

**Book Title: Forensic Aspects of Neurodevelopmental Disorders: A Clinician's Guide**

**Edited by: Dr Jane McCarthy, Dr Regi Alexander and Professor Eddie Chaplin**

**Published by: Cambridge University Press**

**Chapter: A Critical Overview of Offenders with ADHD**

**Authored by: Susan Young, Kelly Cocallis, Corey Lane & Mark David Chong**

## **Abstract**

When undiagnosed or not properly treated, ADHD is associated with a range of adverse outcomes. One of many potential adverse trajectories for those with ADHD is involvement in criminal offending. Meta-analyses have reported increased prevalence rates of ADHD in youth and adult offender populations. The prevalence of comorbid disorders in offender populations is common, but this appears to be increased in those with ADHD which in turn complicates diagnosis and treatment. This chapter outlines the prevalence of ADHD in offender populations and considers gender and cultural effects. The relationship between ADHD and criminal offending is discussed, including onset and type of offending, recidivism, progress within institutional establishments, comorbidity and long-term consequences. We also consider theoretical frameworks for understanding the association between ADHD and criminal offending. Additionally, the chapter highlights the economic consequences of ADHD within offender populations and more broadly within society. We consider system barriers and practical strategies that may be implemented to identify and meet the needs of offenders with ADHD.

**Key words:** ADHD, offender, criminal justice system, prevalence, gender, culture, recidivism, prison, custody, theory, economic, assessment, treatment, intervention

## **Introduction**

Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder arising in childhood that comprises a range of inattentive and/or hyperactive-impulsive symptoms and which significantly interferes with functioning or development in two or more settings (1). The prevalence of ADHD in the general population worldwide is estimated to be approximately 5% for children/adolescents (2), and 2.5% for adults (3).

## **Overrepresentation of ADHD in criminal justice offender populations**

Empirical studies have highlighted the significant overrepresentation of individuals with ADHD in youth and adult offender populations. A meta-analysis of 42 studies revealed a prevalence rate of 25.5% in incarcerated populations, reflecting a five-fold and 10-fold increase (for youths and adults, respectively) in the prevalence of ADHD comparative to the general population (4). These findings are consistent with a meta-analysis of 102 studies which found a prevalence rate of 26.2% (5). In a later meta-analysis of 27 relevant studies, Beaudry and colleagues (6) calculated a prevalence rate of 17.3% and 17.5% for male and female adolescents, respectively. Whilst lower than previously reported prevalence estimates, this remains considerably higher than general population prevalence rates. Of note, Young and colleagues (4) found a significant difference in the prevalence estimates between screenings and clinical interviews, while Baggio and colleagues (5) found no significant difference. Nevertheless, to alleviate the individual and wider societal costs, early identification, prevention and intervention strategies have been advocated (7).

## **Gender effects**

Meta-analyses have revealed no significant differences in prevalence rates for gender (4,5), contrasting epidemiological findings from general population studies. Various explanations have been proposed for this disparity. Some authors postulate that comparative to their male peers, female offenders may represent more serious cases, demonstrating higher rates of adverse childhood experiences and psychiatric disorders, including ADHD (8). An alternative postulation is that this disparity may reflect systematic referral preferences and identification biases. A meta-analysis demonstrated that ADHD is more likely to be diagnosed in males than females by health services in the general population (9). This is despite growing evidence which suggests ADHD symptoms are as common in females as males (10,11).

ADHD has traditionally been perceived as a male childhood disorder. Females may demonstrate later onset of impairment and may work harder to compensate for or hide their symptoms in an effort to meet parent and/or teacher expectations. Collectively, this may result in fewer referrals of females to health professionals. One potential source of confusion may be that hyperactivity is commonly (and erroneously) ascribed a 'male' symptom and inattention a 'female' symptom. This bias may impede accurate diagnosis of ADHD in females who display hyperactivity, and males who do not demonstrate overt hyperactive behaviour (7). It is noted, however, that the gender ratio of ADHD within the general population narrows as

individuals' transition from childhood to adulthood (12-15). In adulthood, females have an increased tendency to seek help from health professionals compared to their male peers which may result in a shift in referral patterns (16), perhaps providing support for the referral/identification bias supposition.

### **Cultural effects**

Large variations exist in the reported rates of ADHD in the CJS population for different countries (4,5). Some authors propose variability in prevalence rates may be indicative of specific judicial practices that affect the CJS pathway of an individual with ADHD (e.g., diversion). Where prison population rates are high in a country, it is thought that the mental health status of the prison population may be more representative of the general population, resulting in more modest prevalence rates comparative to countries with lower prison population rates (17).

In Westmoreland and colleagues' (18) examination of the characteristics of male and female offenders in America, offenders with ADHD were more likely to be Caucasian; consistent with USA studies of non-CJS populations. Some authors however argue that not all groups are equally likely to be identified (and receive treatment), hampering interpretation of findings. Children from ethnic minorities have been reported to be diagnosed with ADHD at a lower rate than White children (19-21). However, most research has focused on African American and Hispanic children in western societies (predominantly in the USA), with less known about identification disparities for children of other ethnicities, particularly in non-western societies.

