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Co-occurring Attention Deficit Hyperactivity Disorder symptoms in adults affected by heroin dependence: Patients characteristics and treatment needs☆

Fabio Lugoboni[a], **Frances Rudnick Levin**[b], **Maria Chiara Pieri**[c], **Matteo Manfredini**[d], **Lorenzo Zamboni**[a], **Lorenzo Somaini**[e,*], **Gilberto Gerra**[f], and **Gruppo InterSert Collaborazione Scientifica (GICS)**[g,1]

[a]Department of Internal Medicine, Addiction Unit, Verona University Hospital, Verona 37134, Italy

[b]Division of Substance Abuse, New York State Psychiatric Institute, and Department of Psychiatry, College of Physicians and Surgeons of Columbia University, New York, NY, USA

[c]Addiction Treatment Centre, Local Health Service, Bologna, Italy

[d]Department of Life Sciences, University of Parma, Parma, Italy

[e]Addiction Treatment Centre, Local Health Service, Cossato, Biella, Italy

[f]Drug Prevention and Health Branch, United Nations Office on Drugs and Crime (UNODC), Vienna

[g]Gruppo Intersert Collaborazione Scientifica GICS

Abstract

Attention Deficit Hyperactivity Disorder (ADHD) is a risk for substance use disorders. The aim of this study was to investigate the association between adult ADHD symptoms, opioid use disorder, life dysfunction and co-occurring psychiatric symptoms. 1057 heroin dependent patients on opioid substitution treatment participated in the survey. All patients were screened for adult ADHD symptoms using the Adult ADHD Self-Report Scale (ASRS-v1.1). 19.4% of the patients screened positive for concurrent adult ADHD symptoms status and heroin dependence. Education level was lower among patients with ADHD symptoms, but not significant with respect to non-ADHD patients. Patients with greater ADHD symptoms severity were less likely to be employed. A positive association was observed between ADHD symptoms status and psychiatric symptoms.

☆"The views expressed herein are those of the author(s) and do not necessarily reflect the views of the United Nations."

*Correspondence to: Addiction Treatment Center Local Health Service Via P. Maffei, 59 13836 Cossato, Biella, Italy. lorenzo.somaini@aslbi.piemonte.it (L. Somaini).

[1]Arzillo C., Benigna L., Bersani N., Bersani P., Betti O., Biasin C., Bossi C., Bottazzo A., Bove A., Caccamo E., Cancian S., Cantanchin F., Cantiero D., Canzian G., Cargnelutti D., Casalboni D., Casari R., Casarini R., Cibin M., Civitelli P., Cozzi T., De Cecco L., Del Zotto R., Dellantonio E., Dersini F., Duranti I., Faccini M., Fadelli M., Favero E., Fona B., Fontana N., Franceschini A., Gaiga E., Gardiolo M., Gentile N., Gervino D., Ghezzo N., Giacomin MA., Kashanpour H., Lietta P., Manera E., Manzato E., Mazzo M., Meneghello D., Mihalcea C., Milan E., Montresor M., Moratti E., Morbioli L., Musso D., Musso M., Pani A., Pavani V., Peroni F., Pellachin P., Piazza M., Prosa D., Pupulin B., Rescigno B., Resentera C., M. Residori., Ricci C., Righetti P., Ripoli MA., Riscica P., Rizza C., Rizzetto V., Rossi A., Rovea A., Ruffato A., Ruzziconi C., Sabbion R., Santo E., Scarzella M., Sembianti N., Simonetto P., Smacchia C., Stellato M., Stimolo C., Suardi L., Vaiana A., Zavan V., Zerbetto E., Zerman M.

Conflict of interest

None.

Patients with ADHD symptoms status were more likely to be smokers. Patients on methadone had a higher rate of ADHD symptoms status compared to buprenorphine. Those individuals prescribed psychoactive drugs were more likely to have ADHD symptoms. In conclusion, high rate of ADHD symptoms was found among heroin dependent patients, particularly those affected by the most severe form of addiction. These individuals had higher rates of unemployment, other co-morbid mental health conditions, heavy tobacco smoking. Additional psychopharmacological interventions targeting ADHD symptoms, other than opioid substitution, is a public health need.

