. Multinomial logistic regression results are presented in Table 13. PCL:SV Total and Factor 1 were both significant predictors of location at 12 months, whilst this was not the case for Factor 2. These relationships indicated that higher scores on PCL:SV Total and Factor 1 were associated with decreased likelihood of being discharged.

Table 13
Multinomial logistic regression results: The relationship between PCL:SV Total and Factor scores and location at 12 month follow up

Predictor Variable	Location	β	SE	Z	p	OR (95% confidence intervals)
PCL:SV Total	Transferred	-.01	.03	-.43	.67	.99 (.94 - 1.04)
	Discharged	-.13	.03	-4.34	<.001***	.88 (.82 - .93)
Factor 1	Transferred	-.01	.06	-.08	.93	.99 (.88 – 1.12)
	Discharged	-.15	.07	-2.17	.03*	.86 (.76 - .99)
Factor 2	Transferred	-.02	.06	-.31	.76	.98 (.87 – 1.11)
	Discharged	-.12	.06	-1.94	.05	.89 (.78 – 1.00)

Note: Significance level, p* < .05, p ** < .01, p ** < .001***
Location in secure psychiatric hospital (no change, transferred, discharge (based on changes from location at baseline data point))
SE, standard error, OR, odds ratio
Reference category = no change

Logistic regression was then computed to investigate the relationship between PCL:SV and positive change or no/ negative change across security levels with results revealing significant positive relationships for PCL:SV Total and Factor scores, Table 14. A one-point increase in PCL:SV Total, Factor 1 and Factor 2 significantly increased the chances of experiencing a negative change or no change by 1.10 times (10%), 1.16, (16%), and 1.19 (19%) respectively. All results for changes in location and security level survived multiple imputation for missing data analysis (see Appendix D).

Table 14

Logistic regression results: The relationship between PCL:SV Total and Factor scores and changes in security level at 12 months.

Outcome Variable	Predictor Variable	β	SE	z	*p*	OR (95% confidence intervals)
Changes in security level	PCL:SV Total	.10	.03	3.06	<.01**	1.10 (1.04 – 1.18)
	Factor 1	.15	.06	2.65	.01*	1.16 (1.04 – 1.31)
	Factor 2	.17	.06	3.04	<.01**	1.19 (1.07 – 1.33)

Note: Significance level, p < .05, p ** < .01, p ** < .001****
SE, standard error
Reference category: positive change

Research Question 3 - What is the predictive validity of the PCL:SV for aggressive or problematic behaviour in a sample of autistic adults detained under the Mental Health Act, 1983?

Descriptive data of the aggressive or problematic behaviour at 12 month follow up shows physical and verbal aggression as the most frequent type of problematic behaviour (*M* = 1.47 and 1.52 respectively) and sexual behaviour as the least frequent (*M* = .41), Table 15. As the analysis used a binary version of these variables to complete the ROC curve analysis, frequency data on presence vs absence of each behaviour is also presented.

Table 15

Descriptive Statistics of aggressive or problematic behaviours over 12 week period at 12 month follow up

Type of Behaviour	*n*	*M*	*SD*	*Min - Max*	*Present vs Absent*
Physical Aggression	176	1.49	5.12	0-52	Absent - 116
					Present - 60
Verbal Aggression	176	1.41	2.66	0-17	Absent - 94
					Present - 82
Sexual Behaviour	176	.41	1.24	0 - 10	Absent – 144
					Present – 32
Violence To Self	176	.59	3.23	0 - 38	Absent – 150
					Present - 26
Rule Breaking	176	.70	2.04	0 - 15	Absent – 125
					Present - 51
Threats of Violence/ Aggression	176	.75	2.44	0 - 20	Absent – 136
					Present - 40
Intimidating Behaviour	176	.95	2.86	0 - 22	Absent – 129
					Present - 47
Inappropriate Behaviour	176	.89	3.58	0 - 31	Absent – 145
					Present - 31
Total Frequency	176	7.19	12.93	0 - 84	Absent – 50
					Present - 126
Violent Intent	178	-	-	-	Absent – 78
					Present - 100

Logistic regression was used to investigate the predictive validity of PCL:SV Total and Factor scores for each of the specific aggressive or problematic behaviours, prior to calculating the AUC for each of these, Table 16. The PCL:SV (Total and Factor scores) had an AUC of less than .70 for all aggressive and problematic behaviours, indicating overall poor discriminatory ability (de Hond et al., 2022). Despite this, the logistic regression results and AUC were statistically significant for several specific behaviours. Factor 2 was the best predictor of aggressive or problematic behaviours and had a statistically significant AUC for all specified behaviours except for violence towards self. PCL:SV Total had a statistically

significant AUC for all specified behaviours except for physical aggression, violence towards self and inappropriate behaviour. Factor 1 had the fewest statistically significant AUC results. Some results did not survive missing data analysis, with AUC for Factor 2 and physical aggression changing from .59 (p =.03) to .57 (p =.07); however, changes were small and did not result in any other significant results becoming non-significant (Appendix E).

Logistic regression results revealed similar patterns of statistical significance, showing that higher scores on PCL:SV Total and Factor 2 were associated with increased likelihood of displaying verbal aggression, sexual behaviour, rule breaking, intimidating behaviour, overall presence of any aggressive or problematic behaviour, and an increased likelihood of displaying any type of behaviour with clear violent intent. In addition, Factor 2 was significantly and positively associated with increased likelihood of displaying threats of aggression and inappropriate behaviour. Results from Factor 1 again indicated that it was a poorer predictor of aggressive or problematic behaviours, and it was significantly and positively associated with increased likelihood of displaying verbal aggression, sexual behaviour, and intimidating behaviour only. Missing data analyses led to findings for sexual behaviour, rule breaking, or threats of aggression for PCL:SV Total and Factors becoming non-significant. The relationships between Factor 1 and intimidating behaviour, Factor 2 and inappropriate behaviour, and Factor 2 and overall presence of aggressive or problematic behaviour also become non-significant (Appendix E).

Table 16

Logistic regression and AUC analysis results: PCL:SV scores as predictors of aggressive/ problematic behaviours at 12 month follow up.

Outcome Variable	Predictor Variable	B	SE	z	p	OR (95% CI)	AUC (95% CI)	AUC p value
Physical Aggression	PCL:SV Total	.02	.03	.82	.41	1.02 (.97 – 1.08)	.53 (.44 - .63)	.24
	Factor 1	-.01	.05	-.18	.86	.99 (.90 – 1.09)	.51 (.42 - .61)	.38
	Factor 2	.10	.05	1.93	.05	1.10 (1.00 – 1.22)	.59 (.49 - .68)	.03*
Verbal Aggression	PCL:SV Total	.12	.03	3.97	<.001***	1.12 (1.06 – 1.19)	.67 (.59- .76)	<.001***
	Factor 1	.16	.05	3.27	<.01**	1.17 (1.07 – 1.30)	.63 (.55 - .72)	<.01**
	Factor 2	.22	.05	4.13	<.001***	1.25 (1.13 – 1.39)	.69 (.61 - .77)	<.001***
Sexual Behaviour	PCL:SV Total	.10	.34	2.84	<.01**	1.10 (1.03 – 1.18)	.66 (.57 - .76)	<.01**
	Factor 1	.15	.06	2.5	.01*	1.16 (1.03 – 1.30)	.64 (.53 - .75)	.01*
	Factor 2	.19	.07	2.96	<.01**	1.21 (1.07 – 1.39)	.68 (.58 - .77)	<.01**

Violence Towards Self	PCL:SV Total	.03	.04	.92	.36	1.03 (.96 – 1.11)	.56 (.43 - .69)	.16
	Factor 1	-.00	.06	-.03	.98	1.00 (.88 – 1.13)	.51 (.38 - .63)	.47
	Factor 2	.11	.07	1.66	.10	1.12 (.98 – 1.27)	.60 (.47 - .72)	.05
Rule Breaking	PCL:SV Total	.06	.03	2.18	.03*	1.06 (1.01 – 1.13)	.60 (.51 - .70)	.02*
	Factor 1	.09	.05	1.79	.07	1.09 (.99 – 1.21)	.58 (.48 - .68)	.05
	Factor 2	.13	.05	2.4	.02*	1.14 (1.03 – 1.27)	.62 (.52 - .71)	.01*
Threats of Aggression	PCL:SV Total	.06	.03	1.99	.05	1.06 (1.00 – 1.13)	.60 (.50 - .71)	.03*
	Factor 1	.09	.05	1.7	.09	1.09 (.99 – 1.22)	.58 (.48 - .69)	.05
	Factor 2	.12	.06	2.18	.03*	1.13 (1.01 – 1.27)	.62 (.51 - .72)	.01*
Intimidating Behaviour	PCL:SV Total	.09	.03	3.02	<.01**	1.1 (1.03 – 1.17)	.65 (.55 - .75)	<.01**
	Factor 1	.13	.05	2.49	.01*	1.14 (1.03 – 1.26)	.62 (.51 - .72)	.01*