Reasons for reported disparity in identification and treatment of ADHD among ethnic groups are complex and have not been wholly elucidated. Recognised barriers are associated with the patient and family (e.g., lack of knowledge/awareness about ADHD, negative attitudes and beliefs of illness/social stigma and degree of trust toward services) and/or the health system (e.g., lower likelihood of referral by school professionals, language barriers, biases or cultural expectations of what constitutes "normal behaviour" and access to the health system due to lower socio-economic status). Some barriers are likely to be prominent due to differing health systems. For example, in the UK there is free access to healthcare whereas in the USA healthcare is private, which may reduce access to diagnosis and treatment for those of lower socio-economic status. Additionally, the extent to which other factors may confound reported disparities are unclear. When standardised diagnostic procedures are followed, research indicates limited evidence for differences in ADHD rates across different groups (22).

## **Type of offending**

The most frequent offences committed by individuals with ADHD leading to arrest, conviction or incarceration are assault/violence, theft, property offences, substance-related crimes and possession of weapons (23,24). Studies suggest that types of offences committed by individuals with ADHD may vary dependent on age (25). Mohr-Jensen and colleagues (24) found that except for murder, the rates for all recorded offences were significantly higher for individuals with ADHD, as compared to their non-ADHD counterparts. In contrast, Erskine and colleagues (26) found that there was no difference between those with ADHD as compared to controls for substance-related arrests (OR 1.69, 0.75-3.77) (despite significant ORs for illicit substance use, dependence and disorders). ADHD however was significantly related to violence-related arrests (OR 3.63, 2.31-5.70).

## **Onset of delinquent and offending behaviours**

While it is not suggested that ADHD is a 'causal' factor of crime, there is empirical evidence to suggest that ADHD increases the risk for rule breaking and the occurrence of delinquent behaviour (25). Studies have shown an earlier onset of criminality for those with ADHD when compared to their non-ADHD peers. Individuals with ADHD have been found to be younger at the time of their first arrest (27) and first conviction (28) than those without ADHD. Silva and colleagues (29) found that males with ADHD but not females with ADHD had an earlier onset of criminality compared to matched controls. In their logistic regression analysis of the US National Longitudinal Study of Adolescent Health data, Fletcher and Wolfe (30) found that those symptomatic of ADHD between the ages of 5 and 12 years old, were much more likely to self-report criminal behaviour (e.g., stealing, selling drugs, robbery and/or burglary) when they were young adults than those asymptomatic of ADHD.

Other studies have likewise found that ADHD significantly increases the risk of a number of other criminal indices including arrests, convictions and incarceration rates. Erskine and colleagues (26) found that those with ADHD were approximately 2.5 times as likely to be arrested, twice as likely to receive a court conviction and 2.5 times more likely to be incarcerated than individuals without an ADHD diagnosis. Similarly, in their meta-analysis of longitudinal studies involving 15,442 individuals, Mohr-Jensen and Steinhausen (23) found that when compared to non-ADHD peers, those with ADHD had nearly a 3.5 times greater

likelihood of receiving a court conviction and nearly three times greater likelihood of being incarcerated.

### **Recidivism**

Studies have demonstrated an elevated risk of recidivism for offenders with ADHD. In their 15-year follow-up study, Philipp-Wiegmann and colleagues (31) found offenders with ADHD had a higher rate of recidivism and quicker time of relapse (re-offended 2.5 times faster) than offenders without ADHD. This finding is in opposition to an earlier study by Grieger and Hosser (32) where ADHD did not predict re-offending. Silva and colleagues (29) reported an elevated risk of recidivism for male offenders with ADHD but not female offenders with ADHD.

### **Progress in institutional settings**

ADHD has been associated with behavioural disturbance in police custody, prison and forensic mental health settings and these findings have clear resource implications. Analysis of police custody records found that ADHD contributes significantly to frequency of requests being made of staff (33). In prison and mental health settings, records document a greater risk of critical incidents involving verbal aggression, damage to property and severe physical aggression (34-37). These behaviours are likely have implications for staffing and resources. They may impede progress within the institution, attract adjudications and/or convictions, and prevent early release. The underlying mechanisms for this association are likely to be hyperactivity/impulsivity, emotional distress and dysregulation (34).

### **Association between ADHD and criminal offending**

While there are empirical links for the association between ADHD and criminal and delinquent behaviour, this relationship is complicated by the high frequency of comorbid disorders found for offenders with ADHD. A meta-analysis of 18 studies found an increased risk of conduct disorder, substance use disorder, depression, anxiety, and personality disorder for prisoners with ADHD compared to non-ADHD prisoners (38). High prevalence rates of traumatic brain injury, intellectual disability, communication disorders, autism spectrum disorder, post-traumatic stress disorder have also been found in the ADHD offender population (39-43). The effects of such comorbidity is considered of particular importance when the comorbid disorder is itself found to be strongly associated with criminogenic behaviour (see Retz and colleagues (25) for further information regarding the impact of comorbidity). These include oppositional

defiant disorder, conduct disorder, antisocial personality disorder and substance use disorder. Some authors argue that there is no association between ADHD and criminal and delinquent behaviour when controlling for other externalising disorders, particularly conduct disorder (44,45). Some studies however have found an independent effect of ADHD (46-48). Pratt and colleagues (49) concluded that while other factors may be more strongly associated with deviant/criminal behaviour, ADHD nevertheless presents a significant risk factor for delinquency and criminality. One complication for understanding the association is that ADHD shares many symptoms with externalising disorders. Consequently, not only will the potentiality for a misdiagnosis be ever present, an optimal understanding of why ADHD is criminogenic may likewise be compromised.