Keywords

Attention Deficit Hyperactivity Disorder; ADHD; Heroin dependence; Methadone; Buprenorphine; Psychiatric symptoms

1. Introduction

Attention-deficit hyperactivity disorder (ADHD) is a developmental disorder that begins in childhood and persists into adulthood (Sullivan and Levin, 2001; Wender et al., 2001). Often, it goes undiagnosed and has been considered a serious risk factor for the development of substance use disorders (SUD) (Wilens et al., 2011).

While there has been some controversy of whether conduct disorder (CD) in childhood and adolescence is a critical comorbidity for SUD to occur, have ADHD alone is a risk for SUD in adults (Biederman et al., 1995). However, the combination of ADHD with CD has been reported to increase this risk, possibly through increased vulnerability to further psychiatric comorbidity (Carpentier, 2014).

Evidence suggests that the frontal cortex is involved in reward/ emotional processing, attention gating, behavioral inhibition, with a dysfunction of these regions influencing a common behavioral pattern with impulsiveness, impaired attention and drug use susceptibility (Van Dongen et al., 2015; Perry et al., 2011; Wilens et al., 1998). To this purpose, impaired reward processing in the prefrontal cortex has been found to be associated with persistent attention deficit hyperactivity disorder in the adult (Wetterling et al., 2015) and seems also to underlie substance use disorders vulnerability (Park et al., 2010; Müller-Oehring et al., 2013; Lee et al., 2013; Tanabe et al., 2007). Accordingly, frontal dysfunctions of impulse control, with disturbed activity mainly in ventrolateral and medial prefrontal regions, have been reported in both ADHD and SUD patients (Sebastian et al., 2014).

Considering these neurobiological evidence, not surprisingly, adult ADHD has been found to be over-represented in SUD populations and, subject to the sampling methodology applied, prevalence estimates range from 14% to 44% (McAweeney et al., 2010; Van de Glind et al., 2014), which is considerably higher than the 2.5–4% observed in the community (Kessler et al., 2006). Accordingly, persistent ADHD and a history of CD have been reported highly prevalent among patients with SUD. Patients with adult ADHD among drug dependent individuals had significantly higher problem severity scores, lower quality of life scores, more comorbid SUDs and psychiatric disorders (Carpentier et al., 2011).

Increased drug dependence complexity and chronicity have been evidenced in treatment-seeking SUD patients who screen positively for ADHD (Young et al., 2015).

Comorbid ADHD and SUD appear to exacerbate a number of maladaptive SUD outcomes such as earlier drug use initiation, increased psychiatric comorbidities, hospitaliations, suicide attempts, and HIV-risk behaviours (Arias et al., 2008; Tamm et al., 2013), thus making the treatment and management of SUD in clinical settings more challenging and less effective (Carroll et al., 1993; Levin et al., 2004). Poor treatment adherence, slower SUD remission, and greater risk of relapse have been repeatedly demonstrated in these patients (Tang et al., 2007).

Patients with ADHD symptoms on methadone maintenance therapy (MMT) seem to be characterized by greater addiction severity and more comorbid psychopathology, only partly explained by the influence of a coexisting CD (Carpentier et al., 2014; King et al., 1999). In these opiate dependent patients, the role of ADHD symptoms in adulthood, as a risk condition for heroin dependence and as a factor aggravating addictive behavior itself, is still uncertain and needs to be better investigated.

To our knowledge, few surveys have been conducted, due to the difficulty in studying heroin dependent patients, on this specific comorbidity. The evidence available about ADHD symptoms persisting in the adult among opiate dependent patients are very limited (Daigre et al., 2013), particularly in relation to the potential link with symptoms of other co-occurring mental health disorders and the interference of opioid medications.