	Factor 2	.19	.06	3.25	<.01**	1.20 (1.08 – 1.35)	.66 (.57 - .76)	<.001***
Inappropriate Behaviour	PCL:SV Total	.05	.03	1.44	.15	1.05 (.98 – 1.13)	.57 (.44 - .70)	.12
	Factor 1	.03	.06	.56	.58	1.03 (.92 – 1.16)	.53 (.40 - .66)	.32
	Factor 2	.16	.07	2.41	.02*	1.17 (1.03 – 1.34)	.64 (.51 - .76)	.01*
Overall Presence	PCL:SV Total	.08	.03	2.67	.01*	1.09 (1.02 – 1.16)	.63 (.54 - .71)	.01*
	Factor 1	.09	.05	1.71	.09	1.09 (.99 – 1.22)	.58 (.48 - .67)	.06
	Factor 2	.19	.06	3.21	<.01**	1.21 (1.08 – 1.36)	.66 (.57 - .74)	<.01**
Violent Intent	PCL:SV Total	.08	.03	2.83	<.01**	1.08 (1.03 – 1.14)	.62 (.54 - .71)	<.01**
	Factor 1	.07	.05	1.50	.14	1.07 (.98 – 1.18)	.55 (.47 - .64)	.11
	Factor 2	.20	.05	3.81	<.001***	1.22 (1.11 – 1.36)	.67 (.59 - .75)	<.001***

Note: Significance level, p* < .05, p ** < .01, p *** < .001
SE, standard error, CI, confidence intervals
Reference category = behaviour not present

Research Question 4 - What is the relationship between the PCL:SV and the HCR20 and START measures of clinical risk in a sample of autistic adults detained under the Mental Health Act, 1983?

The degree of correlation between the PCL:SV and HCR-20 and the START risk assessment was examined, Table 17. As data were not normally distributed, Spearman's rank correlation was used. As illustrated, there was a moderate degree of correlation between PCL:SV Total and HCR-20 Total scores, $r = .4$, $p < .001$, with weaker correlations between Factor 1, $r = .36$, $p < .001$, and Factor 2, $r = .32$, $p < .001$, and HCR-20 Total scores. All correlations between PCL:SV Total and Factor scores and Total and subscale scores on the HCR-20 were positive and significant, p < .001, except for the relationship between PCL:SV Total and the Imminent Violence subscale, $r = .19$, p < .01, as well as Factor 1 and the Imminent Violence subscale, $r = .14$, p = .02. Correlations between the PCL:SV and the START risk assessment revealed a moderate degree of correlation between the PCL:SV Total and Factor scores and the Vulnerabilities subscale only, which were all significant, $p < .001$. No significant relationships between the PCL:SV Total or Factor scores and the START Strengths subscale were observed. However, when performing missing data analysis, significant negative relationships between PCL:SV Total and Factor 2, and the START Strength subscale were observed, as would be expected. All other significant relationships remained significant using imputed data (see Appendix F).

Table 17

Correlations between PCL:SV Total and Factor scores and HCR20 and START measures of clinical risk

Risk Assessment Tool	PCL:SV Total	PCL:SV Factor 1	PCL:SV Factor 2
HCR20			
Historical Scale	$r = .37, p<.001$ ***	$r =.37, p<.001$ ***	$r =.35, p<.001$ ***
Clinical Scale	$r =.41, p<.001$ ***	$r =.35, p<.001$ ***	$r =.41, p<.001$ ***
Risk Management Scale	$r =.38, p<.001$ ***	$r =.35, p<.001$ ***	$r =.37, p<.001$ ***
Total Score	$r =.40, p<.001$ ***	$r =.36, p<.001$ ***	$r =.32, p<.001$ ***
Serious Physical Harm	$r =.27, p<.001$ ***	$r =.21, p<.001$ ***	$r =.30, p<.001$ ***
Imminent Violence	$r =.19, p<.01$ **	$r =.14, p = .02$*	$r =.22, p<.001$ ***
Future Violence	$r =.30, p<.001$ ***	$r =.24, p<.001$ ***	$r =.31, p<.001$ ***
START			
Strengths	$r = -.01, p =.83$	$r =.06, p = .35$	$r = -.06, p = .34$
Vulnerabilities	$r =.45, p<.001$ ***	$r =.32, p<.001$ ***	$r =.50, p<.001$ ***

Note: Significance level, p < .05, p ** < .01, p ** < .001****

Chapter Four: Discussion

Overview

The systematic review contained within the introduction highlighted an absence of validated measurement tools such as the PCL:SV for autistic adults within the CJS. Based on this finding, the current study aimed to examine the validity of the PCL:SV in autistic adults detained under the Mental Health Act, 1983. Specifically, the study aimed to investigate the construct, predictive and convergent validity of the measure using secondary data analysis with data from 282 participants. Participants were all autistic adults detained in inpatient hospitals across England and Wales, including low, medium, and high secure units, as well as assessment and treatment units, locked and open hospitals. In the previous chapter, the results were presented, going through each research question in turn, including reference to the missing data analysis that was performed. These results will now be reviewed and interpreted with reference to existing research. Strengths and limitations of the current study are then presented, as well as the implications for clinical practice, and future research. To finish, some personal reflections will be introduced.

Summary

The PCL:SV was developed as a brief measure of psychopathy across both forensic and non-forensic populations and can be used in research or applied settings to screen for psychopathy or as a standalone assessment (Hart et al., 1995). Although psychometric scales are often used in populations that differ from those in which the measure was developed, this can be problematic and can lead to invalid assessments as the characteristics or behaviours of a population may differ from those which the measure was originally validated on. This can be even more problematic within the CJS where labelling an individual as a psychopath can influence decision making and encourage more punitive actions (Blais & Forth, 2014). This is the first known paper to explore the reliability and validity of the PCL:SV in autistic adults detained under the Mental Health Act, 1983, therefore the findings provide substantial insight into the appropriate use of this measure in autistic adults.

Overall, the results demonstrated high reliability and construct validity, particularly PCL:SV Total and Factor 1, although Factor 2 showed a more intricate relationship with psychopathy related traits. Regarding predictive validity, higher PCL:SV scores were

associated with a decreased likelihood of discharge and increased likelihood of negative/no change across security wards, which can be used as an indicator of treatment progress. Predictive validity for aggressive or problematic behaviours was limited. However, Factor 2 emerged as a stronger predictor, potentially influenced by observable behaviour associated with autism and/or intellectual disabilities (e.g., behaviours that challenge). Generally, the results aligned with the existing research and theoretical understanding of psychopathy and the PCL:SV. The sample consisted of 282 autistic adults, detained across a range of security settings across England and Wales and included both males and females, covering a wide age range of 18-67 years, with the full range of scores on the PCL:SV. Despite this, results are not generalisable beyond autistic adults detained under the Mental Health Act, 1983.

Reliability

Reliability analyses revealed robust estimates of internal consistency for PCL:SV Total and Factor scores. The high ω coefficients obtained indicate excellent structural reliability, whilst Cronbach's α coefficients were satisfactory and aligned with previous research investigating the reliability of the PCL:SV in different populations (for example, Hart et al., 1995; Rogers et al., 2000; Žukauskienė et al., 2010). Consistent reliability estimates across different populations supported the stability of the PCL:SV as a psychometric instrument when administered across diverse settings and samples. Reliability estimates (Cronbach's α and ω) were lowest for Factor 2, which was again similar to prior research in different populations (Hart et al., 1995; Rogers et al., 2000; Žukauskienė et al., 2010). This may suggest potential variability across populations, with different groups of people exhibiting a wider variation in the lifestyle/ behavioural characteristics measured by Factor 2. Alternatively, this could be due to increased difficulty measuring these behavioural characteristics which may be more subjective to measure.