### **Course of criminality over the long term**

At present, little is known about the long-term course of criminality for offenders with ADHD. Some authors suggest that ADHD may be associated with a criminal career which begins early in life and continues through adulthood; referred to as 'life-course persistent offenders' within Moffitt's (50) developmental taxonomy theory. This contrasts with 'adolescent-limited offenders' who engage in criminality in adolescent years only. There are however few longitudinal studies and of those that do exist, most have demonstrated short follow-up periods.

One of the extant longitudinal studies demonstrating the longest follow-up period found a decline in offending across age. In their 30-year prospective follow-up study of hyperactive boys with conduct problems, Satterfield and colleagues (45) found that arrest rates were highest in early adulthood (59% 18-21 years old) and declined steadily with increasing age (32% 27-32 years old and 16% 36-38 years old). A mean age of desistance (i.e., no further arrests occurred) of 30.1 years old was found, with a small subgroup continuing to offend in late middle age. Only childhood variables were used as predictors in the study, and therefore the contribution of adulthood variables (e.g., whether ADHD symptomatology persisted in full clinical range, as partial remission or full remission) in explaining the finding is unclear. In another study, the number of ADHD symptoms in adulthood, along with the number of childhood ADHD symptoms and severity of ADHD during teenage years were all found to be predictors of lifetime engagement in crime (51). Additionally, studies have reported declining rates of ADHD with age in offender populations. Accordingly, it is possible that decline in criminality may correspond with decline in ADHD symptomatology over the lifespan. Further

longitudinal studies with long follow-up periods, examining both childhood and adulthood predictors (including the interplay of environmental factors) are necessary to understand the long-term effects of ADHD on criminal offending.

### **Frameworks for understanding the association between ADHD and criminal offending**

Harpin and Young (52) offer a range of reasons as to why offenders with ADHD are vulnerable in the justice system. Firstly, they often commit crimes impulsively or opportunistically; the lack of planning involved in the criminal endeavour will also likely mean that they are more easily detected and caught. Secondly, once arrested and processed by the justice system, youth and adults who have ADHD may be less emotionally and mentally equipped to handle the stress of being interviewed, interrogated or questioned by the police and/or barristers in court. A growing body of research has identified a high susceptibility for individuals with ADHD to make a false confession (53,54). Thirdly, on leaving prison offenders with ADHD may have limited support in the community to help them successfully reintegrate into society (e.g. poor access to housing and medical care). Thus, the risk of them re-offending for subsistence or consuming illicit drugs as a coping mechanism or to self-medicate is high.

A variety of psychological and conceptual/theoretical platforms exist upon which scholars, clinicians, criminal justice workers, lawyers and other stakeholders may leverage upon to better understand why ADHD increases the risk of criminal and delinquent behaviour. Contributory factors are considered in the following three frameworks:

#### ***General theory of crime***

General theory of crime is a criminological theory proposed by Gottfredson and Hirschi (55). This is both a meta-theory, in that it purports to account for all criminal conduct and ‘analogous’ behaviours; as well as being highly reductionist in nature since it ascribes blame to just one factor – a lack of self-control. This inability to delay gratification causes, among other traits, impulsivity, callousness, and risk-taking, thereby increasing the likelihood of hedonistic self-interest acts. The cause of this low self-control stems from poor parenting, and if parents cannot monitor, instil proper values, and address deviant behaviour before the child reaches the age of 8 to 10 years old, then it is unlikely that they will be able to develop the self-control needed to live a normative life. Pratt and colleagues (49) suggest that ADHD should be considered “a potential source of this low self-control” and expand the theory to include not only social experiences (e.g., parental management) but also a biological/genetic origin.

### *Criminogenic cognitions*

This concept refers to problematic thought patterns (also known as criminal thinking) that precede criminal behaviour (56). Such cognitions are a key part of Walters' (57) criminal lifestyle theory, a paradigm that argues that these criminal thinking styles (e.g., mollification; cut off; entitlement; power orientation; sentimentality; super optimism; cognitive indolence, and discontinuity) are "cognitive processes that induce a tendency to act in a criminal or anti-social manner" (56). In order to determine which ADHD symptoms were related to criminogenic cognitions, Engelhardt and colleagues (56) examined 192 community-recruited adult participants and found that these criminal thinking styles were: (a) strongly linked to inattention; (b) moderately associated to impulsivity and impulsivity/emotional lability; and (c) not linked to hyperactivity.

### *Motivational vs reactive factors*

Within the literature, violence-related offences have been categorised as reactive-impulsive versus proactive-predatory. There is evidence to suggest that individuals with ADHD typically engage in violent criminal acts that are reactive (reaction to a provocation or a conflict, driven by emotional dysregulation) rather than proactive (instrumental and premeditated). Retz and Rosler (58) propose a theoretical framework for understanding the relationship between ADHD and antisocial behaviour. Those with early-onset conduct disorder who go on to develop antisocial personality disorder are proposed to commit crime due to impulsive aggression as a reaction to a situation, rather than premeditated-proactive aggression. An alternative pathway is for those without comorbid conduct disorder, who commit offences associated with social problems and rule breaking behaviours (e.g. traffic infractions) but the rate of general delinquency is not elevated. Within this framework, substance use disorders may be an important mediator of ADHD related antisocial behaviour (59).

