



ADHD among prison inmates: Pathways into substance use

Ingunn S. U. Kristensen

**Lokaverkefni til MS-gráðu
Sálfræðideild
Heilbrigðisvísindasvið**



HÁSKÓLI ÍSLANDS

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Abstract

Researchers in the field have voiced their opinion on how important it is to recognize and treat ADHD in adults, not all children are diagnosed in childhood and grow up unaware they have ADHD. Antisocial personality disorder and conduct disorder are closely related to ADHD. Because of the relationship between ADHD symptoms and antisocial behaviour, researchers have begun studying ADHD inside prisons and results show a very high prevalence rate. Offenders with ADHD, especially, seem to have a higher prevalence rate for substance use disorders. ADHD among prisoners and its connection to substance use is very interesting not only in terms of whether individuals take drugs, but in terms of *how* they use and *why*. The aim of this study was to compare pathways into substance abuse between an ADHD group and a non-ADHD group. The ADHD prevalence in this study was very high as has been seen in other studies. The findings also suggest that reasons behind use from the first time experimentation with illicit drugs begun, to the time participants could name their favourite illicit drug were in some cases different between the groups. The results also indicate that the strength of underlying reasons for use of illicit drugs is something to consider while assessing why drugs are used as there is a difference between groups, and ADHD symptoms seem to have a greater effect as the use becomes more persistent. There was also a difference between the two groups in regards to which drugs were used and how often, and in relation to drug dependency.

Útdráttur

Rannsakendur hafa lagt áherslu á það hversu mikilvægt það er að bera kennsl á og meðhöndla ADHD hjá fullorðnum. Andfélagsleg persónuleika röskun og hegðunarröskun eru nátengd ADHD. Vegna þessara tengsla hafa vísindamenn komist að því að mikilvægt er að rannsaka ADHD í fangelsum og niðurstöður sýna mjög háa tíðni ADHD. Tengsl milli ADHD hjá fögum og vímuefnaraskana virðast einnig vera sterk. Mjög áhugavert er að skoða tengsl ADHD meðal fanga og tengsl við vímuefnaneyslu og þá ekki aðeins með tilliti til hvort einstaklingar neyta vímuefna eða ekki, heldur einnig hvernig neyslu þeirra er háttáð og ástæðna á bak við hana. Markmiðið í þessari rannsókn var að kortleggja vímuefnasögu fanga með ADHD og bera saman við sögu fanga sem ekki greinast með ADHD. Niðurstöður er í samræmi við það sem áður hefur komið fram en hátt hlutfall fanga greindist með ADHD. Niðurstöðurnar sýndu að ástæður að baki notkun, frá fyrstu notkun ólöglegra vímuefna að þeim tíma sem þátttakendur gátu nefnt uppáhalds efni, voru í sumum tilvikum mismunandi milli hópa. Niðurstöður bentu einnig til þess að styrkur undirliggjandi ástæðna fyrir notkun ólöglegra lyfja sé mismunandi á milli hópa, og að ADHD einkenni hafi meiri áhrif eftir því sem notkun verður þrálátari. Það var einnig munur á milli ADHD hóps og hóps sem ekki náði fullorðins greiningu í sambandi við hvers konar ólögleg lyf voru notuð og hversu oft, og í tengslum við ánetjun ólöglegra efna.

ADHD, a short review

Clinical history of ADHD or *attention deficit hyperactivity disorder* began more than a century ago. However, the earliest description of ADHD in the medical literature is believed to be from 1775 with an article credited to Melchior Adam Weikard (in Barkley, 2005). Clinical work started much later but it is believed that scientific work on ADHD started with George Still's work, in 1902, with 43 children who all had serious problems sustaining attention (Barkley, 2005; Barkley & Peters, 2012). Later, classification of ADHD and ADHD symptoms emerged with the DSM-III and ICD-9, now DSM-IV and ICD-10 (American Psychiatric Association, 2000; Organization, 2004). It is important to remember that although the symptoms of ADHD are behavioural, ADHD has a strong neurobiological and genetic base. This has been shown through the results of many studies over the years (Barkley, 2005; Biederman, 2004; Thapar, Cooper, Eyre & Langley, 2012; Sharp, McQuillin og Gurlingm 2009).

In the DSM-IV, ADHD is classified among the disruptive behaviour disorders. ADHD involves a pattern of inattention and/or hyperactivity-impulsivity so severe that it is disruptive in many areas of a person's life. Although many people are diagnosed much later in life, one of the criteria for diagnosis is that some of the hyperactive-impulsive or inattentive symptoms must have been present before the age of seven (American Psychiatric Association, 2000).

ADHD symptoms can become very problematic if untreated, and problems with attention, hyperactivity and impulsivity can be very disruptive for someone's life. As stated previously, ADHD must have been present in childhood to be diagnosed; therefore many of the symptoms listed in the DSM-IV are regarded as problematic in childhood settings. A child with ADHD can have a lot of difficulties adjusting. According to the DSM-IV problems with attention can make it difficult for someone to

attend to details in their work and/or projects. Problems with attention can also be evident in social settings, as one can be inclined to go from one setting to the next, or one project to the next. Problems in social settings can also be evident through difficulties following a conversation and remembering social gatherings. Sounds from the environment can also be very distracting for someone with attention problems. A person can also have problems finishing a project and/or do it badly. They can also have difficulties following instructions and be disorganized (American Psychiatric Association, 2000).

Hyperactive type ADHD symptoms can take many forms. As listed in the DSM-IV, a person showing hyperactive type ADHD symptoms can be very fidgety and have problems sitting still in his or her seat. The hyperactivity may also make the person be always on the go and have problems participating in activities that do not demand a lot of physical energy. Hyperactive symptoms can involve problems participating in activities that involve being quiet and sitting calmly, like doing homework or doing daily work in a classroom. The symptoms can also involve speaking fast and speaking too much (American Psychiatric Association, 2000).

According to the DSM-IV, ADHD symptoms regarding impulsivity involve impatience and acting out. Impulsivity can be seen as a difficulty with delaying a response, or responding before a question has been completed. This can also involve difficulties waiting for one's turn and interrupting and/or intruding in different social settings. The impulsivity can also lead to accidents and participation in activities that can be dangerous without considering the consequences. This may also include touching things that one is not supposed to and grabbing things (American Psychiatric Association, 2000).

It has been indicated that parents' attitudes towards their children with ADHD can have an effect on the children's lives as they grow up (Ås, 1985). One could speculate that, if untreated and undiagnosed, the child could be given enough room to follow their ADHD impulses, and this could get very problematic as the child grows up. An adult that had ADHD symptoms as a child could then be very effected by those symptoms even if he does not have symptoms as an adult. Parents with children with ADHD have said that the uncertainty of why their child is not like other children can be very difficult (As, 1985). Their child's behaviour is often very chaotic, difficult to manage and contradictory. The child might break their leg jumping but then they would do it again. Madon (2006) found a relationship between mothers' attitudes towards whether their children would use alcohol and if their children did indeed use it as an adult (Madon, Willard, Gyll, Trudeau & Spoth, 2006). A certain behaviour was expected which increased the odds of that behaviour occurring. If this proves to be the case, it adds to the importance of diagnosing ADHD early on, as parents' attitudes towards ADHD behaviour might be an important factor in how a person with ADHD is as an adult. The results of one study indicated that teenagers with ADHD rated themselves as more adjusted than their parents and teachers did, although compared to a control group they were not (Barkley, Anastopoulos, Guevremont & Fletcher, 1991). This might indicate the importance of educating someone with ADHD on his or her symptoms and how life could be if symptoms were dealt with. This also stresses the importance of educating the public on ADHD, symptoms and possible effects, so treatment can be sought. It is also important to educate professionals in the health care system and provide additional research so treatment for young adults and adolescents with ADHD can be efficient and young people with ADHD will be less likely to drop out of treatment (Montano & Young, 2012).

Transition from childhood to adulthood

The 1970's has been credited for the rise of clinical work and research on ADHD in adults. Research indicates that a history of hyperactivity, impulsivity, and inattentive behaviour can be very predictive of behaviour in adulthood (Barkley, 2005). Researchers in the field have voiced their opinion on how important it is to recognize and treat ADHD in adults, as it can have severe and damaging effects in their lives (Bolea, Adamou, Arif, Asherson, Gudjonsson, Muller, Nutt, Pitts, Thome & Young, 2012).

Although many of the childhood symptoms listed in the DSM-IV can be directly transferred into adulthood settings, especially problems related to attention and impulsivity, manifestation of hyperactivity symptoms can change as the child grows up. According to the DSM-IV, a young child might have difficulty controlling himself/herself, e.g. not climbing or jumping on the furniture, while a school-aged child might have difficulty remaining seated in school or even at home. An adult however might have severe feelings of restlessness, as hyperactivity and the inability to control one's movements changes as a person grows older. An adult who shows hyperactive symptoms might not, for example, jump on the couch, instead he might feel very restless and have problem participating in any activity that involves sitting still (Adler & Newcorn, 2011; American Psychiatric Association, 2000). An adult with ADHD could also have difficulty paying bills on time and answering letters. The change in symptoms from childhood to adulthood can thus be seen to become more adaptive and purposeful (Haavik, Halmoy, Lundervold, Famsler, 2010).

Transition for someone with ADHD from childhood to adulthood can also be examined by looking at the connection between impairment from ADHD symptoms and diagnosis of ADHD. As described in Mannuzza, Castellanos, Roizen, Hutchison, Lashua and Klein (2011) if an impairment criteria is added to an ADHD diagnosis in children,

the rate of those who are diagnosed drops, however this is not the case with adults. In fact, correlation between symptoms and impairment is very high when criteria for diagnosis are the same for children and adults. Even when lowering the threshold for diagnosis the correlation is still high. That implies that criteria for ADHD diagnosis in adults are not as strict as in children and shouldn't be. Impairment on daily life from ADHD symptoms can have serious effects on an adult's life, even if symptoms are fewer than as a child.