Construct Validity

The study aimed to investigate construct validity of the PCL:SV in this sample by asking 'how well does the PCL:SV relate to characteristics theoretically associated with psychopathy in autistic adults detained in under the Mental Health Act, 1983?' Significant positive associations between the PCL:SV and theoretically associated characteristics of psychopathy were found, including length of stay in mental health admissions, previous

convictions, and the number of violent offenses. Factor 1, which represents the interpersonal/ affective characteristics of psychopathy, was also significantly associated with increased likelihood of having a forensic background and of being detained under a forensic section. This is in line with previous research which shows that psychopathy has long been associated with criminal and violent behaviour (Dhingra & Boduszek, 2013; Hare, 1999). Psychopathic individuals also tend to have a longer offending trajectory of both nonviolent and violent crimes and are at higher risk of re-institutionalisation after release from prison than non-psychopathic individuals (Porter et al., 1999).

PCL:SV Total and Factor 1 scores were also significantly positively related to the likelihood of having a diagnosis of personality disorder. This relationship was expected given the close link between psychopathy and ASPD, which is typically considered the closest diagnostic category to psychopathy (Ogloff, 2006). Indeed, some research suggests that psychopathy is at the extreme end of ASPD (Coid & Ullrich, 2010), whilst Hare (1996) acknowledges that most psychopaths will also meet the diagnostic criteria for ASPD.

No relationship was observed between Factor 2 and diagnoses of personality disorder. Similar results were reported by Douglas et al. (2005), who found that Factor 2 was unrelated to personality disorder diagnoses in forensic psychiatric patients. Factor 1 is often considered to contain the 'core' personality features of psychopathy and captures characteristics such as superficiality, deceitfulness and lack of remorse or empathy. In comparison to Factor 2, which captures the behavioural aspects of psychopathy, these interpersonal/affective characteristics appear more closely related to the central features of personality disorders which are defined in the ICD-11 as disturbances in self and interpersonal functioning (Swales, 2022).

In contrast to Factor 1, Factor 2 was associated with greater likelihood of being detained under a civil section and reduced likelihood of having a forensic background. Consideration of the specific behavioural characteristics that Factor 2 depicts, such as impulsivity, lack of goals and poor behavioural control, helps to understand these relationships. While these characteristics are associated with psychopathy, they may also be representative of observable behaviour associated with autism and/or intellectual disabilities. For example, behaviours that challenge may be exhibited by individuals with autism and/or intellectual disabilities due to deficits in communication skills and restricted or repetitive patterns of behaviour or interest. In line with this, a systematic review by Collins et al. (2022)

reported autistic people who encounter the CJS are less likely to have a forensic history and had fewer previous convictions than non-autistic offenders.

Although the data set for the current study did not contain information regarding diagnosis of ADHD, it is noteworthy that approximately 28% of autistic people have comorbid ADHD (Lai et al., 2019) and that ADHD is a common psychiatric diagnosis in autistic people in the CJS (Collins et al., 2022). Attention deficit hyperactivity disorder is characterised by ongoing patterns of inattention, hyperactivity, and impulsivity (WHO, 2022), which could further contribute towards high scores on Factor 2 given the overlap of behavioural characteristics. When examining the correlation between ADHD and psychopathy, Eisenbarth et al. (2008) found that whilst the emotional features of psychopathy are not impaired in ADHD, the behavioural features of psychopathy are present. This suggests behavioural overlap between the psychopathic characteristics measured in Factor 2 and ADHD. Indeed, few symptoms are exclusive to one disorder and measures may be impacted by overlapping symptoms (Allely & Cooke, 2016), therefore it is crucial to consider differential diagnoses when administering the PCL:SV in this population.

In the current study, 49% of the sample had a diagnosis of intellectual disability. Morrissey et al., (2007) suggest that the true level of antisocial behaviour may be hard to capture in adults with intellectual disability as carers often show a reluctance to report offending behaviours to the police (McBrien & Murphy, 2006). There is also evidence that once reported, they are less likely to be charged for antisocial acts, or receive a more arbitrary intervention (Cockram, 2005). Therefore, it is possible that even if individuals are exhibiting Factor 2 behaviours due to psychopathy, the interaction between psychopathy and autism and/or intellectual disability may alter people's experience of these behaviours, resulting in less contact with the CJS.

A less expected finding was the lack of relationship between the PCL:SV (Total and Factors) and current convictions, cautions or reprimands, although there are many plausible explanations for this. Firstly, most participants had current convictions, cautions or reprimands ($M = 1.94$). However, data only accounted for frequency of convictions and not severity of convictions. It may be expected that that a proportion of those with higher PCL:SV scores would commit more severe, but less frequent offences (e.g., murder) whilst those with lower PCL:SV may have a different offence profile (e.g., more frequent minor offences). These relationships were not captured by the current data.

Secondly, detained individuals have restricted movement, are subject to regular supervision, risk management plans and treatment for their mental health; actions which collectively reduce opportunities to engage in behaviours that lead to involvement of the CJS. Finally, it must also be considered that behaviours occurring within institutionalised environments (such as secure psychiatric hospitals) might not always be formally recorded or reported to criminal justice authorities (Clare & Murphy, 1998).

Predictive Validity

Predictive validity of the PCL:SV was then investigated by looking at the relationship between the PCL:SV and moves across wards and treatment progress at 12 month follow up. Psychopathy is traditionally considered to be treatment resistant (Lewis, 2018); therefore, it was anticipated that a negative relationship between PCL:SV scores, discharge and positive treatment progress would be found. This relationship was shown for PCL:SV Total and Factor 1, which were both significantly associated with decreased likelihood of being discharged, whilst Factor 2 exhibited marginal significance. PCL:SV Total and Factor scores were also associated with increased likelihood of experiencing either a negative change or no change in security level at 12 months follow up. This is unsurprising given that psychopathic traits are predictive of poor therapeutic progress and risk reduction (Olver et al., 2013), both of which are critical considerations when applying to transfer to a lower security ward (NHS England, 2021).

As only five participants experienced a negative change in security level, conclusions regarding the predictive nature of the PCL:SV and negative change must be viewed tentatively. However, a far greater number of participants did not experience any change, allowing for a firmer conclusion to be drawn about this relationship. Predictive validity of the PCL:SV and treatment progress for autistic offenders has not previously been reported on, but similar results have been reported with regards to the predictive validity of the PCL-R. Morrissey, Mooney, et al, (2007) found that the PCL-R was a significant predictor of negative progress across security levels in their sample of offenders with intellectual disability, whilst Tetley et al. (2010) observed this relationship in individuals with personality disorders detained in high-security settings.

In the current study, Factor 1 and Factor 2 were both significant predictors of negative/ no change in security level, indicating that both interpersonal and lifestyle factors

can inhibit treatment progress. This contrasts to the existing PCL-R research which found that Factor 1 is a stronger predictor of negative treatment progression or therapeutic change than Factor 2 (Morrissey, Mooney, et al., 2007; Olver et al., 2013; Tetley et al., 2010). Conceptually, it makes sense that interpersonal factors such as superficiality, lack of remorse and failure to accept responsibility influence an individual's ability to develop a therapeutic rapport, develop insight into their personality and actions, or recognise when they cause harm (Olver et al., 2013). In turn, this is likely to challenge staff working with these offenders, potentially contributing towards negative staff perceptions of an individual's therapeutic progress, which can impact on professional decisions regarding placement location (Morrissey, Mooney, et al., 2007). An individual displaying psychopathic traits may also end up being labelled as difficult to treat or treatment resistant (Olver et al., 2013), therefore further impacting their opportunities to transfer to lower security settings.

The contrasting findings regarding the influence of Factor 2 in the current study may be partly attributed to differences in study design. Morrissey, Mooney, et al. (2007), Olver et al. (2013) and Tetley et al. (2010) did not investigate autistic adults, administered the PCL-R, recruited smaller samples, focused exclusively from high-security settings and had longer follow up periods. However, it is also important to consider the specific needs and behaviours of autistic adults detained under the Mental Health Act, 1983. Not all patients in secure psychiatric care have a forensic background and some are admitted due to high levels of behaviour that challenges which cannot be safely managed within general psychiatric services (Völlm et al., 2018). Behaviours that challenge are common in autistic individuals, with higher rates observed amongst those with autism and intellectual disability, than those with intellectual disability alone (Matson & Rivet, 2008). Common behaviours include aggression, destructive behaviour and self-injurious or stereotyped behaviour (Matson & Rivet, 2008). These behaviours become more complex to manage in adults due to the physical size of individuals and consequently it can be difficult to maintain a safe environment for them (Matson et al., 2011). Thus, behaviours that challenge exhibited by autistic adults maybe driving Factor 2 as a stronger predictor of negative/no change in treatment progression across security levels.

