Article

Posttraumatic Stress Disorder Is Highly Comorbid With Adult ADHD in Alcohol Use Disorder Inpatients

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Abstract

Objective: Increasing number of studies show an association between adult ADHD (a-ADHD) and posttraumatic stress disorder (PTSD). We explored this association in alcohol use disorder (AUD) inpatients. **Method:** In total, 551 inpatients cross-sectionally completed self-administered questionnaires regarding sociodemographics, lifetime trauma exposure, PTSD Checklist for *DSM-5*, Adult ADHD Self-Report Scale (ASRS), and Wender Utah Rating Scale (WURS). We considered self-reported a-ADHD when ASRS and WURS had significant scores. **Results:** Prevalence for a-ADHD was 20%. PTSD prevalence was higher in a-ADHD patients (84% vs. 40%; $p < .001$). They also were younger ($p < .001$) and women ($p = .015$). Adult ADHD was associated with more traumatic events, and symptoms were correlated with PTSD severity. After adjusting for age, gender and marital status, PTSD severity was associated with a-ADHD. **Conclusion:** Our study confirms that a-ADHD is associated with PTSD in AUD inpatients, and thus, may represent a specific subpopulation. Future studies should explore implication of this dual diagnosis on AUD and treatment outcome. *(J. of Att. Dis. 2021; 25(11) 1594-1602)*

Keywords

adult ADHD, post traumatic stress disorder, alcohol use disorder, dual diagnosis

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a childhood-onset disorder with symptoms appearing before the age of 12; according to a meta-analysis, the prevalence of this disorder in children and adolescents is 3.4% (95% confidence interval [CI] = [2.6%, 4.5%]; Polanczyk et al., 2015). In 50% to 60% of cases, this disorder persists in adulthood and is associated with poor clinical outcomes such as the development of antisocial personality disorder, substance use disorders (SUD), and alcohol use disorder (AUD; Klein et al., 2012). The prevalence of ADHD in adults with AUD has been shown to be between 19.9% and 33% (van Emmerik-van Oortmerssen et al., 2012). Adult ADHD is associated with early alcohol consumption, risky use of alcohol, and AUD (Estévez et al., 2016). ADHD patients with AUD have been reported to have more relapses (Ercan et al., 2003) and a more severe alcohol dependence profile (Daurio et al., 2018).

Posttraumatic stress disorder (PTSD) is a public health issue; prevalence in the general population is estimated to be between 4.8% and 8% (Blanco et al., 2013; Kessler et al., 1995). PTSD occurs after experiencing a traumatic event (*Diagnostic and Statistical Manual of Mental Disorders* [5th ed.]; *DSM-5*; American Psychiatric Association [APA], 2013) and it is highly comorbid with SUD and AUD (Dore et al., 2012; Farley et al., 2004; Gielen et al., 2012). The prevalence of PTSD in individuals with AUD is estimated to be between 20% and 39% (Khoury et al., 2010; Norman et al., 2018). For these individuals, AUD often occurs after the development of PTSD symptoms (Cacciola et al., 2009; Kessler et al., 1997); it is also associated with a higher risk of psychiatric disorders (Dore et al., 2012; Fuehrlein et al., 2016), and higher rates of relapse, hospitalization, and social impairment (Blanco et al., 2013; Dore et al., 2012; Drapkin et al., 2011).

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There is a growing body of literature on the comorbidity of PTSD and childhood or adult ADHD patients. In prospective studies of childhood ADHD patients, it appears that children and adolescents with ADHD are more exposed to traumatic events (Schilpzand et al., 2018) than those without ADHD, as they are more likely to engage in risky behavior due to lack of planning and deficient inhibitory control (Bernardi et al., 2012). This exposure to traumatic events is likely to increase the risk of developing PTSD symptoms. Spencer et al. (2016) reviewed 22 studies examining the relationship between ADHD and PTSD; they found that the relative risk of PTSD in ADHD patients was 2.9 and that the relative risk of ADHD in PTSD patients was 1.7, showing the bidirectional link between these two disorders. Previous data also suggest that PTSD is associated with higher levels of childhood and adult ADHD (Antshel et al., 2013; Biederman et al., 2013). We can thus hypothesize that both childhood and adult ADHD are associated with PTSD.