For this purpose, the aims of the present study were to: (i) estimate the prevalence of adult ADHD symptoms among Italian patients affected by opioid use disorders on opioid substitution programs; (ii) assess the association between ADHD symptoms and age, gender, education/employment and family relations; and (iii) explore the possible association of adult ADHD symptoms with co-occurring nicotine dependence and the symptoms of other psychiatric disorders, in need of pharmacological interventions other than opioid agonists substitution.

The hypothesis of the study was that having ADHD symptoms among patients enrolled in a methadone maintenance program would be associated with greater vulnerability for more serious opioid use disorder severity, with unemployment, social disintegration and higher rate of comorbid mental health disorders symptoms.

In this perspective, we wanted also to explore the relation between ADHD symptoms and the type of opioid-agonists utilized in the treatment program. On one side, we hypothesized that the most problematic opioid use disordered patients, affected by ADHD symptoms persisting in adulthood, would more likely to be prescribed methadone (a full agonist on opioid receptors) rather than buprenorphine (a partial agonist), and would more frequently require the prescription of several psychoactive medications in addition to substitution treatment, when compared with opioid use disordered patients not affected by ADHD symptoms status. On the other, we wanted to investigate whether or not specific opioid medications (methadone or buprenorphine) were able to interfere with the intensity of ADHD symptoms.

For these reasons, 1057 heroin dependent patients on opioid substitution treatment were administered the Adult ADHD Self-Report Scale (ASRS-v1.1) to measure ADHD symptoms, and the Symptoms Checklist 90 (SCL 90) to evaluate co-occurring psychiatric symptoms. Demographic and socio-economic data, nicotine use, information concerning prescribed medications were self-reported in response to a questionnaire and confirmed by clinical records.

2. Methods

The study was conducted in 20 Addiction Treatment Outpatients Centers (Bassano, Bologna, Bolzano, Dolo, Este, Gemona, Gravellona, Legnago, Mantova, Mestre, Mirano, Monselice, Novi L., Oderzo, Pordenone, Rovigo, Treviso, Valdagno, Villafranca, Zevio) of the Italian public health system. The interventions, policies and procedures in each Center were similar and the accessibility threshold was the same across all centers.

Addiction Services in Italy provide outpatient treatment programs with a variety of therapeutic and rehabilitative strategies: methadone, buprenorphine and oral naltrexone are administered in association with possible psychosocial interventions, such as psychotherapy, family therapy, group therapy, social support and medications for psychiatric co-morbidity. The 20 centers selected for the present study did not differ in the psychosocial treatment protocols associated with methadone, staff dimensions or admission criteria. The majority of patients in the Italian Addiction Services are dependent on heroin, although interventions are also available for patients demonstrating dependence on cannabis, cocaine and alcohol. Patients are routinely evaluated using a self-report and observer-rated questionnaire focused on addiction history, and each patient receives a psychiatric diagnostic screening. No exclusion criteria are applied to patients in the public health system. Patients who fail to respond to interventions such as methadone, and continue to inject heroin, are not terminated by these centers. All the patients received also psychosocial treatment with elements of cognitive behavioral treatment.

Addiction Treatment Services went recently through an accreditation process with appropriate monitoring process and certification of quality standards: reference to guidelines and training of professionals at the national/regional level guaranteed that methadone and buprenorphine are prescribed following the same indications and rules.

A cross-sectional survey was administered to a large sample of patients receiving methadone or buprenorphine maintenance treatment for heroin dependence between July 1st, 2014 and December 31st, 2014.

2.1. Subjects

The sample included 1057 patients (797 males and 260 females) attending drug recovery programs in treatment centers for clinically-diagnosed opioid use disorders (DSM-5). The patients were receiving either methadone maintenance (786) or buprenorphine (241) maintenance in combination with psychosocial treatment, while a small number (30) was not receiving any maintenance. They were stabilized in treatment for at least 6 months before entry into the study. This inclusion criterion was employed to coincide with the six-month

Adult ADHD Self-Report Scale (ASRS) symptom assessment period (Kessler et al., 2005), documented as the most reliable period of self-reported ADHD symptoms (Fatseas et al., 2012).