Diagnosing ADHD in adults is very important, however not all children are diagnosed in childhood and grow up unaware they have ADHD. Gudjonsson, Sigurdsson, Young, Newton & Peerson (2009) found the prevalence of childhood ADHD in an Icelandic prison to be 52%. Of the 52%, 37.5% were found to have ADHD in full remission. A diagnosis in adults is therefore very important, as well as acknowledging that ADHD symptoms can be very active and disabling in adulthood (Vollmer, 1998). In a study from 2008, a group of adults with ADHD symptoms was compared with a group of adults with symptoms in remission, a group of adults with symptoms in partial remission, and with a normal control group, in areas regarding performance/adaptive functioning. Results indicated that although the groups with symptoms in remission, either partially or fully, had better scores than the ADHD group, they still had worse scores than the control group (Young & Gudjonsson, 2008). However, the literature shows that primary care givers need to be educated so they can take care of adults with ADHD who are at greater risk of not adjusting positively in the society (Montano & Young, 2012).

The persistence of ADHD symptoms into adulthood is very common; studies have shown that at least half of those whom had childhood ADHD have impairing symptoms as adults (Biederman & Farone, 2005). Follow up studies have shown up to

66% of adults who had ADHD as children still have to deal with symptoms as adults (in Biederman, 2004). According to Searight, Burke and Rottnek (2000), data shows that 30% to 50% of adults who had childhood ADHD continue to have ADHD as adults. It has been estimated that about 1-6% of adults have ADHD, although this number could be higher if the diagnosis criterias used are too strict (Vollmer, 1998). A meta-analysis from 2009, with the mean ages for samples between 19.4 and 44.9 years with most samples having the mean ages between 19.4 and 25.8 years, showed prevalence of adult ADHD to be 1.3% (Simon, Czobor, Bálint, Mészáros & Bitter 2009).

Diagnosing ADHD adults

Because the manifestation of symptoms can change as the person grows older, it can sometimes be difficult to diagnose ADHD in adults. This can be the case because some of the ADHD symptoms are not as obvious in the behaviour of adults as they are in the behaviour of children. Also it can be difficult to differentiate between the symptoms of ADHD and other disorders (American Psychiatric Association, 2000; Murphy & Adler, 2007). A diagnosis of ADHD for an adult could have a great impact on an individual's life, even though he was not diagnosed as a child and therefore never received any treatment. A change in occupational identity and competence after an ADHD diagnosis could occur, and result in a better overall adjustment for the individual (Sandell, Kjellbell & Taylor, 2012). A diagnosis can therefore be very important in adulthood, even though it was missed in childhood.

Many different diagnostic tools have been used for diagnosing ADHD, but most often the definition and criteria of the DSM-IV is used as a reference. It is always important though, when making an assessment or diagnosis, to use several tools of assessment and not just one. By doing so the diagnosis is more valid. It is important to

have clients' case history; self-assessment of symptoms; and valid and reliable tests that assess the criteria for diagnosis (Simon, Czobor, Bálint, Mészáros & Bitter 2009; Murphy & Adler, 2007). When assessing ADHD in adults this is very important, as indicated in the results of a meta analysis conducted by Simon, Czobor, Bálint, Mészáros and Bitter (2009). Results indicated that ADHD in adults might be underestimated partly because of unclear and overly strict criteria of diagnosis in adults. Diagnosis criteria of ADHD in adults should not be the same as the diagnosis criteria for children as it will lead to underestimation of adult ADHD (Mannuzza, Castellanos, Roizen, Hutchison, Lashua & Klein, 2011). Although many of the symptoms asked about are similar to those present in children, fewer symptoms need to be present to have a significant effect on the daily life of the adult (Gudjonsson, Sigurdsson, Sigfusdottir, & Young, 2012; Mannuzza, Castellanos, Roizen, Hutchison, Lashua and Klein, 2011).

Comorbidity and relationship to substance abuse and antisocial behaviour

Comorbidity is very high among mental disorders and this is also true for ADHD. In the DSM-IV, learning disabilities, conduct disorder, antisocial personality disorder, and anxiety disorders are all listed as having high comorbidity with ADHD (American Psychiatric Association, 2000). This has even been the case when an ADHD group has been compared to a clinical referred control group - that is a control group that had problems with their mental health just like the ADHD group (Cumyn, French & Hechtman, 2009). Studies have also shown high rates of mood disorders and alcohol/drug disorders in adults with ADHD and again high comorbidity with antisocial personality disorder (Barkley, Anastopoulos, Guevremont & Fletcher, 1991; Biederman, 2004; Jacob, et. al., 2007; González, Vélez-Pastrana, Varcárcel, Levin, &

Albizu-García, 2012; Huntley & Young, 2012; Klein & Mannuzza, 2010; Retz & Rösler, 2009; Lynsskey & Hall, 2001; Simon, Czobor, Bálint, Mészáros & Bitter 2009).

The comorbidity rate of substance use disorders and ADHD has been found to be as high as 45%, which is much higher than in the normal population, but as indicated in Jacob et al. (2007) this has not been found in all studies. In Fischer, Barkley, Smallish and Fletcher (2002) a control group did not differ from an ADHD group regarding alcohol and substance abuse and dependence. This was thought to be because of the high rate of people in the control group that suffered from substance use disorders, which was higher than had been seen in previous studies. Results have also indicated a difference between genders, where men with ADHD have been found to have a higher rate of current drug abuse than women with ADHD. Even though the connection between ADHD and substance abuse was found to be different between genders, there was an overall difference between the control group and the ADHD group (Cumyn, French & Hechtman, 2009). The relationship between history of ADHD symptoms and substance use has been seen in other studies: an ADHD symptomatic person seems more likely to have developed problems with substance use as an adult than someone with no history of ADHD (Barkley, Fischer, Smallish & Fletcher, 2004; Lee, Humphreys, Flory, Liu & Glass, 2011).

As stated previously, antisocial disorder and conduct disorder are closely related to ADHD. According to the DSM-IV, diagnostic criteria for conduct disorder include patterns of behaviour where social norms and the right of others are disregarded. This can include hostility towards animals or people, lying, thievery, or total disregard of rules and regulations. Conduct disorder is diagnosed in children and usually not in someone older than 18. It is possible to diagnose someone older than 18 with conduct disorder, but only if diagnostic criteria for antisocial disorder are not met, but this is rare.

If criteria for conduct disorder are not met, it is less likely to be diagnosed with antisocial disorder. In fact, one of the diagnostic criteria for antisocial personality disorder is that symptoms for conduct disorder must have been present before the age of 15 (American Psychiatric Association, 2000). Criteria for diagnosis are similar for antisocial personality disorder and for conduct disorder according to the DSM-IV. It includes difficulty to follow social rules or norms, disrespect for the property of others, hostile behaviour towards others, and thievery. This may also include difficulty in feeling sympathy or empathy for others, difficulty controlling one's temper, and a high rate of impulsivity (American Psychiatric Association, 2000).

ADHD among offenders

Although a focus on the association between impulsivity and deficiencies in moral development began more than a century ago, as mentioned in Barkley's (2005) research of ADHD among offenders has become an important subject in recent years. Perhaps this is because of the high comorbidity with antisocial personality.

Young and Gudjonsson (2008) found that those who had ADHD symptoms had participated in a higher number of antisocial activities in the previous year than a normal control group and a group that had ADHD symptoms in remission. This was also true for the remission group when compared with the normal control group, with the remission group having participated in a higher number of antisocial activities during the previous year than the control group.

In a longitudinal study results indicated that children with ADHD symptoms were more likely to engage in criminal behaviour as young adults than controls (Flecher & Wolfe, 2012). In the study the children were followed for six years, starting at seventh grade. If diagnosed with ADHD as a child, it was more likely that in early adulthood the

participant would participate in criminal behaviour. That included behaviour such as theft, burglary and selling drugs, this also included being arrested and being convicted. It is interesting that the study indicated that different kinds of ADHD - inattentive type vs. impulsive type vs. combined type - had correlations with different crimes. Those of the inattentive type were more likely to participate in crimes that required some planning, that is crimes that were not committed in the heat of the moment, like selling drugs or burglary. Those of the hyperactive type had the highest rate of criminal behaviour of all of the groups, and additionally were the group most likely to have been arrested and convicted of a crime. The group with the combined type had the weakest connection to criminal behaviour compared to the other groups.

The correlation between ADHD and different kinds of criminal behaviour has been seen in other studies, and in connection with aggressive/violent acts (Gordon, Williams, Donnelly, 2012; Mannuzza Klein & Moulton, 2008; Retz & Rösler, 2009; Young, Wells & Gudjonsson, 2010). In their study Retz and Rösler (2010) went even further in explaining the connection between ADHD and violent behaviour. They distinguished between proactive and reactive criminal violent behaviour. Reactive being when there is a provocation to the act - it is unplanned, short lived, spontaneous and usually not rational or systematic. Proactive behaviour is planned, goal directed, adaptive and rational. Results suggested that ADHD was not associated with proactive violent behaviour/ crimes, but with the reactive ones.