The participants in this study were AUD inpatients, as we assumed that there would be a higher prevalence of ADHD and PTSD in this sample, due to the severity of their clinical profile, than among individuals with AUD as a whole. There is very little literature available on this dual diagnosis in AUD inpatients compared with other at-risk populations such as war veterans (Jakob et al., 2017; Norman et al., 2018; Yehuda et al., 2005). Further research is thus needed to investigate the relationship between adult ADHD and severity of PTSD among hospitalized AUD patients.

The main aim was to determine the prevalence, severity, and type of PTSD associated with adult ADHD in inpatients with AUD. We postulated that the prevalence and severity of PTSD would be higher in patients with ADHD, due to their greater exposure to traumatic events.

Method

Participants

The study was conducted in "Le Courbat" addiction rehabilitation center, which treated AUD patient from all over the country, mainly employees of the French Ministry of the Interior and police officers suffering from an addictive disorder. In recent years, "Le Courbat" center has been developing specific programs for patients with comorbid PTSD and AUD. All consecutive patients hospitalized for an AUD between January 2016 and October 2017 were recruited. AUD was clinically determined in accordance with the *International Classification of Diseases, Tenth Revision*. Patients were considered eligible if they were aged at least 18 years and if they gave informed and signed consent for this study (which was systematically requested of each patient).

Eligible patients then completed self-administered questionnaires two weeks after detoxification, using digital tablets or computers provided specifically for this study. The self-administered questionnaires were designed and filled-in online using the Sphinx mobile iQ 2 software.

The final sample was composed of inpatients diagnosed with AUD and who had completed self-administered sociodemographic, ADHD, and PTSD questionnaires in full. Participants were excluded in case of missing answers on questionnaires assessing sociodemographics, ADHD, or PTSD. Out of 627 eligible patients, data of 551 were analyzed in this study; the other 76 were excluded due to incomplete data.

Measures

Sociodemographic data, other substance use, and lifetime trauma exposure. Data about gender, age, and marital status were collected through self-administered questionnaires. Past year tobacco and cannabis use were clinically assessed with a yes/no question. Lifetime exposure to traumatic events was explored using the Life Event Checklist for *DSM-5* (LEC-5). This self-administered questionnaire assesses lifetime exposure to 17 possible traumatic events, clustered in five types of events: (a) catastrophes, (b) accidents, (c) physical aggressions, (d) sexual aggressions, and (e) life-threatening events.

Self-reported ADHD. Self-reported adult ADHD was assessed using the short six-item Adult ADHD Self-Report Scale (ASRS) version 1.1 (Kessler et al., 2005) and the 25-item Wender Utah Rating Scale (WURS; Ward et al., 1993; French validation: Caci et al., 2010; Supplementary information #1). The ASRS assesses adult ADHD symptoms based on the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; APA, 1994) criteria; has six items scored on a Likert-type scale ranging from 1 (*never*) to 5 (*very often*). One point was attributed for a score of 3 (*sometimes*) to 5 (*very often*) on Questions 1 to 3, and one point was attributed for a score of 4 (*often*) or 5 (*very often*) on Questions 4 to 6. A total score of at least 4 (out of 6) was considered significant. In our study, internal consistency was acceptable ($\alpha = .79$). Self-reported childhood ADHD was assessed using the WURS-25. This is a 25-item questionnaire scored on a Likert-type scale ranging from 0 (*not at all*) to 4 (*a lot*). Total score ranges from 0 to 100; a score of 46 or more indicates probable self-reported childhood ADHD. In our study, internal consistency was excellent ($\alpha = .94$).

For the purposes of the current study, participants were considered as having "self-reported adult ADHD" when their scores on both the ASRS (cutoff ≥ 4) and the WURS (cutoff ≥ 46) were significant. They were considered as having a probable history of childhood ADHD when cutoff at 46 was met on WURS questionnaire regardless of ASRS score. Total WURS score was used to determine probable childhood ADHD symptoms and the number of positive

ASRS items (ranging from 0 to 6) was used to determine self-reported adult ADHD symptoms.

