ADHD and Crime:

What is the Relationship? Can Implementation of Pharmacological and Psychosocial Interventions facilitate Offender Rehabilitation?

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Introduction

“ADHD is a condition that the CJS [Criminal Justice System] cannot afford to ignore”.


This is a stark statement that stresses the care gap currently existing within the CJS, given that ADHD is estimated to have a prevalence of 25.5% in prison services and yet there is a serious lack of awareness, identification and appropriate management. This essay will explore the high prevalence of ADHD in criminal justice services, the links between ADHD and criminality and address the potential for better interventions as means of offender rehabilitation and thus further crime prevention.

Definition and Diagnosis of ADHD

According to the Diagnostic and Statistic Manual (DSM) of Mental Disorders, 5th edition, diagnosis of an individual with ADHD requires persistent and pervasive symptoms of inattention and/or hyperactivity and impulsivity that interfere with functioning in two or more settings. This diagnosis can be carried out in children or adults, and can be heterogenous in its presentation, with either a combined presentation, or a predominantly inattentive or hyperactive/impulsive presentation.

There are currently a variety of screening scales, including the Barkley ADHD scales, Adult ADHD Self-Report Scale, Wender Utah Rating Scale and diagnostic tools, such as the Diagnostic Interview for ADHD in Adults (DIVA), in use. These tools rely mainly both on self-report and recall from childhood although ideally corroborated by collateral history from a family member, and on subjective accounts on current functional impairment and presence of symptoms that are often more subtle in adulthood. Thus, diagnosing ADHD in adults presents with various challenges and must be done by a qualified mental health professional in an extended clinical interview. These factors may thus lead to potential under-diagnoses of the disorder both in the community and in the prison population, an important barrier towards the effective management of the disorder that will be discussed later in this essay.

Prevalence of ADHD: General Population vs Prison Population

The worldwide prevalence of ADHD is estimated to be 5.29% in those aged 18 and under and 2.5% in adults. However, the prevalence of ADHD in prison settings far exceeds this. American studies have found diagnosable ADHD in 20-30% of adults in prison, Australian research has
found ADHD symptoms in 35% of their prisoner samples\textsuperscript{7}, whereas Swedish estimates are as high as 40% prevalence\textsuperscript{8}. The high prevalence rates are most remarkable in youth offenders, where younger German cohort studies (mean age 19.2) show a prevalence of ADHD of up to 45%\textsuperscript{9}. Although more modest estimates (consistent with the population gender distribution), studies focusing on female offenders (age <25 years) have also shown an increase in prevalence of ADHD to 17.9\%\textsuperscript{10}. British studies have found that 24% of prisoners screened met criteria for childhood ADHD and that up to 23\% of these were presently symptomatic\textsuperscript{11}. The inconsistency of these prevalence rates stems from the use of different screening tools, diagnostic criteria and population types, and, in particular, whether the measures are based on the presence of symptoms in childhood or in adulthood.

In fact, a meta-analyses of 42 of these studies carried out in prison populations showed that the studies that used screening for symptoms had higher estimates of ADHD of about 43.3\%, whereas those using diagnostic clinical interviews had a combined estimate of 25.5\%, where the latter is more reliable and less likely to be an overestimate\textsuperscript{12}. Furthermore, significant differences were noted in the estimates between countries, potentially explained by differences in the criminal justice system and sample sizes\textsuperscript{12}. However, although each study individually may have limitations in its extrapolation and generalization to all prison populations, the overwhelming evidence points to a disproportionately higher prevalence of lifetime ADHD in offenders as compared to the general population.

**Evidence of a relationship between ADHD and Crime**

This higher prevalence of ADHD symptoms in offenders leads us to evaluate the research regarding the nature of its relationship with crime, if any. And indeed, meta-analyses exploring the relationship between ADHD and crime have concluded that it is an important risk factor for overall delinquency\textsuperscript{13}. Childhood ADHD has been associated with double the risk of arrest, over three times the risk of having any convictions and almost three times the risk of a period of incarceration during adolescence or adulthood, compared to controls\textsuperscript{14}. These meta-analyses arise from data from both longitudinal and retrospective studies.