Because of the relationship between ADHD symptoms and antisocial behaviour, researchers have began studying ADHD inside prisons and the results show a very high prevalence rate of both childhood and adult ADHD symptoms. In a Swedish prison study, with a response rate of 62%, the prevalence of adult ADHD was found to be 40% (Ginsberg, Hircikoski & Lindefors, 2010). Another study, with a response rate of 76%,

found the rate of adults with a combination of childhood and adult ADHD symptoms in prison settings to be 45% (Retz et al, 2004; Rösler, et al., 2004). Similar results were seen in a Icelandic prison, where the prevalence of ADHD for adults was much higher in a prison setting than in the general population. Results found that half of the prisoners met the criteria for childhood ADHD, and of these over half still had symptoms as adults (Guðjónsson, Sigurðsson, Bragason, Newton & Einarsson, 2008). In one study the prevalence of childhood ADHD among the prisoners was found to be 24%, of which 33% had symptoms in partial remission and 44% symptoms in full remission (Young, Gudjonsson, Wells, Asherson, Theobald, Oliver, Scott, Mooney, 2009). This high prevalence of ADHD in prisoners has been found repeatedly. The most recent studies have indicated that an expected prevalence rate of ADHD - either in remission or symptomatic; or seen as a history of childhood symptoms - in inmates, could be between 16% - 32% (González, Vélez-Pastrana, Varcárcel, Levin, & Albizu-García, 2012; Hamzeloo, Mashhadi, & Fadaedi, 2012;). In a review from 2011 addressing the literature of ADHD in prisoners, it is estimated that prevalence of ADHD in prisoners is somewhere between 10% and 70% (Ganizadeh, Mohammadi, Akhondzadeh & Sanaei-Zadeh, 2011). However, lower prevalence rates have also been found. In a study from 2012 the prevalence rate in male prisoners was found to be 9.8% with the hyperactive-impulsive subtype most common. In that study, female prisoners were also tested and prevalence rate for ADHD was found be higher than in male prisoners, or 15.1% (Cahill, Coolidge, Segal, Klebe, Marle & Overmann, 2012). Although lower than in other studies this rate is still higher than in the general population.

It is very important for researchers to study ADHD among prisoners, in order to understand if or how ADHD symptoms influence criminal behaviour. Offenders with ADHD are usually younger when they break the law for the first time, and the rate of

recidivism for ADHD offenders is higher (Young, Adamou, Bolea, Gudjonsson, Muller, Pitts, Thome & Asherson, 2011). Results of one study indicated that 60% of inmates with ADHD symptoms started their run-in with the law before the age of 18, 89% before the age of 25 (Young, Wells & Gudjonsson, 2010). For these reasons it is very important to map out the criminal behaviour of inmates with ADHD and compare it to those who do not meet the diagnostic criteria. This is important not only for prevention purposes, but also for rehabilitation purposes. With that in mind, it is important to ask questions, not only about whether there is a connection between ADHD and criminal behaviour, but also what exactly this connection is. This study focuses on ADHD among offenders; and the possible links between criminal behaviour, ADHD and history of substance abuse. The focus is on whether the pathways into substance abuse among ADHD offenders are different from the pathways taken by offenders that don't have any history of ADHD.

Substance misuse among ADHD offenders

Substance use in general is very common among offenders. A review of past studies indicated that the health of prison inmates was worse than in the general population. This was especially true for those who used drugs (Kanato, 2008). With that in mind it is important to remember that substance abuse is very common among inmates (Fazel & Baillargeon, 2011; Friestad & Kjelsberg, 2009; Stewart, 2009). In one study 79% of inmates reported a lifetime use of cocaine, heroin, amphetamine or cannabis (Stewart, 2009). In Fazel, Bains and Doll (2006) a systematic review of 13 studies, with a total of 4141 male prison inmates, showed that there was a clear uniformity among studies. Alcohol abuse and dependence ranged between 18%-30% among male inmates, and drug abuse and dependence between 10%-48%. Offenders with ADHD, especially, seem

to have a higher prevalence rate for substance use disorders (Einarsson, Sigurdsson, Gudjonsson, Newton, & Bragason, 2009; Ginsberg, Hircikoski & Lindefors, 2010; González, Vélez-Pastrana, Varcárcel, Levin, & Albizu-García, 2012; Rösler, Retz, Yaqoobi, Burg, Retz-Junginger, 2009; Young, Wells & Gudjonsson, 2010). One study revealed that 85% of prisoners with ADHD reported having lifetime troubles with substance abuse (Hamzeloo, Mashhadi, & Fadaedi, 2012).

ADHD among prisoners and its connection to substance use is very interesting. When the connection between ADHD and substance use is studied closely in the general population, results indicate that compared to control groups, drug use among ADHD drug users can differ, not only in terms of whether individuals take drugs or of how much they take, but in terms of *how* they use. The more symptoms an ADHD group has, the likelier are they to have used more drugs in the previous year - though this connection is not the same for alcohol use (Young & Gudjonson, 2008). One might draw the conclusion that alcohol and alternative drugs, which offer different stimulation, will each offer different rewards for someone with ADHD, therefore resulting in the seeking out different drugs, compared to someone who does not suffer from ADHD symptoms. In a study where participants were former heroin addicts, 33.1% of participants had childhood ADHD (Peles, Schreiber, Sutzman, Adelson, 2012). It should be mentioned that few studies have looked closely at how drug use among individuals with ADHD differs from that of non-ADHD individuals. This might be because when studying the general population, one would need a very big sample to be able to get a sizeable ADHD group who also has a history of substance use problems. Only then would one be able to look closer at how, or if, the history, or pathways, of substance use or misuse differ from a control group.

This brings the focus back to prisoners. As stated before, this is a group that has a high prevalence rate of ADHD and of substance misuse. In Young, Wells & Gudjonsson (2010), results from a prison study indicated that heroin and ADHD symptoms were important indicators of the persistence of offending. The ADHD group and the control group also differed regarding overall illicit drug use. When asked about the use of amphetamine, cannabis, cocaine, ecstasy and heroin, a higher rate of the ADHD group admitted to their use. It was also interesting that when looking at heroin use in the ADHD group, all but one of those who had tried heroin used it on a daily basis. The difference between alcohol consumption between the ADHD group and the control group was not significant.

How do theories about substance abuse rime with ADHD

A definition of addictive behaviour is one where an individual has an impaired control with harmful consequences, and where the individual finds himself unable to stop engaging in a certain behaviour (West, 2001). This definition could be used to describe someone with ADHD. There are many things said to increase the risk of substance abuse: lack of parental supervision, peer substance abuse, drug availability, and poverty. Early aggressive behaviour, low self control and a difficult temperament are also said to increase the risk of drug abuse (National Institute of Drug Abuse, 2003). Some of those risk factors match exactly with ADHD symptoms and some do not. Another risk factor is age, but it is said that a key risk period for drug abuse is during major transitions in a child's life, like moving home or beginning school (National Institute of Drug Abuse, 2010).

Robert West (2001) groups theories of addiction into five groups: the first group contains theories regarding conceptualization of addiction as a result of biological, social

or psychological processes; the second group includes theories explaining why certain drugs become addictive in relation to which kind of stimulation the drugs gives: pleasure, relief or excitement. The third group includes theories that focus on why some individuals are more vulnerable to addiction than others, whether biochemically, psychologically or socially. Those who are more vulnerable are at more risk. The fourth group list theories that involve environmental and social conditions that make addiction more or less likely, including social roles, influences and opportunities. The fifth group focuses on recovery and relapse of drug use. In relation to ADHD it is very interesting to see if an ADHD group is more likely than a non-ADHD group to use explanations that come from one theory group over another. This is important as there are a number of different theories pointing out different techniques to be used for treatment or even for prevention purposes (Webb, Sniehotta & Michie, 2010).

In relation to ADHD symptoms it is not unlikely that an ADHD group could have different motivational factors or risk factors in relation to addiction and substance abuse, or that different risk factors could have more weight regarding why someone with ADHD uses drugs. It could also be interesting to see how or if reasons behind substance abuse change as symptoms of ADHD change with age. In West's (2001) classification of theories, group one consists of theories that suggest that behind drug use lies an animal-like compulsion to use it e.g. Bejrots theory from 1972 classifies addiction as a natural drive. When the addiction supervenes it becomes an artificially induced drive to use drugs due to the stimulation of the pleasure centre. Volkow and Fowler (2000) suggested that pleasure *per se* is not enough of an explanation, although it is important. Dysfunction in the brain, which comes with continued drug use, induces compulsive drug intake. This connects to the fact that someone with ADHD has low inhibition and is

compulsive to begin with. The path from taking that initial drug to becoming addicted, and maybe trying other drugs, could be more likely for someone with ADHD.

With regards to the second group of theories, it has been suggested that an ADHD symptomatic group is more inclined to favour certain substances over others (Young & Gudjonson, 2008), though this has not been studied much. Different drugs do have different neurological effects in the brain, and ADHD has a strong neurological base (Barkley, 2005; Biederman, 2004; Thapar, Cooper, Eyre & Langley, 2012; Sharp, McQuillin og Gurlingm 2009), so it will be very interesting to see how the drug of choice may differ between an ADHD group and a non-ADHD group.

In relation to the third group of theories, it has been stated previously that ADHD can have severe and damaging effects on an adult's life (Bolea, Adamou, Arif, Asherson, Gudjonsson, Muller, Nutt, Pitts, Thome & Young, 2012). Therefore, just having the symptoms of ADHD can make an individual more vulnerable to developed substance abuse problems or addiction. Self-medicating psychological distress has been suggested as one of the reasons for substance abuse (Zullig & Divin, 2012). One could also speculate that the severity of ADHD symptoms might correlate with the intensity of reasoning behind drug use. The more severe the ADHD symptoms, the more impact on the impairment of the individual's life, which could result in more number of reasons behind the use, e.g. self medicating, as a result of compulsive behaviour, and/or as a way of seeking pleasure.