### **Economic consequences of ADHD in criminal justice offender populations**

ADHD confers significant costs not only to the individual but to wider society (60,61). ADHD related criminal justice annual costs in Australia are estimated to be \$215 million (62). In the USA, costs associated with youth criminogenic behaviour are estimated to fall between US\$50 and US\$170 million per year to the victim, and between US\$2 and US\$4 billion per year to society (30). In the UK, Young and colleagues (63) identified that costs associated with behaviour-related problems and medical treatment in the Scottish prison system amounted to £590 greater per annum for individual prisoners with ADHD when compared to those without



ADHD. When accounting for ADHD prison prevalence rates, they estimated the annual medical and behaviour-related cost for Scottish Prison systems to be £11.7 million. Young and Cocallis (64) argue that appropriate provision of treatment for prisoners with ADHD would likely result in a highly beneficial rate of return for wider society. The same argument may be made for those with ADHD in the broader CJS (e.g., probation, detained forensic settings). Support for the reduced costs associated with treating ADHD in criminal justice populations is provided by Freriks and colleagues (65). Treatment cost effectiveness was measured using the 'Net Moneta Benefit' (NMB) which represents the fiscal worth of reduced quality-adjusted life years less total treatment costs. It is worth noting that costs associated with serious delinquency were included in this analysis. Freriks and colleagues (65) found a NMB of US\$95,449 for medication management, US\$88,553 for behavioural treatment, and US\$90,536 for combined treatments.

### **System barriers and a way forward**

Individuals with ADHD are acknowledged to be disadvantaged within the CJS due to their symptoms being unrecognised and/or misunderstood, resulting in lack of diagnosis and consequently appropriate treatment. An expert consensus report (7) has highlighted several related system barriers including inadequate awareness (both staff and offenders) of ADHD symptoms and treatments; lack of appropriate training; lack of appropriate use of tools to screen and diagnose ADHD; lack of appropriate use of multimodal interventions; lack of care management and multiagency liaison; and lack of preparation for prison release. To address these barriers, recommendations were made to address limitations in three core areas; (i) identification and assessment; (ii) interventions and treatment; and (iii) care management and multiagency liaison; with recognition that work needs to begin with identification.

### ***Identification and assessment***

To effectively identify and accurately diagnose ADHD within correctional facilities, four key elements were deemed to be needed: (i) accessibility to medical records; (ii) training in clinical interview assessments for clinicians; (iii) training for correctional staff to recognise ADHD symptomology; and (iv) the availability of appropriate screening and diagnostic tools. The implementation of a two-tiered screening framework was considered best practice. Recommended tools for youths included the Swanson, Nolan, and Pelham Teacher and Parent Rating Scale (SNAP-IV), the Conners' Comprehensive Behaviour Rating Scale (Conners' CBRS) and the ADHD Child Evaluation (ACE). For adults, the brief version of the Barkley

Adult ADHD Rating Scale (B-BAARS), the Conners' Adult ADHD Diagnostic Interview for DSM-IV (CAADID); the Diagnostic Interview for ADHD in Adults (DIVA-2), and the ACE+ (ACE for Adults) are recommended.

### ***Interventions and treatment***

Once diagnosed, multimodal interventions were recommended. Combining pharmacological (stimulant and non-stimulant medication) and non-pharmacological (psychoeducation, psychological interventions and psycho-social treatment programmes) approaches allows for the broad needs (e.g., psychological, behavioural and educational) of offenders with ADHD to be addressed. The use of ADHD medication is thought to have a by-effect on non-pharmacological interventions through the reduction of ADHD symptoms, thereby allowing for increased engagement and benefit.

Various studies support the efficacy of pharmacological interventions for ADHD in criminal justice offender populations. A seminal study conducted to assess the effectiveness of methylphenidate in 30 Swedish prisoners with ADHD found that the treatment significantly reduced the severity of ADHD symptoms as well as enhanced global functioning (66). Using national registry data, Lichtenstein and colleagues (67) found criminal conviction rates reduced by 32% for males and 41% for females when treated with ADHD medication, as compared with non-medication periods. Chang and colleagues (68) similarly found positive results in their study analysing the effects of a pharmacological stimulant treatment provided to participants post prison release in Sweden. The dispensed psychostimulants resulted in individuals being 42.8% less likely to commit a violent offence during the medication period as compared to the non-medication period. In another national registry data study, Mohr-Jensen and colleagues (24) found conviction and incarceration rates reduced by 30-40% when individuals were medicated for ADHD, as compared to non-medicated periods. A significant positive association was observed for males but not females on incarceration risk. However, the authors acknowledged that this discrepancy may be due to insufficient power to detect between-group differences due to the small sample size of incarcerated females in the study.

Despite growing evidence of its efficacy and success (69), the use of stimulants for offenders is somewhat controversial due to the potential for misuse and diversion and increasing the risk of malingering and drug-seeking behaviour (70-73). To minimise risks, extended release or non-stimulant preparations may be considered due to their limited abuse potential.