Predictive validity of the PCL:SV for problematic or aggressive behaviours was also investigated. Results indicated that the PCL:SV has limited value as a predictor in this sample, with an AUC of less than .70 for each of the specified behaviours. While existing research on the predictive validity of the PCL:SV in autistic adults is lacking, comparable

findings have been noted for the PCL-R for secure psychiatric patients with intellectual disability. Morrissey, Hogue, et al. (2007) reported low AUC values, concluding that the PCL-R did not accurately predict institutional aggression in this population.

Nonetheless, in the current study, significant AUC values were observed for various problematic or aggressive behaviours. Both Total and Factor scores were significant predictors of verbal aggression, sexual behaviours, and intimidating behaviours. Furthermore, Factor 2 was also a significant predictor for physical aggression, rule breaking, threats of aggression, inappropriate behaviours, overall presence of aggressive or problematic behaviours and violent intent. This suggests that Factor 2 is a stronger predictor of aggressive or problematic behaviour, a finding that is somewhat consistent with previous PCL:SV research. For example, Doyle et al. (2002) reported that the PCL:SV is predictive of institutional violence in medium secure psychiatric settings and that Factor 2 was a stronger predictor of more serious violent behaviours. Additionally, a meta-analysis by Guy et al. (2005) found that Factor 2 was a stronger predictor of institutional misbehaviour than Factor 1 when looking at a range of the Hare psychopathy measures (PCL, PCL-R and PCL:SV).

Again, this may be influenced by the specific behavioural problems exhibited by autistic individuals, particularly behaviours that challenge, or social-communication difficulties. As the study looked at presence vs absence of behaviours, rather than intensity or frequency, it is possible that individuals scoring highly on Factor 2 exhibited high frequency but low intensity behaviours (e.g. shouting, banging furniture, hitting, masturbating) rather than low frequency but higher intensity behaviours (e.g. sexual assault, property damage and more violent attacks) which may be more associated with psychopathy than autism. Having said that, Factor 2 was a significant predictor of violent intent (and Factor 1 was not), suggesting that at least one of the behaviours demonstrated by an individual in the 12-week period of data collection was done so with violent intent and may be considered a higher intensity behaviour.

In the current study, data reliability was reliant on consistent and thorough recordings by care staff and this may have introduced bias. Moreover, the relational, physical, and procedural security of these settings limits the opportunities for problematic behaviours to be exhibited. The predictive validity of the PCL:SV aggressive or problematic behaviours in autistic adults residing in less restrictive settings such as residential care homes or non-institutional community settings remains unknown. Gray et al. (2008) found that the PCL:SV

was a significant predictor of violent behaviour and general reconviction after discharge from medium secure psychiatric hospitals in offenders with intellectual disability. Thus, broadening the sample to encompass autistic individuals across different settings may enhance the predictive validity of the PCL:SV as the current sample is biased towards those prone to display a greater frequency of problematic or aggressive behaviours. It would be beneficial to review this in future research.

Convergent Validity

The PCL:SV demonstrated convergent validity with other risk assessment tools, indicating its utility as a risk assessment tool in autistic adults detained under the Mental Health Act, 1983. While the PCL:SV was not designed to assess risk of violence, previous research has reported on its convergent validity with other risk assessment tools (Douglas et al., 2005). In the current study, significant and moderate correlations were observed between the HCR-20 and START, except for the START strengths scale, where no association was found. This lack of correlation is understandable as the PCL:SV does not address an individual's strengths or protective factors. Overall, the measures were expected to align but not be highly correlated as they focus on measurement of different constructs or risk factors, thus these results provide evidence of the convergent validity of the PCL:SV in autistic adults detained under the Mental Health Act, 1983.

However, it is important to note that there is a sparsity of research on the validation of the HCR-20 and the START risk assessment tools in autistic adults. Preliminary evidence for the predictive validity of the HCR-20 in autistic adults has been found for overall risk and physical violence but not verbal aggression (Girardi et al., 2019) whilst research specific to the START tool and autistic adults is lacking. The validity of the PCL:SV in autistic adults could be questioned if the risk assessment tools that it converges with have not also been adequately validated for this specific population. This highlights the necessity for further research into the validation of risk assessment tools for autistic adults within the CJS. Additionally, investigating the convergent validity of the PCL:SV with other measures of psychopathy in autistic adults would enhance our understanding of its utility in this population.

Clinical Implications

Taken together, this study provides preliminary evidence for the construct, predictive and convergent validity of the PCL:SV for autistic adults detained under Mental Health Act, 1983, although Factor 1 may be more closely related to the core aspects of psychopathy, whilst Factor 2 may overlap more with behaviours that challenge and/or autism related behavioural difficulties when used with those who have autism.

Prior research has shown that autistic offenders have impaired ability to recognise fear compared to autistic non-offenders, potentially indicating co-morbid psychopathy (Woodbury-Smith et al., 2005). The 'double hit' hypothesis has also been proposed whereby an individual presents with both autism and psychopathy resulting in additional empathic impairment (Rogers et al., 2006) and this could be representative of a small but clinically significant subgroup of autistic offenders (Alexander et al., 2016). Further, the systematic review included in the introductory chapter highlighted an increased prevalence of CUTs/ psychopathy in autistic individuals, noting that autism and psychopathy are distinct constructs which alter the empathic and cognitive ability of an individual when they co-exist. Treatment needs for this subgroup of autistic individuals are likely to differ. Barnoux et al. (2020) suggested that individuals with autism and psychopathy present with increased forensic risk, requiring longer lengths of stay in secure psychiatric care due to complexities in treatment, whilst those with autism only may benefit from shorter stays and more community-based placements alongside robust care packages.

Clearly it is important to be able to sensitively assess psychopathy as part of the evaluation of autistic offenders, or those at risk of offending, to better understand their presentation. Many staff are still unaware of needs of autistic individuals in secure psychiatric care (Murphy, 2020) and those with autism and psychopathy are an even more unique group, although further research is required on the clinical manifestation of this 'double hit'. Administration of the PCL:SV measure as part of routine screening of autistic adults could prove beneficial in identifying individuals who require a more comprehensive assessment of psychopathy. Accurately identifying psychopathy in autistic individuals is likely to have implications on their clinical care pathways, risk assessment and management, particularly in the CJS or HSPH where risk management is critical.

Although psychopaths have traditionally been deemed to be treatment resistant, tailoring interventions to account for unique behavioural patterns and predisposing factors

may have the potential to mitigate violent outcomes (Reidy et al., 2013). Conversely, interventions not appropriately tailored may exacerbate violent outcomes (Reidy et al., 2013). As highlighted in the earlier systematic review, interventions targeting emotion recognition may elicit different responses in autistic individuals, compared to those with CUTs/psychopathy, and there is evidence of additional empathy impairments when an individual presents with both constructs. Given the complexity of individuals presenting with the 'double hit', clinicians must be adept at recognising the underlying mechanisms of both autism and psychopathy to provide effective and tailored interventions. Validated psychometric tools such as the PCL:SV can aid in the accurate assessment and diagnosis of these individuals, ultimately enhancing treatment outcomes and risk management strategies.

Strengths and Limitations

This study has several strengths which are worth mentioning. It is the first known paper to investigate the reliability and validity of the PCL:SV in a sample of autistic adults detained under the Mental Health Act, 1983, therefore offering valuable insight into this group of patients for who the care pathway requires further refinement. The use of secondary data analysis allowed for the inclusion of data from a large number of NHS patients which would not have been feasible in the time frame provided if independent data collection was required. The large dataset encompassed a diverse range of PCL:SV scores, spanning from the minimum to the maximum score. Within this, 13.48% of participants met criteria for psychopathy, 18.79% met criteria for 'maybe psychopathic', and the remaining 58.51% were categorized as 'non-psychopathic'. Capturing the complete range of PCL:SV scores enhances the generalisability of the study findings.

Comprehensive statistical analysis was used to attend to each research question and missing data imputation was applied where necessary to acknowledge to the sometimes-high amounts of missing data. Statistical analyses suggested that data were MCAR and the multiple imputation analyses supported this assumption by showing the data were largely unbiased. The rigorous approach to data analysis strengthens the overall integrity of the study findings, thus enhancing the confidence in the conclusions drawn from the research.