In line with the inclusion criteria applied for the recruitment of patients in the study, the participants were required to be heroin-dependent for at least 3 years prior to enrolling in methadone maintenance. Prior daily intake of heroin ranged from 1.5 to 3.0 g of street heroin. All the patients included in the study reported occasionally abusing alcohol or other illicit drugs in the past.

All patients recruited for the study had positive urinalyses for heroin use at the beginning of the treatment program (the day before treatment and the first days in treatment).

Exclusion criteria included severe chronic liver illness (with transaminases > 80 U/L and gamma-globulins > 21%), renal disorder (creatinine clearance: 100–120 mg/L/min), other extremely severe chronic medical disorders, severe mental health disorders, such as schizophrenia, that may make it more difficult to tease out ADHD symptoms from another severe underlying condition.

All the patients gave informed consent for participation in this survey, which was approved by the Public Health System ethical committee of Verona University-Hospital, Verona, Italy. Study procedures did not interfere with the daily protocols of the centers. The patients were not paid for their participation in the study and provided their personal information anonymously.

2.2. Assessments

The study questionnaire was developed to assess patient socio-demographics, drug use history, current adult ADHD screening status. Patient drug-specific use was assessed through self-report of age of onset, current clinically diagnosed opioid use disorders, and previous total years of problematic heroin regular use. This information was obtained via the clinical records of the patients, who had approved to look at personal records.

Specifically, the questionnaire collected data concerning age, sex, marital status, educational level, employment, job level/professional qualification, tobacco smoke, number of cigarettes/day, psychoactive medications prescribed, in addition to opioid maintenance treatment, to deal with the symptoms of co-occurring mental health disorders. The type of long term opioid treatment, methadone or buprenorphine, and the respective dosages were also recorded.

2.3. Adult ADHD Self-Report Scale (ASRS-v1.1)

Patients were screened for adult ADHD symptoms using the validated Adult ADHD Self-Report Scale (ASRS-v1.1) which requires endorsement of four out of six current ADHD symptoms and has been previously validated in SUD populations (Daigre et al., 2009; Van de Glind et al., 2014; Dakwar et al., 2012).

This scale permitted only to measure the presence of ADHD symptoms and was not able to obtain ADHD diagnosis. ADHD symptoms status was referred to those patients meeting the highest ASRS-v1.1 scores (4 or above) vs those who scored 3 or below. The cut off for inclusion was the score of 4 or above.

2.4. Symptoms Check List, 90 (SCL 90)

Patients affected by opioid use disorders were submitted to the Symptoms Check List 90 (SCL 90) (Derogatis, 1992). SCL 90 total score was taken into account as a measure of concomitant psychiatric symptoms in general. This scale has been commonly utilized in previous studies on subjects affected by addictive disorders to evaluate psychiatric comorbidity (Wang et al., 2012; Wölfling et al., 2013).

2.5. Statistical methods

Logistic regression models were used to test the determinants of ADHD symptoms status among drug addicted patients. Logistic models were applied to control for possible inter-correlations among such variables (Cupples et al., 1984). A mixed model, namely a model including a fixed part along with a random-effects part, was preliminary estimated with the aim of checking for the possible effects associated with underlying differences among the treatment centers, i.e. the preferential use of methadone or buprenorphine in the treatment of patients. Random-effects models are in fact able to properly model the correlation structure existent in the data, namely among the patients coming from the same treatment center (Agresti et al., 2000).

The first analysis aimed at evaluating the possible differential role of maintenance treatment (buprenorphine vs methadone) on the odds of showing ADHD symptoms status once controlled for individual socio-demographic characteristics (age, sex, marital status, employment, educational attainment, smoking habits). Two nested models with and without the maintenance treatment variable were estimated, and the best fit determined by means of the Likelihood Ratio test (LR test), which compares the log-likelihood of the two nested models using a chi-square approximation.