One of these particular studies followed up subjects from the age of 9 to average age of 26 in order to quantify early behavioural indicators and criminal involvement. They found significant effects for hyperactivity-impulsivity (but not inattention) as predictors of both self-reported crime and official arrests.\textsuperscript{15} More recent studies, using retrospective ratings for ADHD in childhood, have found that whether hyperactive, inattentive or of the combined type, all individuals with ADHD symptoms was significantly more likely to report criminal activities later in life, although the nature of these crimes differed\textsuperscript{16}. Whereas individuals with inattentive presentations were more likely to self-report selling illicit substances or burglary, individuals
with impulsive symptoms were more likely to be convicted of more impulsive crimes including theft. Although, unexpectedly, individuals with combined- ADHD did not have an additive or multiplicative risk of criminal activities\textsuperscript{16}.

However, we should perhaps also consider that some of this increased prevalence of individuals with ADHD in the criminal justice system may be due to an increased probability of being apprehended for their crimes; perhaps due to the unplanned and impulsive nature of the crimes or a decreased ability to defend themselves and cope with the pressures of being processed within the system\textsuperscript{43}. For example, particularly high rates of false confessions that have been reported in those with ADHD\textsuperscript{44}. This has implications, including the need for early screening and special considerations when being processed through the criminal justice process, and thus for increased staff training to encourage awareness of the disorder.

A limitation that is often encountered when collating and interpreting the data from these studies is the high levels of heterogeneity and inconsistency; for instance, the substantial heterogeneity (Q=214.7, df=6, p<0.001) between the studies finding increased risk of conviction for individuals with ADHD\textsuperscript{14}. These discrepancies most likely arise from the differences in methodology, in terms of diagnostic criteria, inclusion and exclusion criteria as well as the wide use of self-reported of crime indicators instead of official criminal records. Furthermore, there have recent studies that directly challenge the link between ADHD and crime. Kolla et al\textsuperscript{40} found that in a general population cohort, when factoring out substance misuse, conduct disorder symptoms and psychological distress, ADHD was not a significant predictor of arrest history (as self-reported), whereas the other variables were. Although these results should be taken with caution, as the data-collection methods were via a telephone survey and measures were self-reported and much other research has supported the relationship between ADHD and offending, they highlight that other factors should be consistently controlled for across all studies and the need for further research into the complicated correlation between ADHD, substance misuse and crime\textsuperscript{17,41}. Another point emphasized in this recent publication\textsuperscript{40} is that the majority of studies reported in this essay and also being carried out in the field currently concentrate on male offenders. This presents potential limitations for the interpretation of the results and for the future implementations of policies in the more general population and criminal justice system, as it does not take into account the important of sex differences in terms of risk factors for criminality, which have been shown to indeed exist\textsuperscript{40}. Thus, this field would benefit from a more standardized approach to research, the use of more objective and accurate measures of both symptoms of ADHD and delinquency, controls for more variables, as well as the inclusion of larger and combined female and male samples.
Factors mediating the relationship between ADHD and Crime: Core Symptoms, Substance Abuse, Environmental Predictors and Psychiatric Comorbidities

When attempting to consider the nature of the relationship between ADHD and crime, one must explore potential links between core symptoms of disorder and crime— for example impulsivity\textsuperscript{32} or how these symptoms may change how they respond to strain\textsuperscript{33}, and even of environmental predictors, such as substance abuse and poor educational outcomes, as well as the link between psychiatric comorbidities and crime.

According to certain criminological theories, low self-control, as displayed with impulsive and risky physical behaviours and short-tempered personalities, is a direct source of delinquency and crime\textsuperscript{34}. Said behaviors and impulsivity are very consistent with many of the symptoms present in individuals with ADHD. And indeed, studies have shown that ADHD diagnosis is a source of said low self-control which is a strong and consistent predictor of delinquent behavior\textsuperscript{32}. As hypothesized by Young\textsuperscript{30}, ADHD symptoms thus may lead to opportunistic, which may reflect the high need for stimulation due to hyperactivity yet unplanned, perhaps due to the innattention, patterns of offending. Studies exploring what particular motivation for offending (of the principal four motivations: financial gain, perception of provocation, excitement and compliance) were self-reported by prisoners with ADHD symptoms, have found that childhood ADHD symptoms correlate with all four of these motivations, whereas in current ADHD symptoms correlate with all except excitement\textsuperscript{21}.