Posttraumatic stress disorder. We assessed PTSD using the self-administered PTSD Checklist for *DSM-5* (PCL-5; Ashbaugh et al., 2016; Blevins et al., 2015). This 20-item assesses PTSD symptoms using a Likert-type scale for each symptom with scores ranging from 0 (*not at all*) to 4 (*extremely*), with a total score of 0 to 80 indicating severity.

Items can be divided into four subscales: re-experiencing (score of 0–20), avoidance (0–8), negative alterations in cognition and mood (0–24), and arousal (0– 28).

In line with the *DSM-5* diagnostic criteria, PTSD was diagnosed when participants had experienced at least one traumatic event (Criterion A), reported one or more of the intrusion symptoms (Criterion B), at least one symptom of persistent avoidance of stimuli associated with the traumatic event (Criterion C), two or more symptoms of negative alterations in cognitions and mood (Criterion D), and at least two symptoms of marked alterations in arousal and reactivity (Criterion E). Total score indicates PTSD severity. In this sample, PCL-5 had excellent internal consistency for the total score ($\alpha = .94$) and re-experiencing dimension ($\alpha = .90$), and very good internal consistency for the other PTSD subscales: avoidance ($\alpha =. 84$), arousal ($\alpha = .85$), and for negative alteration in cognition and mood ($\alpha = .86$).

Data Analysis and Ethics

All data were analyzed using SPSS, version 22.0.0, and the R statistical software (R foundation for Statistical computing, 2012), with a two-sided significance level of .05. Descriptive statistics for quantitative measures (means, standard deviations) and for qualitative measures (percentage) were first calculated. We used a chi-square test to determine the relationship between self-reported adult ADHD and qualitative variables (sociodemographic data, substance use, current and lifetime psychiatric disorders, exposure to traumatic events); we used Fisher's exact test when appropriate. Parametric and nonparametric mean comparison tests (Student's *t* tests or Mann–Whitney *U* test, depending on the normality of the variables) were also used to determine which continuous variables were associated with self-reported adult ADHD. We used Spearman's tests to determine correlations between adult and childhood ADHD symptoms, and PTSD subscores and total score. Finally, we conducted a multivariate logistic regression analysis to determine whether self-reported adult ADHD (as assessed with categorical variables) was associated with PTSD after adjusting for age, gender, and marital status. For each dependent variable, we estimated the beta regression coefficient, its 95% confidence interval, and its associated Wald chi-square and *p* value.

This study was approved by an institutional review board in July 2015, prior to beginning the study (CERNI Tours-Poitiers). All the data collected were in line with French recommendations regarding use of personal data, with the approval of the French CNIL (Commission Nationale de l'Informatique et des Libertés).

Table 1. Descriptive Statistics of the Whole Sample ($N = 551$).

Variables	Descriptive statistics
ADHD	
Self-reported adult ADHD	109 (20%)
Probable history of childhood ADHD	168 (30.5%)
Posttraumatic stress disorder	
PTSD *DSM-5* based diagnosis (PCL-5)	270 (49%)
Dual diagnosis rate	
ADHD− PTSD−	263 (48%)
ADHD+ PTSD−	18 (3%)
ADHD− PTSD+	179 (33%)
ADHD+ PTSD+	91 (17%)
Other substance use rate	
Tobacco use rate	446 (81%)
Cannabis use rate	169 (31%)

Note. Data are presented as $M \pm SD$ or number (%). Self-reported adult ADHD was met when ASRS score was at least 4 and WURS score was at least 46; probable childhood ADHD was met when WURS score was at least 46. PTSD = posttraumatic stress disorder; *DSM-5* = *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition; PCL-5 = PTSD Checklist for *DSM-5*; ASRS = 6-item adult ADHD Self-Report Scale; WURS = 25-item Wender Utah Render Scale.