Despite this, there are also several limitations to mention. Firstly, the data set lacked diversity, consisting largely of white, British males. Data from 30 females and one transgender person was included but this was insufficient to enable meaningful comparisons

to be made between genders. Whilst autism has traditionally been considered a male dominant disorder this appears to be a changing picture, with female dominance increasing (Lai et al., 2015). Future research may wish to pay particular attention to autistic females; particularly as little is understood about female psychopathy and the specific treatment needs of this group (Reidy et al., 2013), which are likely to differ again for females presenting with co-morbid autism and psychopathy.

The study used data from a mixed sample of autistic adults with and without intellectual disability. In terms of descriptive statistics, mean scores for those with and without intellectual disabilities appeared similar. However, further analysis revealed significant group differences for Factor 1 only. Autistic adults without intellectual disability displayed higher Factor 1 scores compared to those with intellectual disability. Conceptually, this makes sense, as autistic individuals with intellectual disability may be less able to purposefully exhibit the psychopathic traits associated with Factor 1, such as grandiosity, deceitfulness, and superficiality. This is in line with previous research looking at CUTs in autistic adults with intellectual disabilities. Álvarez-Couto et al. (2023) reported a low level of CUTs in autistic adults with intellectual disability when administering the ICU measure of psychopathy which appears to focus largely on the interpersonal/ affective aspects of psychopathy that are captured in Factor 1.

As well as intellectual disability, there was also a lack of attention paid to the role of psychiatric co-morbidity. Psychiatric comorbidity has been associated with increased levels of violent behaviour in autistic individuals, particularly in those without an intellectual disability, although this association is attenuated after controlling for comorbid ADHD and conduct disorder (Heeramun et al., 2017). Intelligence quotient was not taken into consideration during the analysis, and this may contribute towards a different interpretation of the results. The observed significant group differences for Factor 1 highlight the potential influence of unmeasured variables. However, Full-Scale IQ data were not available for the full sample and therefore restricted this analysis. Morrissey et al. (2010) investigated the structural validity of the PCL-R in offenders with intellectual disability and suggested that the PCL:SV may be a more suitable measure than the PCL-R for this group. Researching this was beyond the scope of the current paper, although clearly there is a need for more research in this area.

Similarly, data on co-morbid ADHD diagnosis was missing and given the potential behavioural overlap between autism, ADHD, and psychopathy (particularly Factor 2), more research is required to untangle the accurate identification of psychopathy in those who may present with each of these constructs. Thus, although the current results provide preliminary evidence of the validity of the PCL:SV in autistic adults detained under the Mental Health Act, 1983, they must be viewed tentatively.

Future Research

Overall, these findings suggest that the PCL:SV has good reliability and validity when used with autistic adults detained under the Mental Health Act, 1983. Findings from the systematic review highlighted multiple measurement difficulties for assessing psychopathic traits in autistic individuals and a lack of validated measures. Results from this study may lead to a more robust assessment of risk, while also allowing for a more effective investigation of the relationship between psychopathy and autism and the 'double hit' hypothesis using appropriate measurement tools.

However, further research in this area is required to strengthen findings and advance our understanding of psychopathy in this population. Firstly, completion of confirmatory factor analysis is needed to examine the factor structure of the PCL:SV in this sample. Whilst this study focused on the 2-factor model, a systematic review by Veal et al. (2021) investigating the factor structure of the PCL:SV reported that the 3 and 4 factor models of psychopathy were better fitting models. If the model fit is the same in autistic adults detained under the Mental Health Act, 1983, as it is in comparison groups, then this would suggest that the same characteristics relate together in the same way to make up the construct of psychopathy (Morrissey et al., 2010). Conversely, differences in factor structure would suggest group differences in the expression of psychopathy and a lack of measurement invariance.

Results from the current study indicated that Factor 2 was a stronger predictor of aggressive or problematic behaviours. Previous research has observed different relationships between aggression and the interpersonal, affective, and lifestyle factors when the PCL:SV is broken down into the 3 or 4 Factor models of psychopathy (Douglas et al., 2005). Therefore, exploring these alternative models is warranted and establishing the best fit model of psychopathy in this population may provide more accurate and nuanced insights into the

underlying structure of psychopathy in autistic adults, as well as the expression of aggressive or problematic behaviours.

Secondly, classical test theory does not indicate whether individual items and total scores operate equivalently across groups with the same level of the latent trait (Cooke et al., 2005). To address this, item response theory (IRT) using methods such as Rasch analysis should be employed. This would establish if individual items, or total scores of the PCL:SV, differ in their ability to discriminate between levels of psychopathy in autistic adults detained under the Mental Health Act, 1983, and comparison groups (Cooke et al., 2005). If no significant difference is found, it implies that psychopathy can be defined by the same features across autistic adults and the comparison groups.

Item response theory methods also play a crucial role in evaluating how individual items contribute to the overall measurement of psychopathy as they seek to model the way in which latent constructs manifest themselves in observable item responses (Harvey & Hammer, 1999). Whilst classical test theory assumes that all items are equivalent, IRT does not (Cappelleri et al., 2014). Identifying the specific items on the PCL:SV that most closely relate to and are predictive of psychopathy in this population will provide greater precision of measurement. By addressing these research gaps, future studies can further clarify the psychometric properties of the PCL:SV and its applicability for autistic adults in forensic settings, whilst enhancing our understanding of the clinical manifestation of the 'double hit' hypothesis.

Conclusions

Whilst the relationship between psychopathy and autism is a difficult and complex relationship to untangle, it is clearly an important one. Accurate measurement of psychopathy in autistic adults within the CJS will support the development of appropriate care pathways for individuals at increased risk of committing violent crimes. This study provides preliminary evidence for the use of the PCL:SV measure in autistic adults detained under the Mental Health Act, 1983. The findings demonstrate high reliability and construct validity, particularly in PCL:SV Total and Factor 1 scores, with Factor 2 showing a more nuanced relationship with the behavioural traits of psychopathy. Predictive validity was found for the PCL:SV Total and Factor scores and ward location at 12 month follow up and AUC analyses revealed that PCL:SV Total and Factor scores were significant but weak predictors of

aggressive or problematic behaviours. Factor 2 emerged as a significant predictor for several specified behaviours, although this was potentially influenced by observable behaviour associated with autism and/or intellectual disabilities.

As the implications of a high PCL:SV score, or categorising someone as 'psychopathic' can have detrimental impacts for an individual, the PCL:SV should be used with caution until further research is completed to ascertain its validity. Completion of confirmatory factor analysis and Rasch analysis using IRT will serve as a starting point for this and will help to untangle the relationship between autism, psychopathy and aggression or offending behaviours. Overall, this study contributes to our understanding of the applicability of the PCL:SV in autistic adults detained under the Mental Health Act, 1983, and highlights avenues for further research to enhance assessment and treatment outcomes for this small but clinically significant population.

Reflective Account

At the start of this research journey, I found myself at the intersection of a keen interest in autism paired with a complete lack of knowledge in forensic work. My interest and previous clinical experiences working with autism fuelled my curiosity, yet I had little understanding of its manifestation within forensic mental health settings or the CJS. As part of my clinical training, I completed a placement in a forensic child and adolescent mental health service where I observed highly skilled and experienced clinicians have difficulty untangling autism from CUTs and conduct disorder in young people. I witnessed young people with autism and/or CUTs struggle to access appropriate support and treatment plans, whilst those around them struggled to fully understand their behavioural presentations. This led me to consider the importance of accurate differential diagnosis and the implications of diagnosis in general, which are even more critical in forensic mental health settings due to the potential for institutionalisation.

Having previously worked in primary care psychology services which founded their principles on heavy use of psychometric measures, I was critical of the use of psychometrics, particularly when used carelessly. It was evident to me how measures of depression and anxiety were used to quickly and thoughtlessly 'diagnose' and categorise people with mental health disorders. These classifications were then used to either grant or deny access to a specific treatment. Completing this research has given me a new appreciation into the application of psychometrics and their potential utility when used thoughtfully and ethically. In this way, this research has not only developed my research skills but also impacted on my clinical work. I am able to critically consider the administration of psychometrics as part of a comprehensive assessment process, valuing the information that they can provide on an individuals' experiences and needs, whilst recognising the limitations and risks associated with relying solely on psychometrics for diagnosis and treatment decisions. I hope that this research will support clinicians working with autistic adults in the forensic field to do the same.