Multimodal interventions that include psychological interventions in addition to medication have demonstrated stronger effect sizes (74,75). The Reasoning and Rehabilitation 2 ADHD (R&R2ADHD) CBT-based programme has demonstrated medium to large effect sizes in functional outcomes including self-reported antisocial behaviour at post-treatment and 3-months follow-up (76,77). In 2016-2019, the R&R2ADHD programme was the focus of a controlled evaluation in Denmark. At the end of the study there were significant reductions in ADHD symptoms, problems with social functioning, emotional control, depression, anxiety, and temperament. Improvements in quality of life and greater personal locus of control were also found. Excluding the emotional control outcome, these results were sustained at three months post-treatment, with further improvements found for quality of life and personal locus of control. Long-term consequences (at 6- and 12-months post-treatment) were additionally considered using matched controls drawn from Danish Registers. Completion of R&R2ADHD was associated with increased employment and education rates and decreased use of cash benefits and social services. After six months, there was an increase in visits to the hospital emergency room. Emergency room contact may be considered a proxy for impulsive behaviour or alternatively may reflect increased self-care and personal locus of control. While the data was unable to directly explain which of the two hypotheses drove the result, it was presumed a positive consequence (i.e., increased self-care). Because these participants were not specifically referred for anti-social behaviour, the study demonstrates the broader applicability of the R&R2ADHD programme in other sectors (e.g., more generally in the community). R&R2ADHD has also been rolled out within the Danish prison service (78).

### ***Care management and multiagency liaison***

Due to the complex presentation and needs of offenders with ADHD, assistance from a range of services may be required, both while the individual is incarcerated and following release. In England, those with complex needs are often eligible to receive a Care Programme Approach (CPA) which encompasses a structured multi-professional care management plan to support the needs of the individual. Within this format, issues are addressed according to distinct domains and professionals/services allocated accordingly. The consensus recommended that offenders with ADHD receive a CPA or comparable care management plan. It was recommended that a medication plan is included as a core component. Utilising a CPA or comparable care management approach is envisaged to mitigate issues which may arise during transitional periods (e.g. movement within and between prisons).

While the expert consensus report was developed primarily with reference to the prison population in the UK, the report offers a framework which can be adapted to the broader CJS population across countries worldwide.

## **Conclusion**

This chapter has provided a critical analysis of the relationship between criminal offending and ADHD. Of particular note is the consistent empirical finding that those with ADHD are significantly overrepresented in youth and criminal justice offender populations. Many of these individuals are undiagnosed; their ADHD symptoms are either missed or misdiagnosed. A critical need exists across international jurisdictions for the development and systematic employment of approaches aimed at optimising early identification and treatment of ADHD. The provision of psychoeducation and training of staff across the criminal justice system is likely to confer better economic outcomes for the justice system and better clinical and social outcomes for individuals with ADHD. Importantly these may have broader implications within society.

## **References**

- (1) American Psychological Association. Diagnostic and statistical manual of mental disorders. 2013.
- (2) Polanczyk G, de Lima MS, Horta BL, Biederman J, Rohde LA. The Worldwide Prevalence of ADHD: A Systematic Review and Metaregression Analysis. *Am J Psychiatry* 2007;164(6):942-948.
- (3) Simon V, Czobor P, Bálint S, Mészáros Á, Bitter I. Prevalence and correlates of adult attention-deficit hyperactivity disorder: meta-analysis. *British Journal of Psychiatry* 2009;194(3):204-211.
- (4) Young S, Moss D, Sedgwick O, Fridman M, Hodgkins P. A meta-analysis of the prevalence of attention deficit hyperactivity disorder in incarcerated populations. *Psychol Med* 2015;45(2):247-258.
- (5) Baggio S, Fructuoso A, Guimaraes M, Fois E, Golay D, Heller P, et al. Prevalence of Attention Deficit Hyperactivity Disorder in Detention Settings: A Systematic Review and Meta-Analysis. *Frontiers in psychiatry* 2018;9:331.

- (6) Beaudry G, Yu R, Långström N, Fazel S. An Updated Systematic Review and Meta-regression Analysis: Mental Disorders Among Adolescents in Juvenile Detention and Correctional Facilities. *J Am Acad Child Adolesc Psychiatry* 2021 Jan;60(1):46-60.
- (7) Young S, Gudjonsson G, Chitsabesan P, Colley B, Farrag E, Forrester A, et al. Identification and treatment of offenders with attention-deficit/hyperactivity disorder in the prison population: a practical approach based upon expert consensus. *BMC Psychiatry* 2018 Sep 4;18(1):281-9.
- (8) Turner D, Wolf AJ, Barra S, Müller M, Gregório Hertz P, Huss M, et al. The association between adverse childhood experiences and mental health problems in young offenders. *Eur Child Adolesc Psychiatry* 2020.
- (9) Willcutt EG. The Prevalence of DSM-IV Attention-Deficit/Hyperactivity Disorder: A Meta-Analytic Review. *Neurotherapeutics* 2012;9(3):490-499.
- (10) Biederman J, Faraone SV, Monuteaux MC, Bober M, Cadogen E. Gender effects on Attention-Deficit/Hyperactivity disorder in adults, revisited. *Biological Psychiatry* 2004;55(7):692-700.
- (11) Corbisiero S, Hartmann-Schorro R, Riecher-Rössler A, Stieglitz R. Screening for Adult Attention-Deficit/Hyperactivity Disorder in a Psychiatric Outpatient Population with Specific Focus on Sex Differences. *Frontiers in psychiatry* 2017;8:115; 115-115.
- (12) Cortese S, Faraone SV, Bernardi S, Wang S, Blanco C. Gender differences in adult attention-deficit/hyperactivity disorder: results from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *J Clin Psychiatry* 2016 Apr;77(4):421.
- (13) de Zwaan M, Gruss B, Müller A, Graap H, Martin A, Glaesmer H, et al. The estimated prevalence and correlates of adult ADHD in a German community sample. *Eur Arch Psychiatry Clin Neurosci* 2012 Feb;262(1):79-86.
- (14) Moffitt TE, Houts R, Asherson P, Belsky DW, Corcoran DL, Hammerle M, et al. Is Adult ADHD a Childhood-Onset Neurodevelopmental Disorder? Evidence From a Four-Decade Longitudinal Cohort Study. *Am J Psychiatry* 2015;172(10):967-977.