Results

Description of the Whole Sample

A total of 551 inpatients completed the self-administered questionnaires in full. The majority of participants were male and single. Their mean age was 44.1 years (Table 1); 81% of inpatients were smokers and 31% were past-year cannabis users. One third of our sample met the criteria for self-reported childhood ADHD, 20% the criteria for self-reported adult ADHD, and 49% the *DSM-5* criteria for diagnosis of PTSD; 48% did not meet the criteria for either self-reported ADHD or PTSD diagnosis, 3% met the criteria for self-reported ADHD and not PTSD, 33% met the criteria for PTSD diagnosis and not self-reported ADHD, and 17% of our sample met the criteria for both self-reported ADHD and PTSD. Ninety-seven percent of participants had experienced at least one traumatic event, and the most common categories were accidents (77%), physical assaults (69%), and unspecified traumas (71%). Sexual assault had been experienced by 20% of our sample.

Comparison of Patients With and Without Self-Reported Adult ADHD

Sociodemographic data and trauma exposure. Patients with adult ADHD were younger than those without ($p = .001$), with a lower proportion of men ($p = .015$). They also

Table 2. Comparison of Sociodemographics and Exposure to Lifetime Traumatic Events Between Patients With Adult ADHD (a-ADHD+) and Patients Without Adult ADHD (a-ADHD−).

Variables	a-ADHD− ($N = 442$)	a-ADHD+ ($N = 109$)	Statistics	p
Sociodemographic characteristics				
Age (years)	44.8 ± 8.9	41.6 ± 8.6	$t = 3.49$	.001*
Sex, male	379 (87%)	83 (76%)	$\chi^2 = 5.95$	.015*
Marital status, married or in a relationship	164 (37%)	10 (9%)	$\chi^2 = 3.27$	.07
Traumatic events (LEC)				
Number of events	6.2 ± 3.7	7.8 ± 3.8	$t = -3.92$	<.001*
Having experienced at least one event	427 (96%)	109 (100%)	—	—
Catastrophes (at least one)	230 (52%)	56 (51%)	$\chi^2 = .02$	.93
Natural disaster	133 (30%)	35 (31%)	$\chi^2 = .17$	.68
Fire or explosion	195 (44%)	47 (42%)	$\chi^2 = .04$	.85
Accidents (at least one)	332 (75%)	91 (83%)	$\chi^2 = 3.44$	.06
Transport accident	293 (66%)	82 (75%)	$\chi^2 = 3.21$	.07
Domestic or work accident	197 (44%)	61 (56%)	$\chi^2 = 4.56$	.03
Exposure to toxic substance	98 (22%)	27 (25%)	$\chi^2 = .34$	.56
Physical aggressions (at least one)	293 (67%)	87 (80 %)	$\chi^2 = 7.47$	.006*
Physical aggression	261 (60%)	84 (77%)	$\chi^2 = 12.1$	<.001*
Assault with a weapon	205 (47%)	66 (60%)	$\chi^2 = 7.03$	.008*
Sexual aggressions (at least one)	69 (16%)	43 (39%)	$\chi^2 = 30.68$	<.001*
Sexual aggression	51 (12%)	33 (29%)	$\chi^2 = 23.7$	<.001*
Other unwanted sexual experience	54 (12%)	33 (29%)	$\chi^2 = 21.4$	<.001*
War events (at least one)	56 (13%)	19 (16%)	$\chi^2 = 1.69$	.12
Combat or war-related experience	49 (11%)	12 (10%)	$\chi^2 = .001$	.98
Captivity	18 (4%)	8 (6%)	$\chi^2 = 2.08$	.15
Life threatening events (at least one)	129 (29%)	45 (41%)	$\chi^2 = 5.93$	.015*
Life-threatening illness or injury	123 (27%)	41 (37%)	$\chi^2 = 4.01$	.045*
Severe human suffering	171 (38%)	64 (59%)	$\chi^2 = 14.3$	<.001*
Sudden violent death	202 (45%)	53 (48%)	$\chi^2 = 0.3$	.58
Sudden accidental death	277 (62%)	79 (73%)	$\chi^2 = 3.68$	.055
Serious harm caused by participant	113 (26%)	38 (34%)	$\chi^2 = 3.80$	.051
Other stressful event (at least one)	303 (69%)	91 (84%)	$\chi^2 = 9.57$	.002*

Note. Descriptive data are presented as $M \pm SD$ or number (%). a-ADHD− = patients without adult ADHD; a-ADHD+ = patients with adult ADHD; LEC-5 = Life Events Checklist for *DSM-5*; χ^2 = chi-square tests were used to compare prevalence; t = Student's t tests were used to compare mean scores.
*$p < .05$.

reported more traumatic events ($p < .001$) with more life-threatening events, and physical and sexual aggressions; there was no difference between groups regarding catastrophes, war-related experiences, or accidents (Table 2).

