Journal of
Alcoholism & Drug Dependence

Wijngaarden-Cremers et al., J Alcohol Drug Depend 2014, 2:4
DOI: 10.4172/2329-6488.1000170

Research Article Open Access

Addiction and Autism: A Remarkable Comorbidity?

Patricia JM van Wijngaarden-Cremers[1,2*], Wim Van den Brink MD[3] and Rutger Jan van der Gaag[2]

[1]*Dimence Mental Health – Deventer, The Netherlands*

[2]*Radboud University Medical Centre Nijmegen–Karakter University Centre Child & Adolescent Psychiatry, The Netherlands*

[3]*Academic Medical Centre Amsterdam (AMC) & Amsterdam Institute for Addiction Research (ARIAR), The Netherlands*

Abstract

Objective

Autism Spectrum Disorders (ASD) are well known for high prevalence's of comorbid conditions especially anxiety, obsessions, depression and challenging behaviours. In this article we will consider the evidence for an eventual comorbidity between ASD and Addiction (Substance Use Disorders (SUD) and explore the possible underlying explanations.

Methods

A literature study on similarities between Addiction and ASD (at a phenotypical and neurobiological level) as well as a case note review on a year cohort of 200 consecutive admissions in an adult addiction psychiatry unit was studied here.

Results

In our pilot-survey 8 (men) on 118 patients were diagnosed with autism spectrum disorder. This is substantially higher than in the general population (1%) but in line with other European studies.

Autism spectrum disorders and addiction can both be perceived as developmental disorders in which a genetic predisposition and vulnerability interact with environmental factors. They can be induced by early stress thus affecting the proper functioning of the cortico-striatal dopaminergic regulation systems (and also the HPA axis). There is growing evidence that ASD and SUD share developmental dysregulations of the limbic and sensorimotor cortico-striatal regulations loops.

Conclusions

There are clear indications that a possible comorbidity of substance abuse disorder should be considered in cases of individuals with autism spectrum disorders. This finding is important for clinicians to take into account in assessing patients with addiction problems or ASD.

Keywords: Addiction; SUD; ASD; Autism; Dual diagnosis

Introduction

When one thinks of a person with addiction, a comorbid diagnosis Autism Spectrum Disorder (ASD) is not the first one that comes to one's mind. Conversely in autism Substance Use Disorder (SUD) is not a comorbidity that is commonly considered. Yet it can be hypothesized that these conditions have more commonalities than one would suspect. In this article we will explore the likelihood of comorbidity between ASD and SUD. And look into possible underlying explanations. From a neurobiological point of view there seems to be some stricking overlap between both conditions that could account for the enhanced mutual vulnerability. This could explain the higher prevalence of ASD in an addicted population and that the dual diagnosis ASD/SUD is not merely a matter of chance.

But let us begin with two clinical vignettes to illustrate our case.

Peter an overlooked case of marked autistic rigidity

Peter was 20 years of age when he was admitted to a detox with a serious addiction to alcohol and features of a cluster B personality disorder. He would get very aggressive when hindered by his parents or others to consume alcohol. The detox in se did not pose any problems. The problems occurred when at the start of the rehabilitation he was assigned tasks in the group. Thus he was asked to do the shopping that day. The therapeutic goal is to learn to perform tasks within a certain time frame, and take responsibility for oneself and others. He managed to get the shopping done in time but was tidying the purchased items when he was expected to join a group therapy session. When one of the nurses confronted him, he went out of his mind, became very aggressive and bashed doors and broke windows whilst threatening the nurse verbally. Due to this unacceptable behaviour he was dismissed from the program immediately. A week later he came back to our outpatient clinic and was asked what had happened and had caused his extreme reaction. He said that he became very angry because the nurse had interrupted him. For him it was inconceivable that he should have joined the group leaving his task unfinished. In the clinical interview it became clear that this type of rigid behaviour, and his incapacity

***Corresponding author:** Patricia van Wijngaarden-Cremers, Radboud University Medical Centre Nijmegen – Karakter University Centre Child & Adolescent Psychiatry, The Netherlands, Tel: +31-24-361-11; E-mail: p.vanwijngaarden@dimence.nl