Each of the explanatory variables was categorical, with one category chosen as reference category. Smoking habit was classified using not smoking as reference category, which was contrasted with three categories of smokers. The three categories were determined using the quartiles of the distribution of the number of cigarettes, and collapsing the two lower quartiles into one single category.

The final logistic model evaluated the association between ADHD symptoms status and SCL-90R subscales, once controlled for age and sex of drug addicted patients.

All logistic regression models were run using robust standard errors to deal with the problems of heteroscedasticity (Huber, 1967; White, 1980).

3. Results

Table 1 reports frequencies and means of demographic and socioeconomic characteristics of drug addicted individuals belonging to the two groups of drug addicted patients with no ADHD symptoms status (ADHD score < 4) and those with ADHD symptoms status (ADHD score > = 4). Overall, the mean age of the patients was 38.3 ± 10.2 year. The patients presented a sex ratio of M/F =3.07.

More than seventy percent (74.7%) of drug dependent patients were on methadone maintenance treatment (average dosage 60.7 ± 67.7 mg per day) and 22.9% were on buprenorphine (average dosage 9.2 ± 7.3 mg per day). In addition, 410 of the patients (38.8%) were treated with prescribed psychoactive drugs for co-occurring mental health disorders. Among such patients, the specific prescribed drug is reported for 329 subjects, and among them 16.4% were treated with neuroleptics, 15.2% with antidepressant, 45.8% with sedative hypnotics (benzodiazepines), and 21.8% with multiple drugs.

Overall, 205 (19.4%) participants screened positive for concurrent adult ADHD symptom status and heroin dependence.

A preliminary estimation of a mixed model excluded the existence of random effects relative to functional/clinical differences among the treatment centers, in particular in the possible different prescription of methadone and buprenorphine. The LR test between the mixed model and the simple fixed–effects logistic (see model 2, Table 2) model resulted in fact not statistically significant ($\chi 2 \approx 0.001$, p-value≈0.999). The findings below will be therefore based on the results of simple logistic models.

In model 1, the risk of showing ADHD symptoms status among addicted patients was significantly associated with employment status and smoking habit (Table 2). In particular, employed patients were 49% less likely to have ADHD symptoms status than unemployed patients (p-value < 0.001), whilst no significant differential risk was found for educational level.

ADHD symptoms status was also significantly associated with heavier tobacco use. Although most of the patients with drug use disorders were tobacco smokers “heavy smokers” (more than 20 cigarettes per day) were significantly twice as likely to meet ADHD symptoms status than non-smokers (p-value =0.046).

In model 2, the effects of the different treatments for opioid addiction on ADHD symptom status (buprenorphine vs methadone) were also estimated. The addition of that variable improves significantly the fit of model 2 compared to model 1 (LR=7.58, p-value=0.006), and the odds of showing ADHD symptoms was 81% significantly higher among patients treated with methadone than with buprenorphine (p-value < 0.001). The inclusion of such a variable affects also some other coefficients, such as the one associated with “strong smokers”, which decreases and becomes no longer statistically significant.

No association has been found between ADHD symptoms status and methadone and buprenorphine dosages, when using such continuous variables instead of the categorical variable of drug treatment.

SCL-90 scores were found to be significantly associated with ADHD symptoms status among addicted patients on many SCL subscales when controlling for age and sex (Table 3). In particular, paranoid ideation and obsessive-compulsive dimensions were significantly and positively associated with having ADHD symptoms status. The odds increases by 60% for each unit-increase in the scores of the paranoid ideation subscale (p-value =0.021), and over four times in the scores of the obsessive-compulsive subscale (p-value < 0.001). ADHD symptom status was also significantly associated with the Global SCL 90 Score, with the odds increasing over four times for each unit-increase in the scores of the scale (p-value < 0.001).

4. Discussion

The findings of the present study, obtained in a large sample of heroin dependent patients on opioid agonists maintenance treatment, demonstrated a high prevalence of ADHD symptoms status (19.4%) in this population.