Although much is yet to be discovered, and more research is needed on the history of drug use, or pathways into substance abuse, and its connection to ADHD, prison studies at least indicate that there is a strong connection. Further studies, like this one, are important as they can indicate how or if pathways into substance misuse differ for those who have a history of ADHD symptoms from those who do not.

Aims of this study: pathways into substance abuse

This study is an important addition to the field of ADHD studies. Remission of ADHD symptoms can result in decreased emotional problems (Young & Gudjonsson, 2008). Rehabilitation inside prisons can therefore benefit from as much information about ADHD inside the prison walls as possible. Also, offenders with ADHD symptoms have a higher number of violations, of a violent and non-violent nature, inside the prison. They also have a higher rate of recidivism (Gordon, Williams, Donnelly, 2012). Strong predictors for recidivism have also been found to be age, antisocial personality attitudes, and a history of substance abuse (Gudjonsson & Young, 2011).

This study also has the potential to be used for prevention purposes. One of the aims of this study is to take a step towards understanding if an individual with ADHD has a path towards substance abuse and crime that is different from a path taken by someone without ADHD symptoms. Through trying to understand if someone with ADHD has different risk factors regarding drug abuse compared to someone without symptoms, the information gathered could: 1. Result in a shifting of focus in terms of risk factors, and 2. provide useful information for treatment purposes early on. It has been indicated that the public is little aware of the extent to which ADHD exists among adults. In one study conducted among nursing practitioners targeting ADHD was well below what was expected, although most acknowledged the existence of ADHD among adults (Knutson & O'Mally, 2009). This indicates that further education is needed about adult ADHD.

This study is important in many ways. By taking a group that has a history of a high rate of ADHD and substance abuse, i.e. prisoners, the goal is to be able to map out the history of substance abuse and compare an ADHD group and a control group. By doing so the aim is to compare if pathways into substance abuse differ between the two

groups. This includes comparing what drugs were first used and why, what drugs were taken second, and why and at what age substance use started. This has not been studied before. The aim is also to see if different pathways correlate to different factors that have a connection to ADHD. Factors like mood disorders, substance abuse disorders, and antisocial personality disorder (Biederman, 2004; Jacob, et. al., 2007; González, Vélez-Pastrana, Varcárcel, Levin, & Albizu-García, 2012; Huntley & Young, 2012; Klein & Mannuzza, 2010; Retz & Rösler, 2009; Lynsskey & Hall, 2001; Simon, Czobor, Bálint, Mészáros & Bitter 2009).

This study's strength lies also in the fact that information about ADHD symptoms will be gathered using more than one tool of assessment. Researches in the field have mentioned the importance of using more than one tool of assessment when assessing ADHD (Simon, Czobor, Bálint, Mészáros & Bitter 2009; Murphy & Adler, 2007). This is also important in assessing substance abuse. It is important not only relying on self-report by the subject (Fazel, Bains & Doll, 2006; Young, Wells & Gudjonsson, 2010). In this study self-report will be used in addition to a structured diagnostic interview.

In this study it is hypothesized that pathways into substance use and the reasons behind the use are different for prisoners with ADHD than for those without ADHD. It is also hypothesized that, as a result of ADHD symptoms, strength of underlying reasoning for the use of illicit drugs is greater for prisoners with ADHD symptoms, in other words ADHD symptoms will result in stronger reasoning underlying using.

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**Study of ADHD among prison inmates: Pathways into substance use
(an article for publication)**

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Abstract

Objective: The aim of this study was to determine if pathways into substance use were different among prisoners with ADHD and prisoners without ADHD, in relation to how they used illicit drugs and why.

Methods: The participants were 66 recently admitted prisoners in an Icelandic prison. The MINI-plus was the main diagnostic tool for ADHD and substance use disorders, ADHD was also assessed by using a current and childhood self report scale. Substance use was assessed by using STARS, a new scale intended to evaluate pathways into illicit drug use and SAQ. *Results:* Results showed a high number of prisoners with ADHD. The ADHD participants reported stronger underlying reasons for illicit drug use and were more frequently diagnosed with illicit drug dependency. Underlying reasons for illicit drug use connected to ADHD did mostly indicate factors related to psychological distress and dependency problems. *Conclusion:* Findings suggest that pathways into substance use for prisoners with ADHD are different from pathways of prisoners without ADHD, from the first instance of drug used to present day.

Introduction

ADHD diagnosis in adults is very important and it is important to acknowledge that ADHD symptoms can be very prominent and disabling in adulthood, just like they are in childhood (Vollmer, 1998). The change in symptoms from childhood to adulthood can be seen to become more adaptive and purposeful. Thus the impact on daily life resulting from ADHD symptoms can be seen to have serious effects on an adult's life, even if their symptoms are fewer than in childhood (Biederman & Faraone, 2005; Haavik, Halmoy, Lundervold, Faraone, 2010; Mannuzza, Castellanos, Roizen, Hutchison, Lashua and Klein, 2011).

Research on ADHD among criminal offenders has become an important subject in recent years. Perhaps this is because of the high rate of comorbidity with conduct disorders, antisocial personality and substance use disorders (American Psychiatric Association, 2000; Barkley, Anastopoulos, Guevremont & Fletcher, 1991; Biederman, 2004; Jacob, et al., 2007; González, Vélez-Pastrana, Varcárcel, Levin, & Albizu-García, 2012; Huntley & Young, 2012; Klein & Mannuzza, 2010; Retz & Rösler, 2009; Lynsskey & Hall, 2001; Simon, Czobor, Bálint, Mészáros & Bitter 2009). In a longitudinal study, results indicated that children with ADHD symptoms were more likely to engage in criminal behaviour as young adults than a control group without ADHD symptoms (Flecher & Wolfe, 2012). The correlation between ADHD and different kinds of criminal behaviour has been seen in other studies, and in connection with aggressive/violent acts (Gordon, Williams, Donnelly, 2012; Mannuzza Klein & Moulton, 2008; Retz & Rösler, 2009; Retz & Rösler, 2010; Young, Wells & Gudjonsson, 2010). Because of the relationship between ADHD symptoms and antisocial behaviour, researchers have begun studying ADHD inside prisons and the preliminary results of these studies show a very high rate of both childhood and adult

ADHD symptoms (Hamzeloo, Mashhadi, & Fadaedi, 2012; Ginsberg, Hircikoski & Lindefors, 2010; Guðjónsson, Sigurðsson, Bragason, Newton & Einarsson, 2008; González, Vélez-Pastrana, Varcárcel, Levin, & Albizu-García, 2012; Young, Gudjonsson, Wells, Asherson, Theobald, Oliver, Scott, Mooney, 2009).

Substance use in general is very common among offenders (Fazel, Bains & Doll, 2006; Fazel & Baillargeon, 2011; Friestad & Kjelsberg, 2009; Stewart, 2009). Offenders with ADHD, especially, seem to have a higher prevalence for substance use disorders (Einarsson, Sigurdsson, Gudjonsson, Newton, & Bragason, 2009; Ginsberg, Hircikoski & Lindefors, 2010; González, Vélez-Pastrana, Varcárcel, Levin, & Albizu-García, 2012; Rösler, Retz, Yaqoobi, Burg, Retz-Junginger, 2009; Young, Wells & Gudjonsson, 2010). Early aggressive behaviour, low self-control and a difficult temperament are all said to increase the risk of drug abuse (National Institute of Drug Abuse, 2003). Some of those risk factors match exactly with factors connected to ADHD (American Psychiatric Association, 2000). A definition of addictive behaviour is one where an individual has an impaired control with harmful consequences, and where the individual finds himself unable to stop engaging in a certain behaviour (West, 2001), this definition could be used to describe someone with ADHD. When the connection between ADHD and substance use is studied closely, results indicate that compared to control groups, drug use among users diagnosed with ADHD can differ in terms of *how* they use (Young & Gudjonson, 2008). In relation to this, the pathway into substance abuse for an individual diagnosed with ADHD might be stronger than for someone without it, but to be able to understand *why*, one must look at the reasons behind use going down that pathway. Self-medicating psychological distress has been suggested as one of the reasons behind substance abuse (Zullig & Divin, 2012). As a result, an individual diagnosed with ADHD that is experiencing psychological problems

connected to their ADHD symptoms (Gudjonsson, Wells & Young, 2010; Young & Gudjonsson, 2008; Gudjonsson, Sigurdsson, Eyjolfsson, Smari, & Young, 2009) could be more inclined to use drugs to deal with their impairing symptoms.

In this study, it is hypothesized that pathways into substance use, and the reasons behind the use, are different for prisoners with ADHD than for those without ADHD. It is also hypothesized that, as a result of ADHD symptoms, the strength of the underlying reasoning for their use of illicit drugs is greater for prisoners with ADHD symptoms - in other words ADHD symptoms will result in stronger reasoning underlying the use.

Method

Participants

All participants were Icelandic male prisoners whom had been sentenced in Iceland, and were starting to serve their prison sentence. At the time the study was conducted, 175 prisoners started to serve their sentence. Of those, 53(30%) prisoners were not eligible because they were foreigners, 13(7%) were not eligible because of mental state, and 18(10%) because they had been incarcerated in another part of the country. An additional 22(13%) inmates were not approached because researches were not made aware when they started their sentence. 69(39%) of the prisoners were approached to participate and of those 66(96%) agreed to participate but 3(4%) failed to do so. Mean age was 33 (SD=9,3, range 18-54 years). Table 1 shows the types of offences that the inmates were sentenced for. The most frequent type of offence was serious traffic violations, (n=18, 27%).