PTSD and ADHD characteristics. Table 3 presents the PTSD and ADHD characteristics of patients with and without self-reported adult ADHD. Patients with self-reported adult ADHD had a higher prevalence of PTSD (84% vs. 40%, $p < .001$), and greater symptom severity ($p < .001$). Table 4 presents correlations between ADHD-related variables (adult and childhood symptom severity) and PTSD-related variables (number of stressful events, severity of individual symptoms, severity of entire syndrome). Severity of adult ADHD symptoms was correlated with overall PTSD severity ($p < .01$) and with the severity of individual symptoms. Adult ADHD was thus associated with PTSD severity, when measured both categorically and dimensionally.

Multivariate Statistics

Association between PTSD and adult ADHD after adjustment. In multiple logistic regressions adjusted for age, gender, and marital status, the only significant associations with PTSD diagnosis were genderadu (female; Supplementary information #2; Wald chi-square = .88; CI 95% [.30, .85]; $p = .01$) and self-reported adult ADHD (Wald chi-square = 46.8; CI 95% = [4.04, 12.38], $p < .001$).

Table 3. Comparison of PTSD Prevalence and Severity Between Patients With (a-ADHD+) and Without Adult ADHD (a-ADHD−).

Variables	a-ADHD− (*N* = 442)	a-ADHD+ (*N* = 109)	Statistics	*p*
PTSD prevalence	179 (40%)	91 (84%)	$\chi^2 = 64.7$	<.001*
PTSD severity, PCL-5 score	28.5 ± 16.9	48.5 ± 11.7	$t = -11.7$	<.001*
Repetition score	6.7 ± 5.3	11.8 ± 4.9	$t = -8.9$	<.001*
Avoidance score	3.2 ± 2.4	4.6 ± 2.1	$t = -5.8$	<.001*
Negative thoughts and beliefs score	10.1 ± 6.5	17.2 ± 4.5	$t = -10.9$	<.001*
Hyperarousal score	8.4 ± 5.3	14.8 ± 4.3	$t = -11.7$	<.001*
ADHD-related variables				
Adult ADHD symptoms, ASRS score	2.2 ± 1.7	4.8 ± .78	$t = -16.8$	<.001*
Childhood ADHD symptoms, WURS score	28.8 ± 16.5	61.7 ± 12.1	$t = -16.0$	<.001*

Note. Descriptive data are presented as *M* ± *SD* or number (%). a-ADHD− = patients without self-reported adult ADHD; a-ADHD+ = patients with self-reported adult ADHD; PTSD = posttraumatic stress disorder; PCL-5 = PTSD Checklist for *DSM-5*; ASRS = Adult ADHD Self-Report Scale; WURS = 25-item Wender Utah Render Scale; χ^2 = chi-square tests were used to compare prevalence; *t* = Student's *t* tests were used to compare mean scores.
*$p < .05$.

Table 4. Correlations Matrix Between Adult ADHD Symptoms, Childhood ADHD Symptoms, Age, Overall PTSD severity, and PTSD Subscale Severity in the whole sample (*N* = 551).