The potential link between ADHD and crime has also been researched within the context of the general strain theory, a sociological explanation of crime as a conditioned response to strain, particularly in individuals with certain personality traits such as high anger and low constraint\textsuperscript{35}. Johnson et al\textsuperscript{33} studied this relationship by selecting individuals with high indices of ADHD symptoms, and asked them to self-report criminal behaviours as well as scoring them on scales of stressful life events as indicators of strain. Regression analyses showed a positive correlation between ADHD symptoms, high strain measures and crime. Importantly, it appeared that, for the same levels of strain, those with high ADHD scores were more likely to react by committing criminal acts than those with low ADHD scores. This may highlight the importance of providing means of coping and reducing strain as ways of preventing criminal behaviours, which may be done by psychological interventions and rehabilitation, which will be discussed later on.

In an extensive study carried out by Young et al, 198 Scottish prisoners were assessed for symptoms of ADHD as well as for substance abuse and the extent of past offending as per their
From this cohort, 27 participants had current ADHD symptoms, of which, 96% reported having used illicit drugs (significantly more than the non-ADHD participants), and the ADHD group had a significantly higher number of previous offences and convictions. They were also significantly younger in age when they were first convicted (mean age $16.5 \pm 3.1$ SD). Supporting these findings, in a very comprehensive study in this field of research, of a total of 1179 prisoners in Puerto Rico were studied. Of the sample, 21% of the prisoners appeared to screen positively on retrospective assessment of features of ADHD (using the Wender Utah Rating Scale tool), and these appeared to be significantly more likely to have completed 6 years of schooling or less as well as have been under foster or state care. The presence of childhood ADHD symptoms was also significantly associated with early criminal activity and repeat offenses. The study also examined the relationship between the type of offenses committed, finding that those with ADHD symptoms were more likely to have been convicted of rape and attempted murder, as well as non-violent offenses such as burglary, theft and vandalism, showing diversity in the pattern of offenses committed, but in general more reactive-impulsive offenses rather than pre-meditated. However, an important finding of this study, which warrants further investigation, is that when adjusting the relationships to exclude the role of lifetime substance use disorders (SUD), most of the associations were weakened or no longer present. Thus, because the co-morbidity between ADHD and SUD is so common, it often proves very hard to disentangle as well as establish causality. In my opinion, a likely theory is that ADHD acts as a risk factor for SUD (as supported by longitudinal studies) and is a strong predictor for early offending, and this creates the pathway toward delinquency. It is perhaps then where continued SUD may become a more significant mediator of recidivism and for specific types of offenses.

In addition, in the previously discussed Scottish prisoner cohort, results show that the ADHD symptomatic group was significantly more likely to have been involved in critical incidents (defined as verbal aggression, physical assault, self-injury and property damage) in the last three months while in prison. The prisoners also showed increased functional impairment within the prison setting. Furthermore, studies of those current prisoners found to have ADHD have shown that their QALY (Quality-Adjusted Life Years) and health-related quality of life (HRQoL) were significantly lower than the other prisoners, in particular, increased likelihood of previous traumatic brain injury, potentially driven by their propensity to be involved in more critical incidents. This cohort of prisoners are also associated with significantly greater service utilization and prison costs, particularly medical costs which become even more considerable once taking into account the early first offense age as well as recidivism. All together, these findings suggest that screening for and implementing treatment to decrease ADHD symptoms may be beneficial not only towards prevention of recidivism, but...
also towards the prison environment, towards decreasing costs for the National Health System (NHS), and for the health of the individuals themselves.

Educational attainment is another environmental factor that may contribute to the relationship between ADHD and criminality. Savoilanen et al\textsuperscript{36} found that of the potential interactive effects of several environmental factors, it was the interaction between poor reading abilities and ADHD that was the most significant as predictors of felony convictions. Further studies that consider school attendance and grades along with ADHD as predictors of criminal behaviours show that the school factors are indeed important for development of future antisocial behaviours\textsuperscript{37}. This is particularly significant for females, where the increased tendency of those with ADHD to commit crimes may be actually mediated by the negative school experiences. This is evidenced as controlling for schooling factors significantly reduced the effect size of retrospective reported ADHD symptomatology on crime\textsuperscript{37}. These findings emphasize the importance of encouraging school attendance and educational engagement as important interventions in (especially female) adolescents with ADHD as means of reducing tendencies for criminal behaviour in future.