Table 1. Types of offences committed by participants

Offences	n (%)
Offences against public servants	1 (2)
Falsification of documents	2 (3)
Robbery	2 (3)
Sexual offences	7 (11)
Deprivation of (a person's) freedom	2 (3)
Physical assault	7 (11)
Narcotics/drugs violations	13 (20)
Property offences	14 (20)
Serious traffic violations	18 (27)
Total	66(100)

Measures

The Mini-International Neuropsychiatric Interview (MINI-Plus; Sheehan et al, 1998).

The Mini-Plus is a structured psychiatric interview intended to assess mental disorders classified according to the DSM-IV (Sheehan et al., 1998). The interview was translated to Icelandic in 2004. It has been tested in relation to other neuropsychiatric assessment tools and has been found to be reliable (Baldur Heiðar Sigurðsson, 2008). The advantage of using the Mini-Plus is that although it is a structured interview, it offers the possibility of rephrasing questions or repeating them to ensure the interviewee understands every question clearly. The Mini-Plus is used to assess the presence of 33 disorders according to the DSM-IV criteria. In this study it was used to assess six disorders: Adult ADHD; Substance Dependency, both current and lifetime; Alcohol Dependency, both current and lifetime; and Antisocial Personality Disorder.

The Mini-Plus does not differentiate between inattentive and hyperactive subtypes of ADHD, though it covers inattention, hyperactivity/restlessness and impulsivity. Diagnosis of adult ADHD is established if, prior to the age of seven, the subject meets 6 of 10 criteria for childhood symptoms and 9 of 14 criteria as an adult (Sheehan et al., 1998). Participants were divided into two groups according to diagnosis - those who had adult ADHD and those who did not. In this study, the Mini-Plus was used as the primary diagnostic tool for ADHD diagnosis.

Diagnostic Statistical Manual IV Checklist of symptoms - Current symptoms scale (American psychiatric Association, 1994).

The Current symptoms scale has been translated into Icelandic, and psychometric properties of the list have been examined by Daniel Ólason, Páll Magnússon and Sigurður Grétarsson (2006). The list is compiled after the DSM-IV criteria for ADHD, and contains 18 questions about current symptoms of ADHD within the last six months. Nine items assess inattentive symptoms and nine items assess symptoms of hyperactivity and impulsivity. Items are answered on 4-point scale (*never or rarely/occasionally/often/very often*). Scores range from 0 to 54 for the total scale. When the psychometric properties of the questionnaire were first examined in Iceland using data from participants aged between 17-70 years, results revealed that the list can be used as a screen for ADHD in adulthood. The list has been recommended for screening for current symptoms of ADHD in adults, but not as a substitute for diagnosis because additional information is needed (Ólason, Magnusson & Grétarsson, 2006).

Cronbach's alpha for the total scale in this study was 0.95.

Diagnostic Statistical Manual IV Checklist of symptoms - Childhood symptom scale (American psychiatric Association, 1994).

The list was based on the DSM-IV criteria for ADHD and contains 18 questions, focused on behavior between the ages of from five and twelve years old. Therefore, the

questions rely on the memory of the participants. Nine of these items assess inattentive symptoms, while the remaining nine items assess symptoms of hyperactivity and impulsivity. These 18 items are based on the same scale as the current symptoms. Questions are answered on a 4-point scale (*never or rarely/occasionally/often/very often*). The score ranges from 0-54 for the total scale.

Cronbach's alpha for the total scale in this study was 0.98. The total score of the lists were used as a continuous variable (Gudjonsson, Sigurdsson, Sigfusdottir, & Young, 2012) to assess the relationship between ADHD symptoms and the strength of the underlying reasoning for illicit drug use.

Substance and Transition Addiction Rating Scale (STARS)

The STARS is a new scale intended to evaluate pathways into illicit drug abuse. This list was developed through the collective contribution of healthcare professionals with expertise in addiction, and both Forensic and Neuropsychiatry services. This group was led by Susan Young, Gisli Gudjonsson, Kim Wolf and Kiriakos Xenitidis and was piloted on within an addiction service, both inpatients and outpatients within. The list was translated to Icelandic by a team of five psychologists and the first author of this paper.

The list contains four subscales (A-D) that are intended to evaluate reasoning behind drug use. Scale A contains 18 items about *the first drug ever used and reasons behind the use*. Scale B contains 33 items about *why use of that first drug was continued*. Scale C contains 21 items about the *second illicit drug ever used and reasons behind the use*, and scale D contains 33 items about whether participants have a *favourite drug and reasons behind the use*. The list contains a total of 105 statements, and statements are rated on a five-point scale (*very untrue/mostly untrue/somewhat true/mostly true/true*), it takes about 12 minutes to complete. Total score on scales range between 18 and 90 on

the A scale, between 33 and 165 on the B scale, between 21 and 105 on the C scale and between 33 and 165 on the D scale. A high total score on each subscale implies a strong underlying reasoning for drug use (or greater justification). The more participants agree with each statement the greater the strength of their underlying reasoning for using illicit drugs.

Substance Use Questionnaire (SAQ) (Sigurdsson and Gudjonsson, 1995)

This 12 item questionnaire focuses on participants' past alcohol and illicit drug use before coming to prison. The first question on the SAQ scale is "Before coming to prison, how often did you consume alcohol?" The same question is then asked in relation to amphetamine, cannabis, cocaine, ecstasy and heroin. In relation to each substance participants were asked to indicate their consumption according to the following 9-point scale: (1) daily use; (2) a few times a week, (3) weekly, (4) a few times a month, (5) monthly, (6) less frequently than monthly, (7) not in the last 6 months, (8) not in the last 12 months, and (9) never. They were also asked the question "Do you have problems with alcohol?", "Have you ever had drug abuse problems?", "Have you ever injected drugs into yourself?", "Have you ever started treatment for substance abuse?", and "Did you complete a treatment programme?" and if so, "How often have you completed a full treatment programme?". In addition, participants were asked at what age alcohol consumption first occurred.

Procedure

Participants were recruited at the main admission prison in Iceland, where the majority of prisoners in Iceland start their prison sentence, between July 2012 and April 2013. Participants were given detailed information about the study, its nature and purpose, where among other things it was made clear that they could quit the study at any point if they chose not to participate. They were asked to sign an informed consent if they were

willing to participate. Two of the authors (ISUK and JHE) conducted the interviews and administered the questionnaires.

Statistical analysis

An independent t-test was used to compare means between the ADHD group and the non-ADHD group for all the questions in the STARS subscales. A t-test was also used to compare mean age for when alcohol and an illicit drug was first tried, and mean age in the sample. To investigate the relationship between ADHD and substance and alcohol dependency (assessed using the MINI-Plus) a Chi-Square test was used. Frequencies of participants' first drug ever used, the second drug used, the favourite drug and drug use before coming into prison were calculated. In order to investigate whether childhood ADHD predicted intensity behind reasoning for using illicit drugs, measured on a continuum with the *STARS* and *Childhood symptom scale*, regression analysis was used.

Results

STARS

Means for the total score of the scales were as follows: For the A scale 38 (SD=12.1, range 23-74), for the B scale 91 (SD=30, range 33-148), for the C scale 43 (SD=16, range 21-81) and for the D scale 91 (SD=26, range 41-139).

ADHD

According to the MINI-Plus, 21 (31%) of the 66 prisoners were diagnosed with adult ADHD, 8 (12%) had experienced exclusively childhood ADHD symptoms. Mean age for the ADHD group was 28 years, and 35 years for the non-ADHD group. The difference was significant ($t=3.01$, $p<0.01$). Correlation between the childhood symptom scale and the current symptom scale, using the scales as a continuum, was significant ($r=0.77$, $p<0.000$). Out of all prisoners 19(29%) were diagnosed with antisocial

personality disorder, 5(11%) of ADHD group compared to 14(67%) in the non-ADHD group.

Pathway begins - First use of alcohol and illicit drugs

Mean age when alcohol was first used was 13 years for the non-ADHD group, and 12 for the ADHD group. The difference was not significant ($t = -1.54, p < 0.1$). Mean age when illicit drugs were first used was 17 for the non-ADHD group and 15 for the ADHD group. This difference was marginally significant ($t = -1.91, p < 0.07$).

Table 2 shows first time drug use of the participants with regard to eight types of illicit drugs. All of the participants who claimed that they had never tried an illicit drug came from the non-ADHD group - not one of the ADHD group had never used an illicit, a marginally significant difference ($\chi^2(1, N=66) = 3.65, p < 0.06$). In this sample cannabis was the most commonly first used illicit drug for both groups. The participants in the ADHD group in this sample were also more likely to have tried more than one drug when they first tried illicit drugs (2,9.5%).

Table 2. Drugs that were used the first time a participant used illicit drugs, comparing the ADHD group and the non-ADHD group.

	ADHD	Non-ADHD
	n (%)	n (%)
Never tried illicit drug	0 (0.0)	7 (15.6)
Amphetamine	3 (14.3)	10 (20.2)
Cannabis	15 (71.4)	26 (57.8)
Cannabis/Amphetamine	2 (9.5)	0 (0.0)
Cocaine	0 (0.0)	1 (2.2)
Ecstasy	0 (0.0)	1 (2.2)
Mushrooms	1 (4.8)	0 (0.0)
Total	21(100)	45 (100)

Table 3 shows the difference between the ADHD group and the non-ADHD group regarding their reasoning behind first time use of the illicit drug. The ADHD group was also more likely to have stronger underlying reasons for overall use of the first illicit drug ($t=2.94$, $p<0.01$). Out of 18 reasons given in the STARS-A, scale 2 reasons were significantly different between the ADHD group and the non-ADHD group, *to help me cope with restlessness* and *as a way of rebelling*; and 2 reasons were marginally different, *because prescription was stopped* ($t=1.95$, $p<0,07$) and *because of the thrill of it* ($t=1.86$, $p<0.07$). The ADHD group was more likely to agree with previously-cited reasons.