Received May 05, 2014; **Accepted** July 20, 2014; **Published** July 25, 2014

Citation: Wijngaarden-Cremers PJM, Brink WV, Gaag RJ (2014) Addiction and Autism: A Remarkable Comorbidity?. J Alcohol Drug Depend 2: 170. doi:10.4172/2329-6488.1000170

Copyright: © 2014 Wijngaarden-Cremers PJM, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

to communicate appropriately and a pronounced social insensitivity, were lifelong characteristics as from his childhood. Alcohol helped him to ease the path towards encountering others. A thorough assessment including interviews with his parents and old school reports confirmed a diagnosis of Asperger's syndrome within ASD. Once approached as such, this difficult to handle older adolescent, became compliant and well willing.

Sarah: a preoccupation run out of hand

Sarah is a 14-year old adolescent diagnosed with Asperger's. At the elementary school she was well accepted as a pedantic eloquent clumsy girl with a special interest for all that was related to nature. She collected leaves and feathers and always had a tame mouse under her pullover. She was left alone and no one ventured to tease or bully her. She did well and went to the gymnasium the highest secondary school type in our country with Latin, Greek and sciences. Her interest shifted from nature to gaming. She would spend hours in a row, playing games and chatting with virtual friends. Once in a while these would organize meetings. There she met people who drank and blowed. She liked it because it helped her overcome her shyness. The group went on and experimented with speed. Her parents are amazed to witness a metamorphosis from socially aloof towards suddenly, spending time with "friends". One day they get a phone call from the police. Their daughter has been arrested for dealing drugs. She has been used and (sexually) abused by dealers, and used as a drugs courier. She confessed in a very naive manner that she thought these were her first real friends and would do anything to be their friend. Once in detox she reappeared to be the socially isolated and clumsy intelligent young girl.

Autism and addiction an explorative pilot

Addiction is a condition with a very high degree of concurrent comorbidity ranging from 60 up to 90% in addiction units. In addiction units group approaches are greatly favored. After detox patients can support each other in order to help them cope with problems such as craving and relapse. They also share, in anticipating, which pressures they will have to face when returning to their own social environment where peers will still be using drugs.

Yet within such a clinical setting a number of patients do not seem to fit in that group model. These "loners" can disrupt the group processes. They miss the point, cannot enjoy jokes or humor. They stick in a rigid way to rules that they take literally and get upset by all the exceptions that are made. To explore this phenomenon we performed a survey in our clinic on a random cohort of subsequent admissions over a period of a year (Table 1). To assess for developmental disorders we used the standard diagnostic tools recommended by our national guidelines (for diagnosing Autism Spectrum Disorders in Adults the Dutch Guidelines were established in conjunction with the British ones from the NICE institute [1]. Thus 8 (men) out of 118 patients subsequent admissions were diagnosed with autism spectrum disorder. This is far higher than in the general population [2] where the prevalence is currently estimated at approximately 1%. Yet the figure is difficult to compare to the prevalence within psychiatric populations as no studies as such have been published to the best of our knowledge. Yet beyond our own research group [3] this dual diagnosis had not been reported until recently [4]. All diagnoses in the 8 men with ASD SD were not diagnosed with ASD before referring to the addiction unit were confirmed during their admission in the detox with tools according to the Anglo-Dutch guidelines for ASD in adults [1]. And all of them had a normal to high IQ based on their level of education. Unfortunately we lack information of family history on ASD. The other dual diagnoses in our cohort are in line with what is reported elsewhere: mostly externalizing disorders (conduct disorder and antisocial personality disorders and ADHD) along with depressions and psychoses though it must be noted that ADHD and ASD present a clinical and genetic overlap ranging from 20 up to 40% [5] (Table 1).