To support the validity of our results, in prior studies with methadone patients and opioid use disorders the prevalence rate of adult ADHD diagnosis was 24.9% (Carpentier et al., 2011; King at al, 1999; Van Emmerikvan Oortmerssen et al., 2014), consistent with ASRS symptoms status evaluation in the present study. The prevalence of ADHD symptoms status among drug dependent patients was significantly higher in comparison with the rate of adult ADHD diagnosis in the general population reported in previous research (5.0%) (Bonvicini et al., 2016). Similarly, adult ADHD was found to be over-represented by other research groups in SUD populations and, subject to the sampling methodology applied, prevalence was reported to range from 14% to 44% (McAweeney et al., 2010Van de Glind et al., 2014), which is considerably higher than the rate observed in the community (Kessler et al., 2006), in particular the 2.9% and 4.4% reported in the United States (Faraone and Biederman, 2005; Kessler et al., 2006) and the 5.29%, 2.5% world-wide (Polanczyk et al., 2007; Simon et al., 2009).

This large prevalence variability in both drug use disorders and general population is possibly due to a variety of potential influences such as cross-national variation in screening methodology, SUD treatment availability, or divergent clinical SUD characteristics and drug specific SUD distribution of the patients seeking treatment.

Although ASRS has been shown to have good sensitivity (84–88%) in identifying ADHD in SUD patients (Young et al., 2015), ASRS screening alone may result in a small amount of false positives and slightly inflated prevalence estimates when compared to a ‘gold-standard’ clinical diagnostic interview utilized by other research groups. For this reason, the ASRS in the current study indicates the presence of ADHD symptoms status and should not be easily interpreted as a DSM-IV or DSM-5 diagnostic indication of adult ADHD prevalence in opioid substitution patients. The slight risk of false positive evidenced in other patients

affected by substance use disorders (Roncero et al., 2015) could have partially affected the results also among our heroin dependent patients, without necessarily extinguishing the difference between the prevalence rates, which remains much lower in the general population.

The link between ADHD and substance use disorders is likely to be due to a shared genetic and environmental vulnerability (Capusan et al., 2015). Impaired neural reward processing in children, that has been found to significantly affect reward sensitivity, with diminished brain response during reward perception and a possible associated dysfunction of the dopaminergic system (Mizuno et al., 2015; Volkow et al., 2011), could contribute to a multiple risk condition including attention deficit, hyperactivity and proneness to substance abuse.

This greater susceptibility to impulsive decision making and poor inhibitory control, that characterizes both drug use disorders and ADHD, may result from a child's impaired ability to delay gratification, in turn reported associated with environmental adversities, such as insecure/avoidant mother-child attachment (Jacobsen et al., 1997). In line with this hypothesis, our previous findings have suggested the possibility that childhood experience of neglect and poor parent-child attachment may have an effect on central mono-amines function, contributing to co-occurring ADHD and substance abuse shared neurobiological vulnerability (Gerra et al., 2007; Storebo et al., 2016).

Alternatively, the exposure to heroin in vulnerable patients may have provoked changes in the gray matter density and a derangement in frontal cortex function, as reported by other research groups (Yuan et al., 2009; Liu et al., 2009), inducing impulsive behavior, poor psycho-motor control and attention problems as a consequence of drug use, rather than a preexisting shared neurobiological condition. This second possible interpretation appears not to be supported by the present findings, given that there was no association between years of exposure to heroin and ADHD symptoms status.

The association between ADHD symptoms and age reported in previous studies, with the prevalence of ADHD in adults declining with age in the general population (Simon et al., 2009), has been shown in our large sample of heroin dependent patients, suggesting a possible age-related improvement of impulsive behavior control in the population with co-occurring drug use disorders.