Table 3. (STARS-A) Difference between the ADHD group and the non-ADHD group regarding reasoning behind first time use of illicit drug.

	ADHD n=21 Mean (SD)	Non-ADHD n=38 Mean (SD)	t-value	Cohen's d
Strength of underlying reasoning	44.33 (13.38)	35.23 (10.11)	2.94**	0.77
<i>I first tried the illicit drug...</i>				
1 ...because I thought it would help me relax	2.33	1.84	1.24	0.33
2 ...because my friends were doing it	3.57	3.34	0.60	0.16
3 ...out of curiosity	4.19	4.34	-0.60	0.15
4...as a way of meeting new people	2.29	2.00	0.83	0.22
5...because I was bored	2.52	1.95	1.50	0.39
6...because I thought it would help me sleep	2.10	1.71	0.81	0.23
7...as a way of 'forgetting' all my problems	2.67	1.95	1.59	0.44
8...because people encouraged me to do so	2.43	1.95	1.28	0.34
9...because of the thrill of it	4.19	3.47	1.95	0.54
10...to help me lose weight	1.05	1.05	-0.08	0
11...to help me cope with feelings of restlessness	3.24	1.53	4.68**	1.20
12...because I was feeling lonely	2.10	1.53	1.66	0.47

13...to help me cope with schoolwork	1.43	1.24	0.84	0.22
14...to help me cope with bullying	1.52	1.37	0.60	0.15
15...because my prescription was stopped	1.29	1.00	1.86	0.43
16... to help me cope with stress	2.10	1.61	1.40	0.39
17...because the urge to do so was overpowering	2.33	1.82	1.32	0,35
18...as a way of rebelling (e.g. from society, parents, authority)	3.00	1.55	3.76*	1.07

*significant, $p < 0.05$, **significant, $p < 0,01$

Table 4 shows the difference between the ADHD group and the non-ADHD group regarding reasoning behind continuing use of the first illicit drug. The ADHD group was more likely to have stronger underlying reasons for overall use ($t=2.39$, $p < 0.05$). Out of 33 reasons, 5 reasons were significantly different between the ADHD and the non-ADHD group, *couldn't stand the thought of stopping taking it*, *it helped me to calm down*, *I saw no harm in taking it*, *the urge to continue was overpowering*, *it was a way to feel normal* and *because it was a way of forgetting all my problems*; 3 reasons were marginally different, *I couldn't live without it* ($t=1.90$, $p < 0,07$), *I enjoyed taking it and didn't want to give it up* ($t=1.94$, $p < 0,07$) and *without it I felt hopeless about the future* ($t=1.97$, $p < 0,07$), the ADHD group more likely to agree with those kind of reasons.

Table 4. (STARS-B). Difference between the ADHD group and the non-ADHD group regarding reasoning behind continuing use of the first illicit drug.

	ADHD n=21 Mean (SD)	Non-ADHD n=38 Mean (SD)	t-value	Cohen's d
Strength of underlying reasoning	102.4 (31.6)	83.6 (26.5)	2.39*	0.64
<i>I continued to use the illicit drug because...</i>				
1...I couldn't stand the thought of stopping taking it	3.71	2.66	2.45*	0.68
2...I couldn't live without it	2.62	1.86	1.90	0.54
3...If I didn't take it I would lose my friends	1.62	1.23	1.67	0.44
4...it helped me feel comfortable in social situations	3.62	2.86	1.64	0.46
5...it helped me to concentrate	3.05	2.37	1.53	0.42
6...it was a good way of making new friends	2.19	2.00	0.57	0.16
7...I didn't think taking drugs was bad for my health	2.71	2.09	1.56	0.42
8...it helped me cope with boredom	3.48	2.80	1.67	0.46
9...I didn't feel I had the mental strength to stop taking it	2.38	1.82	1.53	0.41

10...without it I felt worthless	1.81	1.80	0.03	0.01
11...it made me feel better about myself	3.62	3.00	1.42	0.39
12...I felt under great pressure from friends to take it	1.95	1.69	0.83	0.22
13...it helped me to calm down	3.76	2.83	2.34*	0.64
14...I enjoyed taking it and didn't want to give it up	4.33	3.66	1.94	0.55
15...without it I would have been 'nobody'	2.14	1.66	1.30	0.35
16...taking it was a part of my culture	3.48	2.83	1.46	0.40
17...it helped maintain my weight loss	1.29	1.23	0.25	0.07
18...it had become an important part of my life	3.38	2.91	1.04	0.29
19...it made me feel 'high'	4.33	3.89	1.26	0.34
20...it gave me a feeling of confidence	3.24	2.97	0.60	0.17
21...without it I felt hopeless about the future	2.43	1.71	1.97	0.55
22...it gave me energy	3.14	2.86	0.62	0.17
23...I found taking it very exciting	4.10	3.69	1.14	0.32
24...I saw no harm in taking it	4.19	3.43	2.01*	0.57

25...I felt physically unwell when I tried to stop	2.43	2.14	0.75	0.21
26...I wanted to reach new spiritual heights	2.76	2.40	0.83	0.22
27...I was reminded of it by certain people and areas	3.52	3.57	-0.40	0.24
28...the urge to continue was overpowering	3.43	2.31	2.52*	0.69
29...something bad happened in my life that led to my drug use getting out of control	2.90	2.29	1.34	0.36
30...it was a way to feel normal	3.95	2.91	2.41*	0.67
31...it was a way of forgetting all my problems	3.86	2.86	2.48*	0.68
32...it helped me to cope with daily life	3.62	2.97	1.48	0.41
33...I tried to stop and failed	3.33	2.46	1.81	0.50

*significant, $p < 0.05$, **significant, $p < 0.01$

Pathways into continuing use - second drug used

Table 5 shows which illicit drugs were used after the first drug used. Participants who had never used illicit drugs are not included in the table. In the sample amphetamine was the most common second illicit drug used if drug use was continued. This held true for both the ADHD group and the non-ADHD group. Compared to the ADHD group, the

non-ADHD group was more likely to just use that first drug and not extend use to other drugs.

Table 5. The second illicit drug used, comparing the ADHD group and the non-ADHD group.

	ADHD	Non-ADHD
	n (%)	n (%)
Tried illicit drugs only once	0 (0.0)	2 (5.3)
Only used that first illicit drug	1 (4.8)	4 (10.5)
Amphetamine	14 (66.7)	23 (60.5)
Cannabis	3 (14.3)	3 (7.9)
Ecstasy	0 (0.0)	1 (1.6)
Cocaine	1 (4.8)	4 (10.5)
Cocaine/Amphetamine	0 (0.0)	1 (1.6)
Cocaine/ Ecstasy	2 (9.5)	0 (0.0)
Total	21 (100)	38 (100)

Table 6 shows the difference between the ADHD group and the non-ADHD group, regarding reasoning behind use of the second drug used. The ADHD group was more likely to have stronger underlying reasons for overall use ($t=2.33$, $p<0.05$). Out of 21 reasons, 4 were significantly different between the ADHD and the non-ADHD participant: *because I thought it would help me relax, to help me cope with feelings of restlessness, as a way of rebelling* and *to cope with the effects of the first drug I took*. One reason was marginally different, *I needed to seek a better high* ($t=1.95$, $p<0,06$). The ADHD group was more likely to agree with previously-cited reasons.

Table 6. (STARS-C) Difference between the ADHD group and the non-ADHD group regarding reasoning behind continuing use of illicit drugs.

	ADHD n=21 Mean (SD)	Non-ADHD n=38 Mean (SD)	t-value	Cohen's d
Strength of underlying reasoning	49.9 (18.9)	39.2 (11.2)	2.33*	0.69
<i>I moved on to other substances...</i>				
1 ...because I thought it would help me relax	2.62	1.38	3.23*	0.96
2 ...because my friends were doing it	3.52	3.44	0.24	0.06
3 ...out of curiosity	4.05	4.13	-0.26	0.07
4...as a way of meeting new people	2.38	2.28	0.25	0.07
5...because I was bored	3.05	2.41	1.61	0.45
6...because I thought it would help me sleep	1.43	1.19	1.08	0.28
7...as a way of 'forgetting' all my problems	2.90	2.06	1.83	0.64
8...because people encouraged me to do so	2.29	2.19	0.24	0.07
9...because of the thrill of it	4.14	4.03	0.33	0.09
10...to help me lose weight	1.14	1.25	-0.51	0.16
11...to help me cope with feelings of	3.10	2.06	2.32*	0.64

restlessness				
12...because I was feeling lonely	2.19	1.66	1.44	0.40
13...to help me cope with schoolwork	1.52	1.25	1.01	0.26
14...to help me cope with bullying	1.52	1.13	1.56	0.46
15...because my prescription was stopped	1.57	1.25	1.01	0.29
16... to help me cope with stress	2.00	1.56	1.27	0.37
17...because the urge to do so was overpowering	2.90	2.31	1.22	0.35
18...as a way of rebelling (e.g. from society, parents, authority)	3.00	1.66	3.13*	0.92
19...because the drug I was taking wasn't enough anymore	3.00	2.13	1.87	0.54
20...because I needed to seek a better high	3.43	2.56	1.95	0.70
21...to cope with the effects of the first drug I took	2.14	1.44	2.11*	0.62

*significant, $p < 0.05$, **significant, $p < 0.01$

Pathways into continued use - favourite illicit drug

Table 7 shows which drugs were chosen as the favourite illicit drug. Again participants who claimed not to have used illicit drugs are not included in the table. In the sample cannabis was most commonly listed as a favourite illicit drug for both the ADHD group

and non-ADHD group. In this sample, a higher number of the ADHD group participants had a favourite drug: 20(95%), as compared to 30(79%) in the non-ADHD group.