Addiction and Autism from the autistic perspective

Prior to 2005, apart from anecdotal reports like that by Kalat [6] and heavy drinking in a couple of cases in a follow-up study [7,8], no mention is made of any comorbidity between autism and addiction. There is however a number of autobiographic accounts that illustrating the case. For example Gunilla Gerland in her book "A Real Person: Life on the Outside" [9], describes her addictions. She felt at ease in the drugs scene, where contacts were functional and communication explicit with clues and prompts. Many of the behaviours she describes are reminiscent of preoccupations, trance like repetitive behaviours and obsessions as described in young children with autism [10]. When asked clinicians (working with people with autism) confess that the possibility of a co-occurrence of autism and substance abuse never

	N (%)	Sex (%)		SUD per diagnosis				
		Male	Female	Alcohol	Soft Drugs	Hard drugs	Others (medication –gambling)	More than one SUD
ADHD	36 30,5%	31 35,7%	5 16,2%	23/36 63,8%	21/36 58,3%	22/36 61,1%	8/36 22,2%	26/36
ASD	8 6,7%	8 9,1%	0	4/8 50%	4/8 50%	5/8 62,5%	0	5/8
Psychotic	3 2,5%	3 3,4%	0	2/3 66%	2/3 66%	3/3 100%	1/3 33,3%	2/3
Internalizing Disorders	33 27,9%	22 25,3%	11 35,5%	30/33 90%	6/33 18%	10/33 30%	7/33 21,1%	20/33
Externalizing Disorders	38 33,2%	23 26,4%	15 48,3%	23/38 58,9%	21/38 55,2%	22/38 57,9%	13/38 34,2%	26/38
	118 100%	87 100%	31 100%					

Table 1: Diagnoses and Types of SUD

crossed their mind and they thus never question in that direction.

But is there a case for co-morbidity between autism and addiction. Reflecting on the compulsive repetitive behaviours and trance like behaviours in individuals with autism it could be hypothesized that both conditions have communalities. But which? Let us explore at different levels similarities and differences between autism and addiction.

Similarities

In the domain of Perceptions: it appears that both ASD and Addiction are strongly dopamine related neurobiological brain disorders [11,12]. But they also share similarities at a behavioural level such as the level of detailed perception and rigid and compulsive habits. In autism this is named "a different central coherence" with an extreme focus on (visual) details [13]. Moreover individuals with autism develop strong interests called preoccupations and rigidly stick to them. These help them regulate their anxieties and hypersensitivities. Likewise one of the characteristics of substance abuse is the extreme preoccupation with the substance or habit (gambling, stalking, sex). Individuals with an addiction tend to focus on small details related to their substance-using habits. For example the sight of aluminium foil that can activate craving in (ex) heroin addicts even after years of successful abstinence.

Problems in the domain of Social Sensitivity: obviously people with autism have problems with social reciprocity as from a very young age. In people with addiction behaviour these problems may emerge when the substance dependence and the loss of control impends on their ability to relate to others. In some individuals with addiction this problem may subsist after detox thus pointing towards a possible underlying ASD whereas in the majority of cases addicts recuperate their social skills after a successful detoxification.

Substances may facilitate social engagement. Many individuals that are shy or socially awkward tend to use substances to help them cope with the tension fostered by social encounters. Likewise individuals with ASD, that long for social contacts, may experience the benefits of using substances in order to help them in more complex social situations. And as anxiety and depression are very common in individuals with ASD (ranging up to 85% of the cases) [14-16] the need for alleviating the tensions by using substances is understandable.

But there appear to be strong neurobiological similarities between addiction and ASD; at such a level that one may wonder whether these conditions share neurobiological roots? Recently de Lange and her colleagues [11,12] showed a strong overlap in dysregulation of the limbic cortico-striatale circuits between individuals with addiction, obsessive-compulsive disorder, ADHD and autism, both in animal and human studies. Their studies advance evidence for common roots in dopaminergic dysregulation in three cortico-striatal pathways. If the impairment is mainly located in the sensorimotor loop the clinical expression will be a neurological condition such as Parkinson's disease or even Huntington's disease. Impairments in the functioning of the "cognitive" cortico-striatal loop will lead to disinhibition and impulsive behaviour such as manifested in Attention Deficit Hyperactivity disorders. Finally the disruption of the "limbic" cortico-striatal loop will manifest clinically as addictive behaviour. In autism [11,12] the dopaminergic regulatory circuits are disrupted in all three areas [17,18].

From an evolutionary point of view it has been hypothesized that both addiction and autism appear to be deviances of normal adaptive coping strategies for the individual and the species [19]. For example salience and focalization on smell cues plays a core role in primary attachment. It is a vital behavioural pattern that enables the child to survive by seeking food and comfort with his mother. This preponderance of focus on smell and oral exploration persists in people with autism and characterizes individuals with addictive behaviour [20].