Furthermore, due to the high comorbidity between ADHD and other psychiatric and behavioural problems, it is important to distinguish whether it is the comorbidities or ADHD symptoms themselves which lead to increased risk of offending. Sibley et al\textsuperscript{18} found that even though individuals with childhood ADHD and Conduct Disorder or Oppositional Defiant Disorder had worse delinquency outcomes, individuals with only ADHD still had significantly higher risk for offending in adulthood. Similarly, ADHD symptoms have significant effects on offending irrespective of mood instability and antisocial personality traits\textsuperscript{19}. Thus, although these comorbidities may be exacerbating factors, at least some of the correlation between crime and ADHD must be driven by the core symptoms of the disorder.

Overall, in summary, what this research appears to support is that individuals with ADHD are more likely to react to adverse life conditions, such as increased strain and poor schooling experiences, through criminal behaviour, which may be mediated through their low self-control, need for stimulation and potentially exacerbated by substance abuse and/or other comorbidities. Thus, I believe that for interventions for ADHD to be effective in terms of offender rehabilitation, they must tackle the core symptoms of ADHD as well as any comorbid disorders, substance misuse, educational and occupational needs and offer coping mechanisms for the individuals to respond to any further adverse events in non-criminogenic ways.
Can Interventions for ADHD prevent Criminal Behaviour and thus promote Rehabilitation?

According to the 2018 NICE guidelines for management of ADHD in adults, medications should be considered as first line treatment, where methylphenidate or lisdexamfetamine are the first choice, or atomoxetine if these cannot be tolerated or do not provide benefit. Non-pharmacological treatment, such as a full course of CBT, is only to be considered if medication is not beneficial or in combination if there are residual impairments. These recently updated NICE guidelines identify that “untreated ADHD can have a negative impact on a person’s life, with lower educational attainment, and higher criminality. So they [the committee] agreed to recommend medication”, highlighting the potential importance of appropriate treatment in reducing offending behaviour.

In order to explore this relationship, Marcotte et al carried out a statistical regression analysis between crime rates and the prescription rates for stimulants used to treat ADHD in the USA between 1997 and 2004. They found that for every 1% increase in stimulant prescription there was a 0.129% decrease in violent crimes, in other words, there was an inverse correlation (whereas, as a control, the prescription rates for statins, in cholesterol treatment, were not correlated with crime rates). As additional evidence, one of the largest studies of ADHD treatment and criminality was carried out using Swedish register of 25,656 ADHD patients, and correlating treatment periods with criminal convictions for a period of 3 years. During treatment periods, crime rates were significantly reduced by 32% and 41% for men and women respectively. Furthermore, for patients that had been previously treated, when they had a period of non-treatment, the risk of being convicted of a crime was increased by about 12%. This association of treatment with reduction in criminality remained true regardless of the type of crime.

Thus, there may be a potential link between stimulant treatment and decrease criminality, and this may be multifactorial in terms of the mediators of this correlation. Firstly, and as supported by the NICE guidelines and longitudinal treatment studies, pharmacological therapy, usually in the form of the stimulant methylphenidate, reduces the core symptoms of ADHD more so than comparison and control intervention, symptoms which by themselves lead to some of the risk of increased offending. In addition, it has been found that adults with ADHD that have been treated pharmacologically in their youth have a lower ‘Index of Burden’, in terms of alcohol abuse, substance abuse, criminality, global severity index and functioning of life. Specifically, meta-analyses of the effects of stimulant therapy in childhood ADHD show that those that are treated have an approximate 2 fold decrease in risk for substance use disorders both in youth and adulthood (including both drug and alcohol) compared to those that were not treated,
which as previously discussed may exacerbate the increased rates of offending\textsuperscript{17}. Therefore, if used alongside the existing prison-based drug abuse interventions, including detoxification and psychosocial interventions, stimulant therapy could potentially lead to decreased rates of recidivism. Furthermore, there is evidence that use of methylphenidate to treat ADHD leads to a decrease in both overt aggression behaviours (such as physical aggression or tantrum) and covert aggression (including vandalism, cheating, shoplifting, lying), separate from the effects the stimulant has on core symptoms\textsuperscript{28}. Thus, stimulants may be beneficial to reduction of crime in at least three ways: decreasing core symptoms of ADHD, decreasing substance abuse and decreasing aggression.