Table 7. Favourite illicit drugs, comparing the ADHD group and the non-ADHD group.

	ADHD	Non-ADHD
	n (%)	n (%)
Tried illicit drugs only once	0 (0)	2 (5.3)
No favorite illicit drug	1 (4.8)	6 (15.8)
Amphetamine	6 (28.6)	11 (28.9)
Cannabis	7 (33.3)	13 (34.2)
Cocaine	5 (23.8)	5 (13.2)
Morphine	1(4.8)	0 (0)
Contalgin	0 (0)	1 (2.6)
Mushrooms	1 (4.8)	0 (0)
Total	21 (100)	38 (100)

Table 8 shows the difference between the ADHD group and the non-ADHD group regarding reasoning behind use of the favourite illicit drug used. The ADHD group was likelier to have stronger underlying reasons for overall use ($t=2.81$, $p<0,01$). Out of 33 reasons, 9 were significantly different between the ADHD and the non-ADHD participants, *I can't stand the thought of stopping, drugs help me cope with boredom, I want to reach new spiritual heights, I am reminded of them by certain people and areas, the urge to continue was overpowering, it was a way to feel normal, it was a way of forgetting all my problems, it helps me to cope with daily life and I tried to stop in the past and failed*, 2 reasons were marginally different, *without drugs I feel worthless*

($t=1.89$, $p<0.07$) and *I felt physically unwell when I tried to stop* ($t=1.97$, $p<0.07$). The ADHD group was more likely to agree with previously-cited reasons.

Table 8. (STARS-D) Difference between the ADHD group and the non-ADHD group regarding reasoning behind use of the favourite illicit drug.

	ADHD n=21 Mean (SD)	Non ADHD n=38 Mean (SD)	t-value	Cohen's d
Strength of underlying reasoning	102.8 (21.4)	83.4 (25.4)	2.81**	0.83
<i>I continued to take illicit drugs because...</i>				
1...I can't stand the thought of stopping	3.70	2.63	2.43*	0.71
2...I can't live without taking illicit drugs	2.70	2.13	1.36	0.39
3...If I didn't take drugs I would lose my friends	1.50	1.40	0.42	0.12
4...drugs help me feel comfortable in social situations	3.37	2.83	1.22	0.36
5...drugs help me to concentrate	3.60	3.00	1.43	0.42
6...taking drugs is a good way of making new friends	2.00	2.03	-0.10	0.03
7...I don't think taking drugs is bad for my health	2.05	2.20	-0.35	0.10
8...drugs help me cope with boredom	4.00	2.90	2.84**	0.82

9...I don't feel I have the mental strength to come off drugs	3.16	2.47	1.61	0.47
10...without drugs I feel worthless	2.25	1.63	1.89	0.55
11...drugs make me feel better about myself	3.30	2.67	1.49	0.42
12...I feel under great pressure from friends to take drugs	1.75	1.60	0.54	0.15
13...drugs help me to calm down	3.95	3.20	1.86	0.53
14...I enjoy taking drugs and don't want to give it up	3.25	2.77	1.32	0.38
15...without drugs I would be 'nobody'	2.05	1.70	0.96	0.27
16...taking drugs is a part of my culture	3.25	2.67	1.42	0.41
17...drugs help maintain my weight loss	1.45	1.17	1.04	0.31
18...drugs are now an important part of my life	3.80	2.80	2.62	0.76
19...taking drugs makes me feel 'high'	4.10	3.93	0.47	0.14
20...drugs give me a feeling of confidence	3.26	3.10	0.35	0.10
21...without drugs I feel hopeless about the future	2.30	2.03	0.66	0.19
22...drugs give me energy	3.55	3.13	1.02	0.30

23...I find taking drugs very exciting	2.86	2.77	0.17	0.05
24...I see no harm in taking drugs	2.30	2.00	0.76	0.21
25...I felt physically unwell when I tried to stop	3.50	2.63	1.97	0.56
26...I want to reach new spiritual heights	3.35	2.13	3.15*	0.89
27...I am reminded of them by certain people and areas	4.05	3.13	2.45*	0.72
28...the urge to continue was overpowering	3.65	2.60	2.50*	0.72
29...something bad happened in my life that led to my drug use getting out of control	3.10	2.43	1.48	0.42
30...it was a way to feel normal	4.00	2.97	2.70**	0.77
31...it was a way of forgetting all my problems	4.00	2.80	3.01**	0.86
32...it helps me to cope with daily life	3.95	2.87	2.94**	0.82
33...I tried to stop in the past and failed	4.35	3.13	2.88*	0.80

*significant, $p < 0.05$, **significant, $p < 0.01$

Current problems - alcohol and substance use before coming to prison

Table 9 shows the participants' substance abuse before coming to prison with regard to alcohol and three types of illicit drugs listed in the SAQ scale. The ADHD group was more likely to use cannabis, amphetamine, and cocaine daily when compared to the non-ADHD group. Only when substance was used few times a month/monthly or less frequent did the ADHD- group have a higher rate of participants than the ADHD group.

Table 9. The participants' frequent use of substances before coming to prison,

	ADHD n (%)	Non-ADHD n (%)
Alcohol:		
Daily	3(14)	6(16)
Few times a week/weekly	8(38)	6(16)
Few times a month/monthly	5(24)	19(50)
Less freq. use	4(19)	11(29)
Cannabis:		
Daily	10(48)	7(18)
Few times a week/weekly	7(33)	8(21)
Few times a month/monthly	2(10)	9(24)
Less freq. use	4(19)	18(47)
Amphetamine:		
Daily	5(24)	4(11)
Few times a week/weekly	8(38)	2(5)
Few times a month/monthly	1(5)	8 (21)
Less freq. use	6 (29)	20 (53)
Cocaine:		
Daily	5 (24)	1 (3)
Few times a week/weekly	4 (19)	2 (5)
Few times a month/monthly	3 (14)	2 (5)
Less freq. use	8 (38)	27 (71)
Total	21(100)	38 (100)

Current problems - alcohol and substance dependencies

Table 10 shows that current and lifetime substance dependency differ significantly between the two groups. This implies a relationship between ADHD and illicit drug dependency, with the ADHD group more likely to have both a lifetime and a current problem with illicit drug dependency.

Table 10. Participants' current and lifetime substance dependency.

	ADHD n(%)	Non ADHD n(%)	Pearson Chi- Square
Alcohol dependency - Current	14(67)	24(53)	1.04
Alcohol dependency -Lifetime	20(95)	36(80)	2.59
Illicit drug dependency - Current	18(86)	22(49)	8.13**
Illicit drug dependency - Lifetime	20(95)	30(67)	6.36*
Total	21(100)	45(100)	

*significant, $p < 0.05$, **significant, $p = 0.01$

Seven (33%) of the ADHD group said they had an alcohol problem and 27(60%) of the non-ADHD group, which is a significant difference ($t=2.05$, $p < 0.05$). Nineteen (90%) of the ADHD group had started a treatment programme for substance/alcohol abuse compared to 25(56%) of the non-ADHD group, which is a significant difference ($t=3.51$, $p < 0.05$). However the groups did not differ significantly in how often they had completed a full treatment program ($t=0.74$, $p > 0.1$). Eleven (52%) of the ADHD group said they had injected themselves with an illicit drug, compared to only 9(20%) of the non-ADHD group, which is a significant difference ($t=2.55$, $p < 0.05$).

The effect of childhood ADHD symptoms on the strength of reasons behind illicit drug use, from first use to the favourite drug

Table 11 shows the results of a regression analysis of the effect of childhood ADHD symptoms on the strength of underlying reasoning for illicit drug use. The table shows the beta values for the five STARS scales and the amount of reasoning explained (the R^2) by ADHD childhood symptoms. Only childhood symptoms were used because both groups were teenagers when they used illicit drugs for the first time.

ADHD childhood symptoms did have a marginally significant effect on reasons for trying the first drug (Scale A) ($b=0.15$, $p=0.08$) and on reasons regarding continuing use of the first drug (Scale B) ($b=0.41$, $p=0.06$). ADHD childhood symptoms did have significant effect on reasons behind using the second drug (Scale C) ($b=0.36$, $p<0.05$), and on reasons behind using the favourite drug (scale D) ($b=0.57$, $p<0.05$).

Table 11. Results of a regression analysis of the effect of childhood ADHD symptoms on strength of reasoning, on the five STARS scales.

	A	B	C	D
	β	β	β	β
Childhood ADHD symptoms	0.24	0.26	0.43	0.43
R^2	0.05	0.07	0.18	0.18

Discussion

Main findings

Current findings suggest that pathways into substance use are in some ways different for prisoners with ADHD compared to prisoners without ADHD. Reasons behind use from the first time experimenting with illicit drugs began, to the time participants could name their favourite illicit drug were in some cases different between the groups. Results also indicate that the strength of underlying reasons for the use of illicit drugs is something to consider while assessing why drugs are used, as there were differences between the groups - and because ADHD symptoms seem to have a greater effect as the use becomes more persistent. There is also a difference between groups in regards to which drugs are used and how often, and in relation to drug dependency.

Pathways into substance use

The ADHD group started to use illicit drugs at a younger age than the non-ADHD group; the ADHD group in this study was also younger than the non-ADHD group. This is in line with results that show that prisoners with ADHD are younger when they participate in criminal activities (Young, Wells & Gudjonsson, 2010; Flecher & Wolfe, 2012). There was not a difference regarding age when alcohol use started. This lack of connection to alcohol use might be because of different stimulation that alcohol offers compared to illicit drugs (Young & Gudjonson, 2008).