The so-called "autistic condition" [21] refers to the evolutionary advantages of "extreme male thinking" perseverance in scientist and engineers in digital thinking that gives them great reward. E.g. using drugs/doping to pursue one's goals thus taking the risk of getting addicted in the process.

People with ASD have these hypersensitivities for which their normal arousal regulation is insufficient. In order to cope with these situations where they tend to get overwhelmed by stimuli, they tend to develop strong hyperfocalisations and/or stereotypies that give them a frontal dopamine depletion that gives them a pleasant relaxation and helps them to cope.

In addiction a genetic vulnerability [22,23] implying a lower density of dopamine receptors in their central reward system makes them less sensitive to "typical" rewards, making them easily bored and more dependent on "thrill seeking" sensations or behaviours. At a behavioural level the obsession with the substance or behaviours becomes more intense as the addiction progresses reducing their other activities and social life, to a point that they drop out from normal society.

In individuals with ASD a longing for social contacts, an urge for getting out of isolation emerges in adolescence. Yet they are hindered in this striving by their social awkwardness and lack of sensitivity as to how to tune into the intentions and needs of others. This process is often frustrating and many experiences that alcohol, cannabis or stronger drugs ease the path into participating in social group activities.

Moreover there are similarities at a genetic and en psychophysiological level that may contribute to explaining the high vulnerability for addiction in autism.

A series of studies demonstrate that a strong dependence on endogen opioids in individuals with ASD [10,24]. These morphine like substances produced in the brain to help coping with stress are also depleted by activities that induce "virtual stress" like running or repetitive movements (stereotypes and preoccupations in individuals with ASD – trance like activities as dancing). These effects have also been described with regard to the neuropeptid oxytocin in autism: detailed perception, rigidity obsessive preoccupations and lack of habituation [25]. Finally, a paucity of dopamine sensitivity appears to play a role in different characteristics in autism related to regulation problems at a cognitive and emotional level [26-28] and involved in stereotypes and preoccupations [29,30]. This paucity predisposes to the search for stimuli and substances that favour dopamine depletion a mechanism well described in the development of addictive behaviour [31].

Thus autism spectrum disorders and addiction can both be perceived as developmental disorders in which a genetic predisposition and vulnerability plays a role, that can be induced by early stress (not understanding the surrounding environment, traumatisation and bullying) and exacerbated by current stress (anxieties, social isolation) thus affecting the proper functioning of the cortico-striatal dopaminergic regulation systems (and also the HPA axis) (Figure 1).

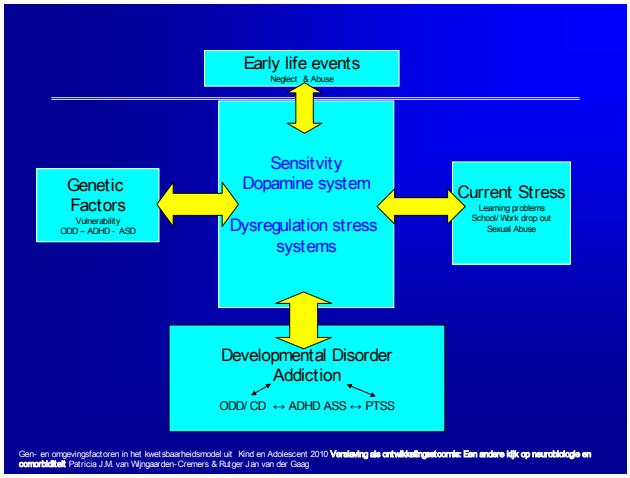

Figure **1:** Diagnoses and Types of SUD

Conclusions and Implications

This very preliminary report intends to raise awareness on the possible comorbidity between autism spectrum disorder and addiction. In clinical practice it is very well possible that the diagnosis autism spectrum is missed in addiction psychiatry units. Conversely many addicted individuals with autism spectrum disorders may go unnoticed and are thus ill-treated within services for autism, because of a lack of knowledge about this possible comorbidity and its therapeutic implications.