Variables	1	2	3	4	5	6	7	8	9
Adult ADHD symptoms (ASRS)	—								
Childhood ADHD symptoms (WURS)	.54**	—							
Age	−.16**	−.23**	—						
Number of stressful events (LEC-5)	.06	.18**	−.01	—					
PTSD total severity (PCL-5)	.59**	.64**	−.15**	.25**	—				
Repetition score (PCL-5)	.46**	.48**	−.13**	.26**	.88**	—			
Avoidance score (PCL-5)	.37**	.38**	−.04	.17**	.74**	.68**	—		
Negative thoughts and beliefs score (PCL-5)	.59**	.61**	−.11**	.19**	.92**	.72**	.63**	—	
Hyperarousal score (PCL-5)	.57**	.67**	−.20**	.24**	.86**	.64**	.50**	.75**	—

Note. We used Spearman's correlation tests because some variables did not meet normality assumptions. Adult ADHD symptoms were assessed using the Adult ADHD self-report scale (ASRS) total score. Childhood ADHD symptoms were assessed using 25-item Wender Utah Render scale total score. Number of stressful events was assessed using Life Event Checklist for *DSM-5*. PTSD severity as well as PTSD dimensions severity were assessed using the Life Events Checklist for *DSM-5*. ASRS = Adult ADHD Self-Report Scale; WURS = 25-item Wender Utah Render Scale; LEC-5 = Life Event Checklist for *DSM-5*; PTSD = posttraumatic stress disorder; PCL-5 = PTSD Checklist for *DSM-5*.
*$p < .05$. **$p < .01$.

Discussion

The main objective of this study was to examine the relationships between self-reported adult ADHD and PTSD in AUD inpatients. We found a significantly higher prevalence of PTSD in inpatients with self-reported adult ADHD (84%) than in those without adult ADHD (40%). We also found that ADHD was associated with higher PTSD symptom severity scores. Patients with ADHD had also experienced more traumatic events, especially ones that were life-threatening, or related to physical or sexual aggression.

To the best of our knowledge, this is the second study to assess the relationship between adult ADHD and PTSD in AUD inpatients (Evren et al., 2016), and the results of the two studies are similar. Nonetheless, the prevalence of self-reported adult ADHD in our AUD patients was in the lower range of other findings (van Emmerik-van Oortmerssen et al., 2012). By contrast, prevalence of PTSD was in the upper range findings reported in the literature (Dragan & Lis-Turlejska, 2007; Evren et al., 2018; Grundmann et al., 2018; Kessler et al., 1995; Pietrzak et al., 2011; Sells et al., 2016). A possible explanation for this overrepresentation of PTSD in our sample could be a recruitment bias, as many of the patients in "Le Courbat" center are policemen and employees of the French Ministry of the Interior. It could also be due the use of self-report questionnaires, or to the growing knowledge of trauma-related disorders in AUD patient; PTSD is often described as a disorder that precedes AUD, due to the use of alcohol to auto-medicate PTSD symptoms (Müller et al., 2015) or because PTSD symptoms trigger alcohol craving (Simpson et al., 2012). Although the link between those two disorders appears to be bidirectional

(Spencer et al., 2016), it would seem that some studies find as much as twice the prevalence of PTSD in ADHD patients compared with those without (Biederman et al., 2014).

Finally, our findings suggest that self-reported ADHD patients are exposed to a higher number of traumatic events, especially aggressions (physical and sexual) and life-threatening events. It has been shown that ADHD patients have a higher risk of accidents, exposure to violence, and sexual abuse, when studied both retrospectively (Konstenius et al., 2017; Reinhardt & Reinhardt, 2013) and prospectively (Man et al., 2015; Schilpzand et al., 2018). This may in turn increase the risk of developing PTSD (Jakob et al., 2017). Another factor that could explain the relationship between ADHD and PTSD is the low resilience that has been observed in ADHD patients (Regalla et al., 2015), and which is associated with adverse clinical outcomes such as drug use (Dvorsky & Langberg, 2016); it would be interesting to explore this factor in future studies.