Throughout this work, I felt it important to maintain a Critical Realist approach despite the quantitative, hypothesis testing nature of the study. Although we have developed tools that allow us to measure autism and psychopathy, in my view, these constructs remain at least partly unobservable, changeable, and constructed by human experience. These

constructs cannot be directly measured but are assumed to exist based on observable behavioural responses. For example, the gold standard measures of autism rely on observations and clinical judgements which may change depending on societal views at any given time.

However, psychometric measures and assessment tools, remain important both clinically and scientifically. Appropriate use of these can provide critical guidance to support individuals demonstrating traits of a constructs, whilst enhancing the understanding of those working around them. Additionally, throughout this work, I have been reminded that 'poor measures provide a weak foundation for research' and that science is based only on the adequacy of its measurement (Foster & Cone, 1995). I have tried to hold this Critical Realist approach in mind throughout my work.

Throughout the research process, I experienced a sense of growth and accomplishment and I feel fortunate to have had such excellent support and supervision. The supervision provided helped me to shape the trajectory of the research whilst also building confidence in my ability to navigate the complexities of research design, analysis, and interpretation. The intensity of the learning curve, alongside a challenging and somewhat relentless three-year clinical course, pushed me beyond my comfort zone; however, towards the end of this journey (and to my great surprise!) I have at times found myself enjoying the process. Completing this thesis has provided me with multiple learning opportunities and I have gained experience of designing and completing a high-level piece of research resulting in two potential publications.

Although some of the research design was decided for me due to the use of secondary data analysis, the broadness of the data set meant that I had the opportunity to develop and refine my research questions. Working with such a large and intricate data set forced me to learn how to use new statistical programmes. Originally, I had planned to use 'JASP' which simplifies statistics through its user-friendly interface, making it feel more accessible. Unfortunately, the software was not yet developed enough to allow me to complete the complexity of the required analysis for this research and I was encouraged to switch to 'R'. Although using 'R' was a steep learning curve, I was well supported and now feel somewhat competent using this for statistical analysis. I hope this this will inspire me to feel less fearful of new and challenging research questions in the future.

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Appendices

Appendix A – University of Essex ethics application and approval

Ethics ETH2223-0055: Miss Kate Maguire

Date Created   15 Aug 2022

Date Submitted   17 Aug 2022

Date of last resubmission 05 Dec 2022

Academic Staff   Miss Kate Maguire

Category   Postgraduate Research Student

Supervisor   Prof Frances Blumenfeld

Project   The relationship between Psychopathy and Autism: Validation of the PCL:SV in autistic adults detained under the Mental Health Act in secure psychiatric hospitals.

Faculty   Science and Health

Department   Health and Social Care

Current status   Signed off under Annex B

Ethics application

Project overview

Title of project

The relationship between Psychopathy and Autism: Validation of the PCL:SV in autistic adults detained under the Mental Health Act in secure psychiatric hospitals.

Do you object to the title of your project being published?

No

Applicant(s)

Miss Kate Maguire

Supervisor(s)

Prof Frances Blumenfeld

Proposed start date of research

01 Jan 2023

Expected end date

01 Oct 2024

Will this project be externally funded?

No

Will the research involve human

participants? Yes

Will the research use collected or generated personal data?

Yes

Will the research involve the use of animals?

No

Will any of the research take place outside the UK?

No

Project details

Summary of the project

Autism is overrepresented within high security psychiatric care (Murphy, 2020). While there is evidence that autistic individuals do not engage in criminal offending behaviour more frequently than the general population (Collins et al., 2022) there may be a small subgroup of autistic individuals at increased risk of committing serious crime and research is needed to examine contributory factors
(Allely et al., 2017). Psychopathy has long been associated with criminal and violent behaviour (Hare, 1999). It is therefore important to consider this as a factor when exploring the relationship between autism and violence. Psychopathy and autism are both disorders with impaired empathy. Autistic individuals struggle with "cognitive" empathy due to deficits in theory of mind but "affective" empathy is considered unimpaired within autism (Bird & Viding, 2014), while the reverse is considered the case in those with psychopathy (Blair, 2008). Some autistic individuals may also present with psychopathy which has implications for our conceptualisation of both risk and treatment. The Psychopathy Checklist Short Version (Hart et al., 1995) has been developed to measure psychopathic traits; however, it has

not yet been validated for use within autistic people. This study aims to assess validity of this measure in autistic adults detained under the mental health act in secure psychiatric hospitals. Secondary data analysis will be used to explore construct and predictive validity. Confirmatory factor analysis may also be used to examine the factor structure of the PCL:SV and assess structural validity of the measure. Validation of this measure will contribute towards effective conceptualisation of risk assessment and treatment.

Research project proposal

Will the participants, either the subjects or the investigators, be involved in any activities that could be considered to be unlawful in the UK? No

If the project is being undertaken outside the UK, will the participants, either the subjects or the investigators, be involved in any activities that could be considered to be unlawful in the country overseas? No

Participant details

Who are the potential participants?

N/A - secondary data analysis - original data was also collected anonymously (participants were never identifiable to the mATCH research team).

How will they be recruited?

N/A - secondary data analysis

Recruiting materials

Will participants be paid or reimbursed?

No

If yes, please provide details and justification for this payment.

How much will the participants be paid?

Could potential participants be considered vulnerable?

No

If yes, please explain how the participants could be considered vulnerable and why vulnerable participants are necessary for the research.

Could potential participants be considered to feel obliged to take part in the research?

No

If yes, please explain how the participants could feel obliged and how any possibility for coercion will be addressed.

Will the research involve individuals below the age of 18 or individuals of 18 years and over with a limited capacity to give informed consent?

No

Is a Disclosure and Barring Service (DBS) Check required?

No

If yes, has the DBS check been completed? No

If your project involves children or vulnerable adults but does not require a DBS check, please explain why.

Informed consent

How will consent be obtained?

Consent will not be obtained

If consent will be obtained in writing, please upload the written consent form for review and approval.

If consent will be obtained orally, please explain why.

n/a

Please upload a copy of the script that will be used to obtain oral consent.

If no script is available to upload please explain why. n/a

Who will be obtaining and recording consent? n/a

Please indicate at what stage in the data collection process consent will be obtained. n/a

If informed consent will not be obtained, explain why.

The project is secondary data analysis and no original data will be collected. The original data, collected by the mATCH research team was also collected and shared with the research team anonymously (participants were never identifiable to the mATCH research team) as part of a large scale research project. A subsample of participants did complete consent forms for the mATCH team however this related to data that will not be shared with myself or used for this project.

I have uploaded a blank document under the participant information sheet sections as the website would not allow me to proceed without uploading anything.

Please upload a participant information sheet.
Have you reviewed the information provided by the REO on participant information and consent? Yes

Confidentiality and anonymity

Will you be maintaining the confidentiality and anonymity of participants whose personal data will be used in your research? Yes

If yes, describe the arrangements for maintaining anonymity and confidentiality.

The project is a secondary data analysis only therefore no new data collection will occur. The data set used will contain already anonymised data and does not contain any personally identifiable information allowing for the continued confidentiality of participants. A favourable NHS research ethics opinion was granted to the original research team prior to the collection of any data for the purposes of their project. I have uploaded the NHS REC ethics form for the mATCH study at the end of this application.

If you are not maintaining anonymity and confidentially, please explain your reasons for not doing so.

n/a

Data access, storage and security

Describe the arrangements for storing and maintaining the security of any personal data collected as part of the project.

The data set to be used has been collected as part of a larger research project by the mATCH team at The University of Kent. For the original research, data was collected from autistic adults detained under the mental health act in secure psychiatric hospitals across England and Wales. Data consisted of a variety of demographic and clinical variables relating to: (i) admission to hospital, (ii) stay in hospital; (iii) clinical factors; (iv) behavioural factors; (v) care and treatment. All data was provided to the research team in an already anonymised format using clinical record forms. For the current study, the University of Kent and University of Essex have both signed a data sharing and confidentiality agreement to facilitate the safe sharing of this data. Data will be shared with me via nhs.net email accounts which is a secure email service allowing for data to be safely transferred between NHS accounts. The data set will be stored as password protected documents which only myself and my named supervisors will have access too. The data will be returned once the project is completed.

Please provide details of all those who will have access to the data.

Myself and my named supervisors will have access to the data for use of this research project. My named supervisors are Dr Frances Blumenfeld (internal) and Dr Peter Landgon (field supervisor) who was a lead researchers for the original project.