The question that remains is whether this implementation of treatment is feasible. Some of the difficulties faced with regards to the treatment of ADHD in prison settings mirror those found in the community, including inconsistent diagnosis. To begin with, studies on large sample sizes of adult prison inmates have found that very few of the individuals that now reached diagnostic threshold (approximately 18.8\textsuperscript{45}) had been diagnosed prior to incarceration. The under-diagnosis and thus lack of treatment for many children and adults with ADHD in the community is principally due to the limited presentation to and contact with primary care or health services\textsuperscript{30}. This highlights the potential for public information, targeted at parents and schools, regarding recognizing ADHD symptoms and the importance in their treatment to prevent negative outcomes and encouraging referral to appropriate health services. Furthermore, these difficulties in recognizing the symptoms, continue within the CJS, as identifying the prisoners which could benefit the most from targeted interventions such as medication or psychosocial treatments has proven difficult. Thus, it is imperative that a sensitive and specific screening tool for ADHD is incorporated into the initial healthcare screens carried out on the prisoners. However, a major drawback in the previously used screening tools, such as the WURS and DIVA-2 is that they are lengthy and not practical to implement. For this purpose, Young et al\textsuperscript{45} developed a brief tool of six items, called the B-BAARS by collating the most significant predictors of ADHD from the more lengthy full version BAARS-IV- Barkley Adult ADHD Rating Scale. This new tool proved to have, at least in their adult male prisoner sample, significant diagnostic accuracy. Hence, although this brief scale needs validation across more samples, and, importantly, in a female sample, it suggests a potentially effective solution for quick and early identification of prisoners which may need referral to experts in order to establish the diagnosis and be started on treatment. In fact, in a very recent statement released by the United Kingdom ADHD Partnership\textsuperscript{60}, experts reached a consensus where they recommended the widespread use of the B-BAARS as part of the primary mental health screen for all prisoners.

However, even once the prisoners that require treatment are identified, providing said
treatment in a correctional facility environment poses more challenges, such as the risks of the use of controlled substances, the transient nature of the patients, lack of consistent policies and lack of healthcare resources\textsuperscript{46}. Perhaps the major concerns is the use of stimulants in the prison setting due to their potential to be abused. Solutions for this may involve the use of specific practices, including the use of non-stimulant ADHD treatment agents and increasing the level of prescription and drug use monitoring\textsuperscript{29}. One expert in the field of correctional mental health, Dr. Applebaum, attempted to modify and improve on existing ADHD management protocols, focusing on diagnosis and treatment\textsuperscript{47}. Firstly, he established the need for formal clinical diagnosis and assessment of the functional impairment for each prisoner, as well as the requirement of participation in behavioural programmes, including those for substance abuse, in order to receive the pharmacological treatment. These requirements should prevent malingering for access to stimulants. In terms of the pharmacological treatment, patients would initially be started on non-stimulant medication, such as atomoxetine\textsuperscript{47}. Atomoxetine, contrary to methylphenidate based ('stimulant') medications, exhibit more selective blockage of norepinephrine transporters rather than dopamine transporters, and as such, present lower potential for abuse. And furthermore, trials have shown that once-daily doses of the drug have significant effects on lowering ADHD symptoms in adult population samples\textsuperscript{50}. As a second step in the protocol, if a trial on non-stimulant drug is not effective then treatment with stimulants may begin, although not so in patients with previous history of substance abuse\textsuperscript{47}.