Drug of choice for first time use was most commonly cannabis for both groups (Young, Wells & Gudjonsson, 2010). The second most common drug was amphetamine, also the same for both groups. Just under 10% of the ADHD group had tried more than one illicit drug that first time, while none of the non-ADHD group had tried more than one illicit drug during their first experience. The participants who had never used illicit drugs were all from the non-ADHD group; while everyone in the ADHD group had used

an illicit drug. This strong relationship between drug use and ADHD has been shown in the literature and indicates that a person with ADHD is more likely to use illicit drugs (Ginsberg, Hircikoski & Lindefors, 2010; González, Vélez-Pastrana, Varcárcel, Levin, & Albizu-García, 2012; Rösler, Retz, Yaqoobi, Burg, Retz-Junginger, 2009; Young, Wells & Gudjonsson, 2010). Looking at the reasons behind use of the first drug for the first time, the groups differed in relation to four reasons, with the ADHD group always likelier to have a stronger agreement. Those reasons indicated that the drug was a way to get excited and to deal with restlessness. Both of which could be traced back to the hyperactive and impulsivity symptoms of ADHD. As listed in the DSM-IV, a person showing hyperactive type ADHD symptoms can be very fidgety and restless and the impulsivity can involve impatience so one would always be looking for some source of excitement (American Psychiatric Association, 2000).

When asked about continuing use of the first drug the groups differed in relations to nine reasons, with the ADHD group likelier to agree more with those reasons. Most of the reasons indicated that the drug was used to help feeling adjusted, normal and good. This might indicate that the drug was used to deal with psychological distress, which has been connected to ADHD (Young & Gudjonsson, 2008), and an overall dissatisfaction with life - which also has also been connected to ADHD (Gudjonsson, Sigurdsson, Eyjolfsson, Smari, & Young, 2009). Self-medication to deal with psychological distress, like feelings of hopelessness, sadness and depression has been suggested as one reason for drug use (Zullig & Divin, 2012), so someone with ADHD could be using drugs to self-medicate.

When continuing down the pathway into substance use the groups differed regarding use of the second drug used. Results for continuing use showed that no one in the ADHD group tried drugs only once, all continued using drugs and almost everyone

in the group (except one) moved on to other drugs, which again shows the relationship between ADHD and illicit drug use seen in other studies (González, Vélez-Pastrana, Varcárcel, Levin, & Albizu-García, 2012; Young, Wells & Gudjonsson, 2010). This was not the case for the non-ADHD group where a portion of the group either tried an illicit drug only once or stuck to using that first drug without trying something else. When looking at reasons behind use of the second drug the groups differed in relations to five reasons, with the ADHD group likelier to agree more with those reasons. Some of those reasons indicated that the drug was used to feel adjusted and as a way of coping with feelings of restlessness, which again can be traced back to ADHD symptoms (American Psychiatric Association, 2000), and could indicate that the drug was used as a way to deal with dissatisfaction or psychological distress that can come with ADHD symptoms (Gudjonsson, Wells & Young, 2010; Young & Gudjonsson, 2008; Gudjonsson, Sigurdsson, Eyjolfsson, Smari, & Young, 2009). The groups also differed for reason that could indicate a dependency problem - they needed a better high and to cope with the effects of the first drug. This is interesting and might indicate that, not only dose ADHD seem to increase the likelihood of a dependency problem (Einarsson, Sigurdsson, Gudjonsson, Newton, & Bragason, 2009), but that dependency might arise earlier for someone with ADHD.

Results for continuing drug use showed that the favourite illicit drug was the same for both groups: cannabis. The second favourite drug was amphetamine - the rate was almost the same when comparing the two groups (Young, Wells & Gudjonsson, 2010). Looking at reasons behind use of the favourite drug the groups differed in relations to eleven reasons, with the ADHD group likelier to more agree with those reasons. Most of those reasons reflected a drug dependency problem (Young, Wells & Gudjonsson, 2010) and that the drug was a way to feel adjusted and capable of coping

with daily life. Again, this may indicate that the illicit drug was used as self medication within the ADHD group, to deal with feelings of anxiety and depression connected to ADHD (Gudjonsson, Wells & Young, 2010; Young & Gudjonsson, 2008; Gudjonsson, Sigurdsson, Eyjolfsson, Smari, & Young, 2009).

It is interesting that most reasons, regarding reasoning behind illicit drug use, to differ significantly between the two groups were for the favourite drug, eleven reasons compared to four reasons for the first drug. This might indicate that ADHD symptoms could have a greater effect later down the pathway into substance abuse. The results also indicate that the strength of the underlying reasoning for drug use could be explained by ADHD symptoms in childhood, but the variance explained by symptoms was larger when participants had moved on from that first drug. Regardless the two groups did differ regarding the strength of the underlying reasons for use all down the pathway into illicit drug use. From the first drug used to the favourite drug, the ADHD group was always likelier to have greater strength or justification of underlying reasons for using illicit drugs. This strength of underlying reasons could be the result of factors like mood disorders, substance abuse disorders, and antisocial personality disorder which have strong connections to ADHD (Biederman, 2004; Jacob, et. al., 2007; González, Vélez-Pastrana, Varcárcel, Levin, & Albizu-García, 2012; Huntley & Young, 2012; Klein & Mannuzza, 2010; Retz & Rösler, 2009; Lynskey & Hall, 2001; Simon, Czobor, Bálint, Mészáros & Bitter 2009). A person with problems like those might find themselves more inclined, or to have more reasons, to use illicit drugs as a way of coping with feelings like depression and anxiety in addition to the other mood related problems connected to ADHD (Cumyn, Frenchm & Hechtman, 2009; Gudjonsson, Sigurdsson, Eyjolfsson, Smari, & Young, 2009; Young & Gudjonsson, 2008; Zullig & Divin, 2012).

When asked about their most recent substance use results showed that a greater number in the ADHD group (compared to the non-ADHD group) had used cannabis, amphetamine and cocaine daily before going to prison, in most cases few times a week or weekly. This was also the case in Young, Wells and Gudjonsson (2010). The groups did not differ significantly regarding alcohol dependency diagnosis, though they did differ when it came to illicit drug dependency diagnosis, both current and lifetime. In both cases, participants from the ADHD group were more likely to have drug related dependency problem, and was also more likely to have injected themselves with a drug. There is a connection between ADHD and substance problems both alcohol and drug related (Gudjonsson, Wells and Young 2010; González, Vélez-Pastrana, Varcárcel, Levin, & Albizu-García, 2012; Huntley & Young, 2012; Klein & Mannuzza, 2010), but this indicates that - for an ADHD symptomatic group - the relationship between drug related problems might be stronger than for alcohol problems (Lee, Humphreys, Flory, Liu & Glass, 2011; Young & Gudjonsson, 2008).

It is interesting that, when asked about their alcohol use, only one third of the ADHD group said they had a problem with alcohol - although well over half were diagnosed with current alcohol dependency, and almost all had a history of alcohol dependency.

Secondary findings - ADHD and offending

The rate of prisoners with adult ADHD in this study was found to be much higher than in the normal population (Simon, Czobor, Bálint, Mészáros & Bitter 2009; Vollmer, 1998). Those results are similar to those reported in studies where the focus was on ADHD among prisoners (Cahill, Coolidge, Segal, Klebe, Marle & Overmann, 2012; Ginsberg, Hircikoski & Lindefors, 2010; Guðjónsson, Sigurðsson, Bragason, Newton & Einarsson, 2008; Rösler, et.al., 2004; Young, Gudjonsson, Wells, Asherson, Theobald,

Oliver, Scott, Mooney, 2009; Gudjonsson, Sigurdsson, Young, Newton & Peerson 2009).

Past studies among prisoners have indicated that participants in an ADHD group, compared to a non-ADHD group, will be found to have participated in a higher number of antisocial activities compared to a non-ADHD group (Gudjonsson and Young, 2008; Flecher & Wolfe, 2012). Results in this study showed that the rate in an ADHD group diagnosed with antisocial personality disorder was significantly lower when compared to the non-ADHD group. Given that everyone in the sample had participated in an antisocial activity, this might indicate that a bigger factor for participating in those activities for the group could be their ADHD symptoms and not an antisocial personality disorder.

Strengths and limitations

There are a few limitations to the scope of this study. First this study uses a scale that has never been used before as the main dependent variable, the STARS. The sample size was small so factor analysis could not be used to assess the scale. Further analysis of the STARS scale and underlying factors is an important step for further use of the scale. Most information about substance use was gathered through self-report, relying on memory. In most cases participants had been using drugs for years, and in some cases they had stopped just before going to prison. Reports of substance use might therefore be inaccurate in some cases.

One of the major strengths of this study lies in the use of the MINI-Plus, a structured and reliable interview, which is a better option than self-report scales (Sheehan et al,1998). The response rate in this study is also very high, which makes the results representative of the population. Offenders with ADHD symptoms have a higher number of violations, of both a violent and non-violent nature, while incarcerated. They

also have a higher rate of recidivism (Gordon, Williams, Donnelly, 2012; Gudjonsson & Young, 2011). Knowledge regarding ADHD among prison inmates is therefore very beneficial for rehabilitation purposes, as well as for the purpose of prevention (Bolea, Adamou, Arif, Asherson, Gudjonsson, Muller, Nutt, Pitts, Thome & Young, 2012; Ganizadeh, Mohammadi, Akhondzadeh, & Sanaei-Zadeh, 2011). This kind of study has not been performed in the past and is therefore of great importance as the results comply with past theories with regard to reasons behind drug use (West, 2001).

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