One of the methodological limitations of our study is the presence of confounding factors that could influence the reliability of self-reported adult ADHD results. To reduce this bias, both WURS and ASRS questionnaires were used to determine self-reported adult ADHD (Dakwar et al., 2012) rather than the sole ASRS. The use of both questionnaires with these cutoffs has a 90% sensitivity and 55% specificity (Dakwar et al., 2012). Therefore, associating ASRS scores with a positive WURS score was a way to limit false positives in this triple ADHD-PTSD-AUD population. We can thus consider that a positive ASRS score without the presence of childhood ADHD is a false positive. The scores of the ASRS (adult attention deficit symptoms) by individuals with AUD and PTSD are likely to be biased by false positives, due to the fact that heavy drinking affects attention and working memory (Gunn et al., 2018; Harvey, 2016; Wesley et al., 2017). The results could also be biased by the fact that PTSD causes negative alterations in cognition, both clinically (*DSM-5*, APA, 2013) and neurophysiologically (Herz et al., 2016), which may persist over time (Yehuda et al., 2005). We may hypothesize that given that ADHD is a neurodevelopmental disorder, which symptoms appear before the age of 12 (APA, 2013), this disorder could precede the development of PTSD. However, it could also be hypothesized that PTSD during childhood might precede ADHD, and then later lead to AUD. A longitudinal study is required to determine which disorder appears first.

Other limitations include the cross-sectional design making it impossible to determine causality links, the lack of assessment of other psychiatric disorders assessment that could lead to a confounding bias, and the use of self-administered questionnaires for ADHD and PTSD diagnosis in this sample of patients with comorbid AUD, ADHD, and/or PTSD. Future studies should be conducted with a sample of individuals with less severe AUD (outpatients, primary care patients) to determine whether our results can be generalized to individuals with AUD as a whole. Another bias could arise from the missing data of 76 patients, which may be due to their greater impulsivity or more severe attention deficit symptoms. Finally, our results are only applicable to AUD inpatients.

Our results have a number of clinical implications. First, they suggest that multiple risk factors may coexist in hospitalized AUD patients, and it is important to systematically screen these patients for PTSD symptoms and ADHD. Our findings suggest the idea that patients with both ADHD and PTSD may represent a specific subgroup of these hospitalized patients, with a poorer prognosis given that both diagnoses are associated with severity of AUD symptoms, resistance to treatment and higher relapse risk. Future studies should test this relationship in a larger sample of individuals with AUD and examine how comorbid ADHD and PTSD affect the severity and treatment outcomes of alcohol and other substance use disorder. Finally, the possibility that this dual diagnosis exists in both hospitalized and nonhospitalized individuals with substance use disorders requires further investigation.

Conclusion

In conclusion, our results show that AUD inpatients with self-reported adult ADHD have a higher prevalence, a more severe form of PTSD, and a greater exposure to traumatic events than those without ADHD. The strong association between ADHD and PTSD in AUD inpatients provides additional data on this dual diagnosis. Future studies should investigate whether these results could be generalized to nonhospitalized individuals with AUD.

Authors' Note

This study obtained the approval of an institutional review board in July 2015, prior to the beginning of the study (CERNI Tours-Poitiers). All the data collected were in line with the French recommendation regarding use of personal data, with the approval of the French CNIL (Commission Nationale de l'Informatique et des Libertés).

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Author Contributions

W. El-Hage and D. Maugé developed the study concept and study design. P. Brunault managed the data to provide a fully exploitable database. H. El Ayoubi performed the data analysis and interpretation under the supervision of P. Brunault and S. Barrault.

H. El Ayoubi drafted the manuscript, and P. Brunault, S. Barrault, G. Baudin, D. Maugé, N. Ballon, and W. El-Hage provided critical revisions for important intellectual content. H. El Ayoubi had full access to all of the data in this study and takes responsibility for the integrity of the data and the accuracy of the data analysis. All authors approved the final version of the manuscript for submission.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Nicolas Ballon reports personal fees from Lundbeck, Astra-Zeneca, and DNA Pharma, unrelated to the submitted work. Paul Brunault reports personal fees and nonfinancial support from Lundbeck, personal fees from Astra-Zeneca and DNA Pharma, unrelated to the submitted work. Wissam El-Hage reports personal fees from EISAI, Janssen, Lundbeck, Otsuka, UCB, Roche, and Chugai. He received grants from the Fondation de France and from the French Ministry of Health, French National Hospital Program for Clinical Research (PHRC), unrelated to the submitted work. Hussein El Ayoubi, Servane Barrault, Damien Maugé, and Grégoire Baudin have nothing to disclose.

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