Our findings are in agreement with the evidence obtained by Young (Young et al., 2015), indicating increased drug dependence complexity and severity in treatment-seeking SUD patients who screen positively for ADHD symptoms status. In line with previous research evidence, having ADHD symptoms among our heroin dependent patients was significantly associated with unemployment status (Faraone and Biederman, 2005), with reduced opportunities of recovery and social reintegration, and a possible lower frustration tolerance and coping inability. Accordingly, Carpentier found methadone patients with adult ADHD to score significantly higher on problem severity scale, to have lower quality of life, more co-morbid SUD and more psychiatric co-morbidity (Carpentier et al., 2011). A higher prevalence of co-morbid psychiatric symptoms and co-occurring heavy tobacco dependence

occurred with heroin dependent patients who screened positive for ADHD symptoms status compared to patients who did not screen positive for ADHD symptoms. Although most of the patients with drug use disorders were also tobacco smokers, heavy smokers were significantly more likely to meet ADHD symptoms status than non-smokers.

Patients with ADHD symptoms among heroin dependent patients scored significantly higher on paranoid ideation, obsessive-compulsive sub-scales at SCL 90 and Global SCL 90 scale. Similarly, adult ADHD was previously found to be highly co-morbid with many other DSM-IV disorders (Kessler et al., 2006). In line with our findings, impulse control disorders and ADHD have been reported to be associated with obsessive compulsive disorder by other research groups (Torres et al., 2016) and higher ADHD total score on the ASRS was found significantly associated with psychosis and paranoid ideation (Marwaha et al., 2015).

The lack of association between opioid medication dosages and ADHD symptoms status seems to suggest that methadone and buprenorphine do not impact directly the expression of ADHD symptoms. However, the lack of association could be also attributable to the fact of the high doses of methadone or buprenorphine are commonly associated with the prescription of other psychoactive drugs, as part of a poly-drug consumption pattern (Specka et al., 2011).

The higher prevalence of ADHD symptoms status among our methadone patients in the present survey, with respect to buprenorphine patients, might be attributable to the practitioners' prescription preference [i.e. the most problematic heroin dependent patients affected by ADHD symptoms would more likely be prescribed methadone (a full agonist on opioid receptors) rather than buprenorphine (a partial agonist)]. To this purpose, the full opioid agonist, methadone, has been reported to produce better retention rates compared to the partial agonist buprenorphine (Mattick et al., 2014; Fingerhood et al., 2014). On the basis of our data, it is impossible to exclude that buprenorphine could have controlled at least in part symptoms of ADHD, considering the complex pharmacological profile of this medication, including antagonist effects on kappa opioid receptors that may modulate the dopamine system function (Blum et al., 2014; Gerra et al., 2014).

The potential effect of functional/clinical differences among the treatment centers, particularly in the prescription of methadone and buprenorphine, was preliminary excluded by a mixed model concerning the existence of random effects, demonstrating that the higher prevalence of ADHD symptoms among methadone patients was not an artefact.

To this purpose, the patients with co-occurring ADHD symptoms in our survey demonstrated the need to identify and treat this condition in addition to opioid substitution. Our results should be interpreted with caution because of various limitations. Unfortunately, the design of the present study did not include data collection on possible ADHD symptoms during childhood and adolescence, considering that most of the patients and their families were unable to report about specific early life symptoms in a questionnaire. Moreover, the design was based on a psychometric scale (ASRS), rather than on the DSM Interview, not permitting to identify adult ADHD diagnosis, but only symptoms severity.

The current study relied on participant self-reports which may have impacted on the data quality; social acceptability, perceived consequences of disclosure, and question comprehension. Self-reported data, however, have been found to be sufficiently reliable and valid to inform about drug use patterns and associated problems (Darke, 1998; Ledgerwood et al., 2008). The findings of the present study confirm that adult ADHD symptoms status is over-represented in heroin dependent populations on opioid maintenance treatment, as compared with their community counterparts in Italy and global population.