There are very obvious limitations to the present report: the very tentative pilot study reported here yields a tentative estimate of the occurrence of autism as a dual diagnosis in addiction, but these preliminary figures need to be confirmed. They are in line with some recent European studies [32,33]. But it must be said that no mention is made of any comorbidity with addiction in US studies to date [34]. Moreover it this prevalence estimate of addiction in the autism spectrum population is not exceptional as compared to the prevalence of addictive behaviour in the general population as reported by ESPAD (10-15%). But the occurrence of a potential comorbidity has only sparsely been reported thus far despite the fact that there is evidence on neurobiological grounds to expect the ASD SUD comorbidity to be high. Obviously further studies will be necessary [35,36].

The implications of our findings are that specialized services in addiction and developmental disorders should be aware of the likelihood of this comorbidity [37]. Thus educating professionals will be of uttermost importance as will be offering the assessment tools available to ensure accurate diagnoses. This will prove helpful too in clinical guidance. In addiction units patients with ASD will need individual programs and explicit and well-structured communication. In all cases the patients and teams will need to take into account that addictive behaviour in individuals with ASD stems from a longing for social contacts [38]. It should be taken very seriously and addressed in a proper fashion with teaching skills and relaxation techniques that can replace the need for substances or detrimental habits to facilitate social contacts and ease communication.

References

1. http://www.nice.org.uk/guidance/cg142
2. Baird G, Simonoff E, Pickles A, Chandler S, Loucas T, et al. (2006) Prevalence of disorders of the autism spectrum in a population cohort of children in South Thames: the Special Needs and Autism Project (SNAP). Lancet 368: 210-215.
3. Sizoo B, van den Brink W, Koeter M, Gorissen van Eenige M, van Wijngaarden-Cremers P, et al. (2010) Treatment seeking adults with autism or ADHD and co-morbid substance use disorder: prevalence, risk factors and functional disability. Drug Alcohol Depend 107: 44-50.
4. Singh SK, Hellemans H, Dom G (2012) [Autism spectrum disorder and substance use disorder: an unknown comorbidity?]. Tijdschr Psychiatr 54: 893-897.
5. Schubiner H (2005) Substance abuse in patients with attention-deficit hyperactivity disorder : therapeutic implications. CNS Drugs 19: 643-655.
6. Kalat JW (1978) Speculations on similarities between autism and opiate addiction. J Autism Child Schizophr 8: 477-479.
7. Tantam D (1988) Lifelong eccentricity and social isolation. I. Psychiatric, social, and forensic aspects. Br J Psychiatry 153: 777-782.
8. Tantam D (1988) Lifelong eccentricity and social isolation. II: Asperger's syndrome or schizoid personality disorder? Br J Psychiatry 153: 783-791.
9. Gerland G (2003) A Real Person: Life on the Outside. Independent Publishing Group, USA.
10. Nelson EE, Panksepp J (1998) Brain substrates of infant-mother attachment: contributions of opioids, oxytocin, and norepinephrine. Neurosci Biobehav Rev 22: 437-452.
11. Langen M, Kas MJ, Staal WG, van Engeland H, Durston S (2011) The neurobiology of repetitive behavior: of mice…. Neurosci Biobehav Rev 35: 345-355.
12. Langen M, Durston S, Kas MJ, van Engeland H, Staal WG (2011) The neurobiology of repetitive behavior: …and men. Neurosci Biobehav Rev 35: 356-365.
13. Happé F, Frith U (2006) The weak coherence account: detail-focused cognitive style in autism spectrum disorders. J Autism Dev Disord 36: 5-25.
14. Bolton PF, Pickles A, Murphy M, Rutter M (1998) Autism, affective and other psychiatric disorders: patterns of familial aggregation. Psychol Med 28: 385-395.
15. Boden JM, Fergusson DM (2011) Alcohol and depression. Addiction 106: 906-914.
16. Cottencin O (2009) Severe depression and addictions. Encephale 35 7: S264-S268.
17. Langen M, Leemans A, Johnston P, Ecker C, Daly E, et al. (2012) Fronto-striatal circuitry and inhibitory control in autism: findings from diffusion tensor imaging tractography. Cortex 48: 183-193.
18. Langen M, Bos D, Noordermeer SD, Nederveen H, van Engeland H, et al. (2014) Changes in the development of striatum are involved in repetitive behavior in autism. Biol Psychiatry 76: 405-411.
19. Weiss LA, Purcell S, Waggoner S, Lawrence K, Spektor D, et al. (2007) Identification of EFHC2 as a quantitative trait locus for fear recognition in Turner syndrome. Hum Mol Genet 16: 107-113.
20. Goldstein RZ, Volkow ND (2011) Dysfunction of the prefrontal cortex in addiction: neuroimaging findings and clinical implications. Nat Rev Neurosci 12: 652-669.
21. Lai MC, Lombardo MV, Baron-Cohen S (2014) Autism. Lancet 383: 896-910.
22. Noble EP (2000) The DRD2 gene in psychiatric and neurological disorders and its phenotypes. Pharmacogenomics 1: 309-333.
23. Le Merrer J, Becker JA, Befort K, Kieffer BL (2009) Reward processing by the opioid system in the brain. Physiol Rev 89: 1379-1412.
24. Buitelaar JK, van Engeland H, van Ree JM, de Wied D (1990) Behavioral effects of Org 2766, a synthetic analog of the adrenocorticotrophic hormone (4-9), in 14 outpatient autistic children. J Autism Dev Disord 20: 467-478.
25. Gurrieri F, Neri G (2009) Defective oxytocin function: a clue to understanding the cause of autism? BMC Med 7: 63.
26. Dawson G, Webb SJ, Wijsman E, Schellenberg G, Estes A, et al. (2005) Neurocognitive and electrophysiological evidence of altered face processing in parents of children with autism: implications for a model of abnormal development of social brain circuitry in autism. Dev Psychopathol 17: 679-697.