- (15) Williamson D, Johnston C. Gender differences in adults with attention-deficit/hyperactivity disorder: A narrative review. *Clin Psychol Rev* 2015;40:15-27.
- (16) Bramham J, Murphy DG, Xenitidis K, Asherson P, Hopkin G, Young S. Adults with attention deficit hyperactivity disorder: an investigation of age-related differences in behavioural symptoms, neuropsychological function and co-morbidity. *Psychol Med* 2012 Oct;42(10):2225-2234.
- (17) Mundt AP, Alvarado R, Fritsch R, Poblete C, Villagra C, Kastner S, et al. Prevalence Rates of Mental Disorders in Chilean Prisons. *PLOS ONE* 2013;8(7):e69109.
- (18) Westmoreland P, Gunter T, Loveless P, Allen J, Sieleni B, Black DW. Attention Deficit Hyperactivity Disorder in Men and Women Newly Committed to Prison: Clinical Characteristics, Psychiatric Comorbidity, and Quality of Life. *Int J Offender Ther Comp Criminol* 2010;54(3):361-377.
- (19) Chung W, Jiang SF, Paksarian D, Nikolaidis A, Castellanos FX, Merikangas KR, et al. Trends in the Prevalence and Incidence of Attention-Deficit/Hyperactivity Disorder Among Adults and Children of Different Racial and Ethnic Groups. *JAMA Netw Open* 2019 Nov 1;2(11):e1914344.
- (20) Coker TR, Elliott MN, Toomey SL, Schwebel DC, Cuccaro P, Tortolero Emery S, et al. Racial and Ethnic Disparities in ADHD Diagnosis and Treatment. *Pediatrics* 2016;138(3):e20160407.
- (21) Morgan PL, Staff J, Hillemeier MM, Farkas G, Maczuga S. Racial and Ethnic Disparities in ADHD Diagnosis From Kindergarten to Eighth Grade. *Pediatrics* 2013;132(1):85.
- (22) Polanczyk GV, Willcutt EG, Salum GA, Kieling C, Rohde LA. ADHD prevalence estimates across three decades: an updated systematic review and meta-regression analysis. *Int J Epidemiol* 2014;43(2):434-442.
- (23) Mohr-Jensen C, Steinhausen H. A meta-analysis and systematic review of the risks associated with childhood attention-deficit hyperactivity disorder on long-term outcome of arrests, convictions, and incarcerations. *Clin Psychol Rev* 2016;48:32-42.

- (24) Mohr-Jensen C, Müller Bisgaard C, Boldsen SK, Steinhausen H. Attention-Deficit/Hyperactivity Disorder in Childhood and Adolescence and the Risk of Crime in Young Adulthood in a Danish Nationwide Study. *Journal of the American Academy of Child & Adolescent Psychiatry* 2019;58(4):443-452.
- (25) Retz W, Ginsberg Y, Turner D, Barra S, Retz-Junginger P, Larsson H, et al. Attention-Deficit/Hyperactivity Disorder (ADHD), antisociality and delinquent behavior over the lifespan. *Neurosci Biobehav Rev* 2020;120:236-248.
- (26) Erskine HE, Norman RE, Ferrari AJ, Chan GCK, Copeland WE, Whiteford HA, et al. Long-Term Outcomes of Attention-Deficit/Hyperactivity Disorder and Conduct Disorder: A Systematic Review and Meta-Analysis. *Journal of the American Academy of Child & Adolescent Psychiatry* 2016;55(10):841-850.
- (27) De Sanctis V,A., Newcorn JH, Halperin JM. A prospective look at substance use and criminal behavior in urban ADHD youth: what is the role of maltreatment history on outcome? *Attention deficit and hyperactivity disorders* 2014;6(2):79-86.
- (28) Rösler M, Retz W, Retz-Junginger P, Hengesch G, Schneider M, Supprian T, et al. Prevalence of attention deficit-/hyperactivity disorder (ADHD) and comorbid disorders in young male prison inmates. *Eur Arch Psychiatry Clin Neurosci* 2004;254(6):365-371.
- (29) Silva D, Colvin L, Glauert R, Bower C. Contact with the juvenile justice system in children treated with stimulant medication for attention deficit hyperactivity disorder: a population study. *The Lancet Psychiatry* 2014;1(4):278-285.
- (30) Fletcher J, Wolfe B. Long-Term Consequences of Childhood ADHD on Criminal Activities. *The journal of mental health policy and economics* 2009;12(3):119-38.
- (31) Philipp-Wiegmann F, Rösler M, Clasen O, Zinnow T, Retz-Junginger P, Retz W. ADHD modulates the course of delinquency: a 15-year follow-up study of young incarcerated man. *Eur Arch Psychiatry Clin Neurosci* 2018;268(4):391-399.
- (32) Grieger L, Hosser D. Attention deficit hyperactivity disorder does not predict criminal recidivism in young adult offenders: Results from a prospective study. *Int J Law Psychiatry* 2012;35(1):27-34.