Additionally, co-morbid adult ADHD symptoms appear associated with more problematic form of drug dependence in treatment-seeking SUD population, with poor resources for the recovery process, unemployment and high rate of co-occurring psychiatric symptoms/ tobacco dependence. Patients with high ADHD status had greater addictive disorder severity and were more likely to be prescribed psychoactive medications suggesting this group may require more intensive clinical resources.

Our results underline the need for early detection and treatment of ADHD among heroin dependent treatment seekers, as a possible strategy to identify the patients at risk for poor outcome and relapse, who are in need of more intensive care to improve retention and enhance recovery achievements.

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Table 1

Demographic and socio-economic characteristics. Descriptive statistics for heroin dependent patients and healthy controls.[a].

Variables	Addicted	Controls	Total
N	1057	156	1213
Sex Ratio M/F	3.07	1.44	2.74
Age	38.4 ± 10.1	45.8 ± 15.6	39.4 ± 11.2
Marital status	1052	155	1207
% Unmarried	66.8	35.5	60.0
% Ever-Married	33.2	64.5	40.0
Number of children	0.18 ± 0.4	0.56 ± 0.8	0.23 ± 0.5
Educational attainment	1055	155	1210
% No education / Primary	58.5	38.7	55.9
% Lower Secondary	21.8	18.7	21.4
% Secondary / University	19.7	42.6	22.7
Employment	1055	156	1211
% Employed	52.8	84.6	56.9
% Unemployed	47.2	15.4	43.1
Smoking	1052	156	1208
% Smoker	90.0	67.9	87.2
% Non-smoker	10.0	32.1	12.8

[a]Observations may vary according to the rate of individual responses to each of the items.

Table 2

Logistic regression of having ADHD symptoms. Nested models.

Variables	Frequency	Model 1		Model 2	
		Odds	p-value	Odds	p-value
Sex (ref. M)	75.4				
F	24.6	1.117	0.564	1.102	0.611
Age (ref. < 35 yrs)	39.0				
35–49 yrs	45.4	1.036	0.851	1.046	0.813
50+ yrs	15.6	0.727	0.237	0.735	0.271
Marital status (ref. Ever-married)	33.4				
Unmarried	66.6	1.162	0.427	1.135	0.520
Educ. Attainment (ref. Primary)	58.4				
Lower Secondary	21.9	1.246	0.284	1.271	0.242
Secondary / University	19.6	0.995	0.982	1.032	0.888
Employment (ref. Unemployed)	46.9				
Employed	53.1	0.513	< 0.001	0.528	< 0.001
Smoking Habit (ref. Not smoking)	9.8				
Smoking < =18 cigarettes	50.2	1.138	0.678	1.075	0.816
Smoking 19–20 cigarettes	28.1	1.074	0.830	0.984	0.960
Smoking 21+ cigarettes	11.9	2.039	0.046	1.906	0.070
Treatment (ref. Buprenorphine)	**23.2**				
Methadone	**76.8**			**1.808**	**< 0.001**
N		1003			1003
N (ADHD rate)		191			191
Log-likelihood		−471.3			−467.4
Wald (χ^2)		25.6			35.9
p-value		0.004			< 0.001

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Table 3

Logistic regression of having ADHD symptoms. Scores of SCL-90 subscales.[a]

Variables	Mean	Odds	RSE	p-value
Psychoticism	0.609	1.003	0.233	0.988
Paranoid Ideation	0.907	1.604	0.327	0.021
Phobic Anxiety	0.357	1.165	0.266	0.505
Hostility	0.745	0.838	0.139	0.287
Anxiety	0.779	1.336	0.378	0.306
Depression	1.032	1.175	0.276	0.492
Interp. Sensitivity	0.775	0.666	0.174	0.079
Obsess. Compulsive	0.934	4.848	1.054	< 0.001
Somatization	0.917	0.624	0.127	0.021
N (Total)	1044			
N (ADHD symptoms status)	201			
Log-likelihood	−407.0			
Wald chi2 (*p*-value)	172.63 (< 0.001)			

[a]The model controls also for age and sex. RSE=Robust Standard Error.