In addition, another potential strategy could be the the use of drugs with lower abuse potential, such as a slow/osmotic release oral system-methylphenidate (as compared to short-acting stimulants, as they have less euphoric potential. In a long-term placebo-controlled trial of this drug in a prison setting\textsuperscript{48}, significant improvements in ADHD symptoms as well as general function and quality life were found. And, encouragingly, no substance misuse was detected during the trial period, and participants were compliant with the additional treatment and educational programs\textsuperscript{48}. However, the use medication delivered via capsules presents challenges, as they are more easily hidden and trafficked. This would therefore require enhanced, rigorous monitoring at point of medication delivery, which may not be possible if resources are lacking. A possible slow-release stimulant medication, that may bypass this hurdle, is lisdexamfetamine dimeslate (LDX), which can be administered in liquid form, and has been shown to be effective in adults with ADHD\textsuperscript{49}. However, it has not yet been trialled in prison settings. Thus, there is still a need for more large-scale trials in these settings to compare different protocols, medication regimes and means of delivery, in order to reach the appropriate balance between the needs and potential benefits of treatment of the prisoners with ADHD against risks of using controlled substances in these institutions.

In addition to the first-line pharmacological treatments, psychosocial treatment programs should be considered. Currently, there are several existing and widely used examples in prison
settings, aimed at the general offender population, including the Reasoning and Rehabilitation (R&R)\textsuperscript{51}. A meta-analytic review of the R&R program as implemented in 19 different probation, prison and parole settings (across North America and Europe) found that participants were less likely to reoffend, with an approximate 14% decrease in recidivism rates compared to controls that did not engage in the program\textsuperscript{31}.

However, individuals with ADHD may find it difficult to engage with said programs due to behavioural and attention/concentration problems. Consequently, a specific program, the R&R\textsuperscript{2}, as developed by a collaboration of two expert psychiatrists, Dr. Young and Dr. Ross in 2007\textsuperscript{52}, was designed for the adolescents and adults either in community settings after having exhibited antisocial behaviors or within the criminal justice system. The specific design of the program includes 15 sessions delivered in a group setting, which attempt to cover content spanning from critical reasoning, social skills, emotional control, problem solving and neurocognitive development. The effectiveness of this program has been tested in ADHD adult outpatient clinics in Iceland, as an addition to pharmacological treatments, and results show an improvement in core ADHD symptoms, as well as an improvement in antisocial behavior scales, comorbid problems such as anxiety and depression and global social functioning (as compared to controls which just received the pharmacological treatment)\textsuperscript{53}. In order to assess the potential for use of this program in correctional facilities, trials are currently being carried out in facilities in the UK, where both preliminary results\textsuperscript{54} and multisite studies\textsuperscript{55} showed program completion rate of 64.7% -78%, and improvements in two outcome measures of antisocial thinking and violent behavior, the Maudsley Violence Questionnaire and the Disruptive Behaviour and Social Problem Scale. Thus, although further research is necessary with more large-scale and randomized samples, this program has the potential to be very beneficial in reduction of further offending behavior as well as reduction of critical incidents within the prison setting. The use of concurrent pharmacological treatment alongside these programs is however very important, as by reducing the key symptoms of ADHD, including reduction of impulsivity and increasing the ability to concentrate, this would improve the ability of the individuals to successfully engage and effectively breakdown the barriers to recovery and rehabilitation.
Conclusion

Compared to the general adult population, there is a tenfold higher rate of lifetime ADHD prevalence in prison populations\textsuperscript{12}. Studies have further identified that individuals with childhood ADHD have 2 to 3-fold higher risks of having been arrested, convicted and incarcerated, regardless of their particular ADHD presentation\textsuperscript{14,16}. ADHD has also been shown to be a predictor for early offending, numerous offences, critical incidents within prison and lower quality of life and high costs for the NHS and prison systems\textsuperscript{17,41,11,38,39}. In my opinion, there are a variety of necessary improvements for the management of ADHD within prison facilities. These include routine screening, and if prompted, referral for clinical diagnosis, as well as both pharmacological interventions (which may include either non-stimulants such as atomoxetine or long-acting formulations of stimulants such as OROS-methylphenidate) and psychosocial interventions including substance abuse rehabilitation and programs such as the R&R2. These strategies may lead to improvement of behaviour in prison settings and potentially even prevention of further crime by prevention of recidivism. And indeed, this is something that not only the CJS but, also, the medical community and general public, cannot afford to ignore.
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