- (33) Young S, Goodwin EJ, Sedgwick O, Gudjonsson GH. The effectiveness of police custody assessments in identifying suspects with intellectual disabilities and attention deficit hyperactivity disorder. *BMC Medicine* 2013;11(1):248.
- (34) González RA, Gudjonsson GH, Wells J, Young S. The Role of Emotional Distress and ADHD on Institutional Behavioral Disturbance and Recidivism Among Offenders. *J Atten Disord* 2016;20(4):368-378.
- (35) Young S, Gudjonsson GH, Wells J, Asherson P, Theobald D, Oliver B, et al. Attention deficit hyperactivity disorder and critical incidents in a Scottish prison population. *Personality and Individual Differences* 2009;46(3):265-269.
- (36) Young S, Misch P, Collins P, Gudjonsson G. Predictors of institutional behavioural disturbance and offending in the community among young offenders. *The Journal of Forensic Psychiatry & Psychology* 2011;22(1):72-86.
- (37) Young S, Gudjonsson G, Ball S, Lam J. Attention Deficit Hyperactivity Disorder (ADHD) in personality disordered offenders and the association with disruptive behavioural problems. *Journal of Forensic Psychiatry and Psychology* 2003;14:491-505.
- (38) Young S, Sedgwick O, Fridman M, Gudjonsson G, Hodgkins P, Lantigua M, et al. Co-morbid psychiatric disorders among incarcerated ADHD populations: a meta-analysis. *Psychol Med* 2015;45(12):2499-2510.
- (39) McCarthy J, Chaplin E, Underwood L, Forrester A, Hayward H, Sabet J, et al. Characteristics of prisoners with neurodevelopmental disorders and difficulties. *Journal of Intellectual Disability Research* 2016;60(3):201-206.
- (40) Young S, González RA, Fridman M, Hodgkins P, Kim K, Gudjonsson GH. Health-related quality of life in prisoners with attention-deficit hyperactivity disorder and head injury. *BMC psychiatry* 2018 Jun 22;18(1):209.
- (41) Young S, González RA, Mullens H, Mutch L, Malet-Lambert I, Gudjonsson GH. Neurodevelopmental disorders in prison inmates: comorbidity and combined associations with psychiatric symptoms and behavioural disturbance. *Psychiatry Research* 2018 Mar;261:109-115.



- (42) Hughes N, Williams W, Chitsabesan P, Walesby R, Mounce L. Nobody Made the Connection: Neurodisability in the youth justice system. Published by the Office of the Children's Commissioner for England. ; 2012.
- (43) Pérez-Pedrogo C, Martínez-Taboas A, González RA, Caraballo JN, Albizu-García CE. Sex differences in traumatic events and psychiatric morbidity associated to probable posttraumatic stress disorder among Latino prisoners. *Psychiatry Res* 2018;265:208-214.
- (44) Mordre M, Groholt B, Kjelsberg E, Sandstad B, Myhre AM. The impact of ADHD and conduct disorder in childhood on adult delinquency: A 30 years follow-up study using official crime records. *BMC Psychiatry* 2011;11(1):57.
- (45) Satterfield JH, Faller KJ, Crinella FM, Schell AM, Swanson JM, Homer LD. A 30-year prospective follow-up study of hyperactive boys with conduct problems: adult criminality. *J Am Acad Child Adolesc Psychiatry* 2007 May;46(5):601-610.
- (46) Lundström S, Forsman M, Larsson H, Kerekes N, Serlachius E, Långström N, et al. Childhood Neurodevelopmental Disorders and Violent Criminality: A Sibling Control Study. *J Autism Dev Disord* 2014;44(11):2707-2716.
- (47) Gunter TD, Arndt S, Riggins-Caspers K, Wenman G, Cadoret RJ. Adult outcomes of attention deficit hyperactivity disorder and conduct disorder: are the risks independent or additive? *Ann Clin Psychiatry* 2006;18(4):233-237.
- (48) Sibley MH, Pelham WE, Molina BSG, Gnagy EM, Waschbusch DA, Biswas A, et al. The Delinquency Outcomes of Boys with ADHD with and Without Comorbidity. *J Abnorm Child Psychol* 2011;39(1):21-32.
- (49) Pratt TC, Cullen FT, Blevins KR, Daigle L, Unnever JD. The Relationship of Attention Deficit Hyperactivity Disorder to Crime and Delinquency: A Meta-Analysis. *International Journal of Police Science & Management* 2002;4(4):344-360.
- (50) Moffitt TE. Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy. *Psychol Rev* 1993 Oct;100(4):674-701.

- (51) Barkley RA, Fischer M, Smallish L, Fletcher K. Young adult follow-up of hyperactive children: antisocial activities and drug use. *Journal of Child Psychology and Psychiatry* 2004;45(2):195-211.
- (52) Harpin V, Young S. The Challenge of ADHD and Youth Offending. *Cutting Edge Psychiatry in Practice* 2012;2:138-143.
- (53) Gudjonsson GH, Sigurdsson JF, Sigfusdottir ID, Asgeirsdottir BB, González RA, Young S. A national epidemiological study investigating risk factors for police interrogation and false confession among juveniles and young persons. *Soc Psychiatry Psychiatr Epidemiol* 2016 Mar;51(3):359-367.
- (54) Gudjonsson GH. *The psychology of false confessions: Forty years of science and practice*. New York, NY, US: John Wiley & Sons Ltd; 2018.
- (55) Gottfredson MR, Hirschi T. *A general theory of crime*. Stanford, California: Stanford University Press; 1990.
- (56) Engelhardt PE, Nobes G, Pischedda S. The Relationship between Adult Symptoms of Attention-Deficit/Hyperactivity Disorder and Criminogenic Cognitions. *Brain Sci* 2019 Jun 2;9(6):128. doi: 10.3390/brainsci9060128.
- (57) Walters G. *The Criminal Lifestyle: Patterns of Serious Criminal Conduct*. Newbury Park, California, USA: Sage; 1990.
- (58) Retz W, Rösler M. The relation of ADHD and violent aggression: What can we learn from epidemiological and genetic studies? *Int J Law Psychiatry* 2009;32(4):235-243.
- (59) Román-Ithier JC, González RA, Vélez-Pastrana MC, González-Tejera GM, Albizu-García CE. Attention deficit hyperactivity disorder symptoms, type of offending and recidivism in a prison population: The role of substance dependence. *Crim Behav Ment Health* 2017;27(5):443-456.
- (60) Lane CJ, Chong MD. A hard pill to swallow: The need to identify and treat ADHD to reduce sufferers' potential involvement in the criminal justice system. *James Cook University Law Review* 2019;25:119-136.