Risk and risk management

Risk Assessment documents

Are there any potential risks (e.g. physical, psychological, social, legal or economic) to participants or subjects associated with the proposed research? No

If yes, please provide full details and explain what risk management procedures will be put in place to minimise the risks.

Are there any potential risks (e.g. physical, psychological, social, legal or economic) to the researchers working on the proposed research? No

If yes, please provide full details and explain what risk management procedures will be put in place to minimise the risks.

Are there any potential reputational risks to the University as a consequence of undertaking the proposed research? No

If yes, please provide full details and explain what risk management procedures will be put in place to minimise the risks.

Are there any other ethical issues that have not been addressed which you would wish to bring to the attention of the reviewer(s) of your application? No

Other documents

Appendix B – Details of published systematic review

Reference: Maguire, K., Warman, H., Blumenfeld, F., & Langdon, P. E. (2024). The relationship between psychopathy and autism: a systematic review and narrative synthesis. *Frontiers in Psychiatry*, *15*. https://doi.org/10.3389/fpsyt.2024.1375170.

Review timeline from submission to publication:

Date	Updates
13 Mar 2024	Article accepted for publication.
	Review of Review Editor 1 finalized.
10 Mar 2024	Corresponding Author Kate Maguire re-submitted manuscript.
	Corresponding Author Kate Maguire posted new comments in the Editor tab.
05 Mar 2024	Interactive review forum activated.
29 Feb 2024	Review of Reviewer 2 is finalized.
23 Jan 2024	Corresponding Author Kate Maguire submitted manuscript.

Abstract and title page provided below (NB – full copy not presented here due to formatting issues, please use reference detailed above to access the article which is open access):

The relationship between psychopathy and autism: a systematic review and narrative synthesis

Kate Maguire[1], Hayley Warman[1], Frances Blumenfeld[1] and Peter E. Langdon[2,3,4*]

[1]School of Health and Social Care, University of Essex, Colchester, United Kingdom, [2]Centre for Research in Intellectual and Developmental Disabilities (CIDD), University of Warwick, Coventry, United Kingdom, [3]Coventry and Warwickshire Partnership National Health Service (NHS) Trust, Coventry, United Kingdom, [4]Worcestershire Health and Care National Health Service (NHS) Trust, Worcester, United Kingdom

Background and methods: The aim of this systematic review was to synthesise research examining the relationship between autism and psychopathy to: (a) better understand the relationship between these two constructs, and (b) describe the clinical manifestation of the two when they co-occur. A systematic search of the literature returned 36 studies.

Results: Across all ages, autistic individuals and those with elevated autistic traits but no autistic diagnoses appeared to have increased callous and unemotional traits or psychopathy relative to the general population. Several studies evidenced that although both constructs are associated with empathetic dysfunction, the underlying mechanisms differ. In adults, psychopathy/psychopathic traits were associated with diminished affective empathy and intact cognitive empathy, whilst the opposite was seen autistic adults and those with elevated autistic traits. In children, those with autistic traits or a diagnosis of autism had diminished cognitive empathy, but not affective empathy, while the relationship between callous and unemotional traits/psychopathy and empathy amongst children was less clear. The co-occurrence of autism and psychopathy was seen to lead to additional empathic and cognitive impairment, but findings were mixed making it challenging to clearly describe the clinical manifestation.

Conclusion: There remains a paucity of research investigating the interaction between autism and psychopathy and included studies were characterised by multiple measurement difficulties. Attention should be directed toward developing better methods for identifying psychopathic traits in autistic individuals to advance our understanding of the relationship between autism and psychopathy to allow for the development of appropriate care pathways for this population.

Systematic review registration: https://www.crd.york.ac.uk/PROSPERO/display_record.php?RecordID=413672, identifier CRD42023413672.

Appendix C - Missing data analysis research question 1

Research question 1: How well does the PCL:SV relate to characteristics theoretically associated with psychopathy in autistic adults detained under the Mental Health Act, 1983?

Table 18

Missing data analysis: Negative binomial regression results: PCL:SV total and factor scores and characteristics theoretically associated with psychopathy

Outcome Variable	Predictor Variable	β	SE	z	*p*	IRR (95% confidence intervals)
	Model 1					
Current Length of Stay (days)	Age	.03	.01	5.03	<.001***	1.03 (1.02 – 1.04)
	PCL:SV Total	.03	.01	2.21	.03*	1.03 (1.00-1.06)
	Model 2					
	Age	.03	.01	5.23	<.001***	1.03 (1.02 – 1.04)
	Factor 1	.04	.02	2.07	.04*	1.05 (1.00 – 1.09)
	Model 3					
	Age	.03	.01	4.88	<.001***	1.03 (1.02 – 1.04)
	Factor 2	.05	.02	1.97	.05	1.05 (1.00 -1.10)
	Model 1					
Total Days Spent in Mental Health Admissions	Age	.05	.01	9.17	<.001***	1.05 (1.04 – 1.06)
	PCL:SV Total	.03	.01	2.86	<.01**	1.05 (1.01 - 1.06)
	Model 2					

	Age	.05	.01	9.51	<.001***	1.05 (1.04 – 1.07)
	Factor 1	.06	.02	2.80	<.01**	1.06 (1.04 – 1.11)
	Model 3					
	Age	.05	.01	9.40	<.001***	1.05 (1.04 – 1.06)
	Factor 2	.04	.02	2.17	.03*	1.05 (1.00 – 1.09)
	Model 1					
Total Previous Convictions, Cautions and Reprimands	Age	.02	.01	1.71	.09	1.02 (1.00 – 1.04)
	PCL:SV Total	.12	.02	5.02	<.001***	1.13 (1.07 - 1.18)
	Model 2					
	Age	.02	.01	1.34	.18	1.02 (.99 – 1.04)
	Factor 1	.21	.05	4.62	<.001**	1.24 (1.13 – 1.36)
	Model 3					
	Age	.03	.01	2.41	.02*	1.03 (1.01 – 1.05)
	Factor 2	.18	.05	3.96	<.001**	1.20 (1.09 – 1.32)
	Model 1					
Total Current Convictions, Cautions and Reprimands	Age	-.02	.01	-2.27	.02	.98 (.97 – 1.00)
	PCL:SV Total	.01	.02	.31	.76	1.01 (0.98 – 1.04)
	Model 2					
	Age	-.02	.01	-2.32	.02	.99 (.97 – 1.00)

			SE			IRR
	Factor 1	.03	.03	1.15	.25	1.03 (.97 – 1.09)
	Model 3					
	Age	-.02	.01	-2.29	.02*	.98 (.97 – 1.00)
	Factor 2	-.02	.03	-.49	.62	.98 (.92 – 1.05)
Total Number of Violent Offences	Model 1					
	Age	.00	.01	.18	.86	1.00 (.98 – 1.02)
	PCL:SV Total	.05	.02	2.67	.01*	1.05 (1.01 – 1.10)
	Model 2					
	Age	.00	.01	.02	.98	1.00 (.98 – 1.02)
	Factor 1	.09	.04	2.54	.02*	1.10 (1.02 – 1.19)
	Model 3					
	Age	.00	.01	.31	.76	1.00 (.99 – 1.02)
	Factor 2	.07	.03	2.14	.04*	1.07 (1.01 – 1.15)

Note: Significance level, p* < .05, p ** < .01, p ** < .001***
SE, standard error, IRR, incidence rate ratio

Table 19

Missing data analysis: Logistic regression results: PCL:SV total and factor scores and characteristics theoretically associated with psychopathy

Outcome Variable	Predictor Variable	β	SE	z	*p*	OR (95% confidence intervals)
Forensic Background	PCL:SV Total	.06	.02	2.51	.01*	1.06 (1.01 – 1.11)
	Factor 1	.23	.06	3.78	<.001***	1.23 (1.11 – 1.42)
	Factor 2	-.10	.05	-1.89	.06	0.90 (.81 – 1.01)
Diagnosis of PD	PCL:SV Total	.11	.03	3.91	<.001***	1.11 (1.05 – 1.17)
	Factor 1	.20	.06	3.15	<.01**	1.23 (1.08 – 1.39)
	Factor 2	.00	.06	.06	.95	1.00 (.88 – 1.14)
Mental Health Section	PCL:SV Total	-.04	.02	-2.10	.04*	1.00 (.92 – 1.00)
	Factor 1	-.20	.06	-3.65	<.001***	.82 (.73 – .91)
	Factor 2	.10	.05	1.96	.05*	1.11 (1.00 – 1.23)

Note: Significance level, p < .05, p ** < .01, p ** < .001****
PD, personality disorder, SE, standard error, OR, odds ratio
Reference categories: No forensic background, no diagnosis of PD, forensic section

Appendix D – Missing data analysis, research question 2

Research question: Does the PCL:SV effectively predict moves across wards at a 12 month follow up for autistic individuals detained under the Mental Health Act, 1983?