27. Guilloteau D, Chalon S (2005) PET and SPECT exploration of central monoaminergic transporters for the development of new drugs and treatments in brain disorders. Curr Pharm Des 11: 3237-3245.

28. Salgado-Pineda P, Delaveau P, Blin O, Nieoullon A (2005) Dopaminergic contribution to the regulation of emotional perception. Clin Neuropharmacol 28: 228-237.

29. Rapp JT, Vollmer TR (2005) Stereotypy II: a review of neurobiological interpretations and suggestions for an integration with behavioral methods. Res Dev Disabil 26: 548-564.

30. Laviola G, Adriani W, Rea M, Aloe L, Alleva E (2004) Social withdrawal, neophobia, and stereotyped behavior in developing rats exposed to neonatal asphyxia. Psychopharmacology (Berl) 175: 196-205.

31. Volkow ND (2005) What do we know about drug addiction? Am J Psychiatry 162: 1401-1402.

32. Hofvander B, Delorme R, Chaste P, Nydén A, Wentz E, et al. (2009) Psychiatric and psychosocial problems in adults with normal-intelligence autism spectrum disorders. BMC Psychiatry 9: 35.

33. Lugnegard T, Hallerbäck MU, Gillberg C (2011) Psychiatric comorbidity in young adults with a clinical diagnosis of Asperger syndrome. Res Dev Disabil 32: 1910-1917.

34. Buck TR, Viskochil J, Farley M, Coon H, McMahon WM, et al. (2014) Psychiatric Comorbidity and Medication Use in Adults with Autism Spectrum Disorder. J Autism Dev Disord .

35. Brown PJ, Wolfe J (1994) Substance abuse and post-traumatic stress disorder comorbidity. Drug Alcohol Depend 35: 51-59.

36. Comings DE, Comings BG, Muhleman D, Dietz G, Shahbahrami B, et al. (1991) The dopamine D2 receptor locus as a modifying gene in neuropsychiatric disorders. JAMA 266: 1793-1800.

37. www.espad.org

38. Schellekens A, Verkes RJ, J van Vugt, R Engels, A van Hooff, et al. (2004) Wat heet verslaving Soeterbeeck Programma Nijmegen.

Citation: Wijngaarden-Cremers PJM, Brink WV, Gaag RJ (2014) Addiction and Autism: A Remarkable Comorbidity?. J Alcohol Drug Depend 2: 170. doi:10.4172/2329-6488.1000170