- (61) Daley D, Jacobsen RH, Lange AM, Sørensen A, Walldorf J. The economic burden of adult attention deficit hyperactivity disorder: A sibling comparison cost analysis. *Eur Psychiatry* 2019 Sep;61:41-48.
- (62) Deloitte Access Economics. The social and economic costs of ADHD in Australia: Report prepared for the Australian ADHD Professionals Association. 2019.
- (63) Young S, González RA, Fridman M, Hodgkins P, Kim K, Gudjonsson GH. The economic consequences of attention-deficit hyperactivity disorder in the Scottish prison system. *BMC Psychiatry* 2018;18(1):210.
- (64) Young S, Cocallis KM. Attention Deficit Hyperactivity Disorder (ADHD) in the Prison System. *Curr Psychiatry Rep* 2019 Apr 29;21(6):41-3.
- (65) Freriks RD, Mierau JO, van der Schans J, Groenman AP, Hoekstra PJ, Postma MJ, et al. Cost-Effectiveness of Treatments in Children With Attention-Deficit/Hyperactivity Disorder: A Continuous-Time Markov Modeling Approach. *MDM Policy Pract* 2019 Aug 17;4(2):2381468319867629.
- (66) Ginsberg Y, Lindefors N. Methylphenidate treatment of adult male prison inmates with attention-deficit hyperactivity disorder: randomised double-blind placebo-controlled trial with open-label extension. *Br J Psychiatry* 2012 Jan;200(1):68-73.
- (67) Lichtenstein P, Halldner L, Zetterqvist J, Sjölander A, Serlachius E, Fazel S, et al. Medication for attention deficit-hyperactivity disorder and criminality. *N Engl J Med* 2012;367(21):2006-2014.
- (68) Chang Z, Lichtenstein P, Långström N, Larsson H, Fazel S. Association Between Prescription of Major Psychotropic Medications and Violent Reoffending After Prison Release. *JAMA* 2016;316(17):1798-1807.
- (69) Konstenius M, Jayaram-Lindström N, Guterstam J, Beck O, Philips B, Franck J. Methylphenidate for attention deficit hyperactivity disorder and drug relapse in criminal offenders with substance dependence: a 24-week randomized placebo-controlled trial. *Addiction* 2014;109(3):440-449.

(70) Burns KA. Commentary: The Top Ten Reasons to Limit Prescription of Controlled Substances in Prisons. *J Am Acad Psychiatry Law* 2009;37(1):50.

(71) Appelbaum KL. Attention deficit hyperactivity disorder in prison: a treatment protocol. *J Am Acad Psychiatry Law* 2009;37(1):45-49.

(72) Hall RC, Myers WC. Challenges and Limitations to Treating ADHD in Incarcerated Populations. *The journal of the American Academy of Psychiatry and the Law JID* - 9708963 .

(73) Pilkinton PD, Pilkinton JC. Prescribing in Prison: Minimizing Psychotropic Drug Diversion in Correctional Practice. *J Correct Health Care* 2014;20(2):95-104.

(74) Shaw M, Hodgkins P, Caci H, Young S, Kahle J, Woods AG, et al. A systematic review and analysis of long-term outcomes in attention deficit hyperactivity disorder: effects of treatment and non-treatment. *BMC Med* 2012 Sep 4;10:99-99.

(75) Arnold LE, Hodgkins P, Caci H, Kahle J, Young S. Effect of treatment modality on long-term outcomes in attention-deficit/hyperactivity disorder: a systematic review. *PloS one* 2015;10(2):e0116407.

(76) Emilsson B, Gudjonsson G, Sigurdsson JF, Baldursson G, Einarsson E, Olafsdottir H, et al. Cognitive behaviour therapy in medication-treated adults with ADHD and persistent Symptoms: A randomized controlled trial. *BMC Psychiatry* 2011;11(1):116.

(77) Young S, Emilsson B, Sigurdsson JF, Khondoker M, Philipp-Wiegmann F, Baldursson G, et al. A randomized controlled trial reporting functional outcomes of cognitive-behavioural therapy in medication-treated adults with ADHD and comorbid psychopathology. *Eur Arch Psychiatry Clin Neurosci* 2017;267(3):267-276.

(78) Ramboll and The National Board of Social Services. Better help for young people and adults with ADHD and corresponding difficulties: Final evaluation report . <https://www.psychology-services.uk.com/danish-report-on-r-r2-adhd.htm> 2020.