Table 19

Missing data analysis: Multinomial logistic regression results: The relationship between PCL:SV total and factor scores and location at 12 month follow up

Predictor Variable	Location	β	SE	Z	*p*	OR (95% confidence intervals)
PCL:SV total	Transferred	-.02	.03	-.60	.55	.99 (.93 - 1.04)
	Discharged	-.14	.03	-4.46	<.001***	.88 (.82 - .93)
Factor 1	Transferred	-.02	.06	-.29	.77	0.98 (.86 – 1.12)
	Discharged	-.16	.06	-2.48	.01*	0.85 (.75 - .97)
Factor 2	Transferred	-.01	.06	-.19	.85	0.99 (.87 – 1.12)
	Discharged	-.11	.06	-1.93	.06	0.89 (.80 – 1.00)

Note: Significance level, p < .05, p ** < .01, p ** < .001****

Location in secure psychiatric hospital (no change, transferred, discharge (based on changes from location at baseline data point))

SE, standard error, OR, odds ratio

Reference category = no change

Table 20

Missing data analysis: Logistic regression results: The relationship between PCL:SV total and factor scores and changes in security level at 12 months.

Outcome Variable	Predictor Variable	β	SE	z	*p*	OR (95% confidence intervals)
Changes in security level	PCL:SV total	.10	.03	3.18	<.01**	1.10 (1.04 – 1.17)
	Factor 1	.12	.05	2.22	<.03*	1.23 (1.01 – 1.26)
	Factor 2	.16	.06	2.84	.01*	1.18 (1.04 – 1.32)

Note: Significance level, p < .05, p ** < .01, p ** < .001****

SE, standard error

Reference category: positive change

Appendix E – Missing data analysis, research question 3.

Research Question 3 - What is the predictive validity of the PCL:SV for aggressive or problematic behaviour in a sample of autistic adults detained under the Mental Health Act, 1983?

Table 21
Missing data analysis: Logistic regression and AUC analysis results: PCL:SV scores as predictors of aggressive/ problematic behaviours at 12 month follow up.

Outcome Variable	Predictor Variable	β	SE	z	*p*	OR (95% CI)	AUC (95% CI)	AUC *p* value
Physical Aggression	PCL:SV Total	.00	.02	-.02	.98	1.00 (.96 – 1.04)	.56 (.46 -.65)	.88
	Factor 1	-.03	.04	-.81	.42	.97 (.89 – 1.05)	.53 (.44 - .62)	.26
	Factor 2	.04	.05	.77	.45	1.04 (.93 – 1.16)	.57 (.48 - .66)	.07
Verbal Aggression	PCL:SV Total	.09	.03	3.59	<.001***	1.10 (1.04 – 1.15)	.65 (.57 - .73)	<.001***
	Factor 1	.13	.04	3.12	<.01**	1.14 (1.05 – 1.24)	.62 (.53 - .70)	<.01**
	Factor 2	.17	.05	3.60	<.001***	1.18 (1.08 – 1.30)	.67 (.59 - .75)	<.001***
Sexual Behaviour	PCL:SV Total	.04	.02	1.75	.08	1.04 (.99 – 1.10)	.67 (.57 - .76)	<.01**

	Factor 1	.08	.05	1.79	.08	1.08 (.99 – 1.19)	.64 (.53 - .75)	.01*
	Factor 2	.06	.05	1.27	.21	1.07 (.96 – 1.18)	.66 (.56 - .76)	>.01**
Violence Towards Self	PCL:SV total	-.01	.03	-.56	.58	.99 (.93 – 1.04)	.57 (.44 - .70)	.87
	Factor 1	-.06	.05	-1.23	.28	.94 (.85 – 1.04)	.49 (.37 - .62)	.54
	Factor 2	.01	.05	.16	.87	1.01 (.91 – 1.12)	.61 (.49 - .74)	.03*
Rule Breaking	PCL:SV Total	.02	.03	.68	.51	1.02 (.95 – 1.10)	.61 (.51 - .70)	.01*
	Factor 1	.03	.05	.68	.51	1.03 (.93 – 1.15)	.58 (.49 - .68)	.04*
	Factor 2	.04	.05	.70	.50	1.04 (.92 – 1.17)	.61 (.52 - .71)	.01*
Threats of Aggression	PCL:SV Total	.04	.03	1.18	.26	1.04 (.97 – 1.10)	.61 (.51 - .72)	.01*
	Factor 1	.04	.05	.73	.48	1.04 (.93 – 1.17)	.60 (.49 - .70)	.03*
	Factor 2	.06	.07	.92	.38	1.06 (.91 – 1.24)	.61 (.51 - .72)	.01*

		B	SE	t	p	OR (95% CI)	AUC (95% CI)	p
Intimidating Behaviour	PCL:SV Total	.05	.02	2.17	.03*	1.05 (1.00 – 1.10)	.63 (.53 - .74)	<.01**
	Factor 1	.06	.05	1.23	.23	1.06 (.96 – 1.17)	.61 (.50 - .71)	.02*
	Factor 2	.10	.04	2.53	.01*	1.11 (1.02 – 1.21)	.64 (.55 - .74)	<.01**
Inappropriate Behaviour	PCL:SV Total	.02	.03	.45	.66	1.02 (.94 – 1.10)	.55 (.43 - .68)	.17
	Factor 1	-.01	.06	-.21	.83	.99 (.87 – 1.12)	.50 (.37 - .62)	.52
	Factor 2	.05	.08	.73	.49	1.06 (.89 – 1.26)	.62 (.50 - .73)	.03*
Overall presence	PCL:SV Total	.07	.03	2.42	.02*	1.07 (1.01 – 1.13)	.62 (.53 - .70)	.01*
	Factor 1	.08	.05	1.77	.08	1.08 (.99 – 1.18)	.57 (.48 - .66)	.08
	Factor 2	.13	.06	2.11	.06	1.14 (1.00 – 1.31)	.65 (.56 - .73)	.01*
Violent Intent	PCL:SV Total	.07	.03	2.47	.02*	1.08 (1.01 – 1.14)	.61 (.53 - .70)	.01*
	Factor 1	.05	.04	1.23	.21	1.06 (.97 – 1.15)	.54 (.46 - .63)	.17

Factor 2	.18	.07	2.30	.03*	1.20 (1.02 – 1.41)	.66 (.58 - .74)	<.001***

Note: Significance level, p* < .05, p ** < .01, p *** < .001
SE, standard error, CI, confidence intervals
Reference category = behaviour not present

Appendix F – Missing data analysis, research question 4.

Research Question four - What is the relationship between the PCL:SV and the HCR20 and START measures of clinical risk in a sample of autistic adults detained under the mental health act?

Table 22

Missing data analysis: Correlations between PCL:SV total and factor scores and HCR20 and START measures of clinical risk.

Risk Assessment Tool	PCL:SV Total	PCL:SV Factor 1	PCL:SV Factor 2
HCR20			
Historical Scale	$r = .29, p<.001$ ***	$r =.30, p<.001$ ***	$r =.27, p<.001$ ***
Clinical Scale	$r =.29, p<.001$ ***	$r =.24, p<.001$ ***	$r =.29, p<.001$ ***
Risk Management Scale	$r =.28, p<.001$ ***	$r =.23, p<.001$ ***	$r =.26, p<.001$ ***
Total Score	$r =.37, p<.001$ ***	$r =.35, p<.001$ ***	$r =.35, p<.001$ ***
Serious Physical Harm	$r =.28, p<.001$ ***	$r =.19, p<.01$ **	$r =.30, p<.001$ ***
Imminent Violence	$r =.24, p<.01$ **	$r =.17, p = .01$*	$r =.25, p<.001$ ***
Future Violence	$r =.34, p<.001$ ***	$r =.25, p<.001$ ***	$r =.33, p<.001$ ***
START			
Strengths	$r = -.13, p <.05$*	$r =-.03, p = .57$	$r = -.19, p <.01$**
Vulnerabilities	$r =.40, p<.001$ ***	$r =.25, p<.001$ ***	$r =.42, p<.001$ ***

Note: Significance level, p < .05, p ** < .01, p ** < .001***