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Frequency of and Factors Associated with the Presence of a History of Probable Attention-Deficit Hyperactivity Disorder in a Population of Patients with Sex Addiction

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Keywords

Sex addiction · Hypersexuality · Behavioural addiction · Impulsivity · Attention-deficit hyperactivity disorder

Abstract

Introduction: Since the first description of sex addiction (SA) by Carnes, research on this problematic behaviour has continued to grow, and the association with attention-deficit hyperactivity disorder (ADHD) appears to be frequent. This study aimed to estimate the frequency of a history of probable ADHD in a population of patients with SA and to explore the factors associated with it. **Methods:** One hundred 85 patients referred to the Nantes University Hospital for SA between 2011 and 2020 were included. Patients completed the Sexual Addiction Screening Test (SAST) or its revised version (SAST-R) to establish the presence of SA. As the SAST-R was not validated in French, we conducted a validation study for the French version. ADHD was screened using the Wender-Utah Rating Scale in childhood and the Adult ADHD Self-Report Scale in adulthood. A multivariate logistic regression model was used to identify factors associated with the presence of a history of

probable ADHD. **Results:** Childhood ADHD was identified in 36% of patients with SA. Factors associated with the presence of a history of probable ADHD were a low education level, an earlier age of onset of problematic sexual behaviour, another addictive disorder, an anxiety disorder, impulsivity (high negative urgency score), and high scores on harm avoidance and novelty-seeking temperament scales. Furthermore, the French version of the SAST-R displayed good psychometric properties, especially excellent sensitivity. **Conclusion:** The frequency of a history of probable ADHD among patients with SA is consistent with the literature and close to the highest range. Specific personality traits in patients with both SA and a history of probable ADHD could induce lasting problems of adaptation, which may precipitate the development of SA or maintain it.

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Introduction

The concept of sex addiction (SA) was introduced in 1983 by Carnes in his book “Out of the Shadows:

Understanding Sexual Addiction” [1], which described his experience with patients with excessive and uncontrolled sexual behaviour. Since then, research in this area has continued to grow, particularly with the development of internet sex almost 20 years ago [2]. Although several terms exist in the literature that define excessive sexual behaviour [3, 4], it is the term compulsive sexual behaviour disorder (6C72) that will enter the impulse control disorders section of the eleventh edition of the International Classification of Diseases (ICD-11). It is characterized by a persistent pattern of failure to control intense, repetitive sexual impulses or urges, resulting in repetitive sexual behaviour over an extended period that causes marked distress or impairment in personal, family, social, educational, occupational, or other important areas of functioning [5].

However, the inclusion of this disorder within the addictive disorders could also have been relevant because patients with excessive sexual behaviours were found to experience withdrawal symptoms, tolerance, and difficulties to stop this behaviour despite the harmful consequences [6, 7]. In addition, neuroimaging studies have shown that patients with compulsive sexual behaviour presented activation patterns similar to those of patients with substance addictions [8]. Finally, the use of pharmacological treatments such as naltrexone, used as a treatment to decrease craving in patients with alcohol use disorder, showed improvements in symptoms in patients with excessive sexual behaviour [9–12]. Therefore, in our study, the term SA will be used to describe this excessive and uncontrolled sexual behaviour according to Goodman’s definition of an addiction [13].

Attention-deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder that begins before the age of 12 and sometimes persists in adulthood [14]. Adult ADHD is rarely an isolated disorder, and addictive comorbidities are frequent. The association between the two disorders may be related to a key and common symptom: impulsivity [15, 16]. ADHD leads to executive deficits, lower tolerance for boredom, and increased risk-taking. ADHD has been found to be a vulnerability factor for the development of addiction, particularly SA [17]. However, the association between SA and ADHD has been little explored to date. A recent systematic literature review of 14 studies reported a high prevalence of ADHD in populations with SA, ranging from 8.3% to 34% [18], which is higher than that found in the general population, estimated between 2.5% and 5% [19]. These studies involved clinical groups with SA being assessed using Kafka’s [20] or Goodman’s [21] criteria during a clinical interview,

while ADHD was mostly assessed by the Wender-Utah Rating Scale-Child (WURS-C) [22] and the Adult ADHD Self-report Scale (ASRS-v1.1) [23]. Beyond the estimation of prevalence, further research is needed to explore the factors associated with the presence of ADHD in patients with SA, which was not investigated in the studies cited above. Therefore, the purpose of our study was to confirm the high frequency of ADHD in a population of patients with SA beginning treatment. Our study also aimed to explore the factors associated with the presence of a history of ADHD among a set of sociodemographic and clinical characteristics (psychiatric and addictive comorbidities, personality, sexual history, and habits). Finally, we were interested in comparing patients with persistent ADHD in adulthood with those in whom ADHD was present only in childhood. We also took the opportunity in this study to validate a French version of the revised version of the Sexual Addiction Screening Test (SAST-R).

Materials and Methods

Procedure

As part of the EVALADD cohort (NCT01248767), all incoming patients over 15 years old and seeking treatment for a behavioural addiction at the Nantes University Hospital (France) complete a multiaxial psychological assessment through self-administered questionnaires and a face-to-face structured interview (conducted by trained research staff with experience with behavioural addictions). The assessment was performed at the beginning of treatment and then repeated at 6 months, 12 months, and each year after inclusion, as long as the participants agreed to continue. For the present study, we used only the baseline data. The detailed procedure of the EVALADD cohort is described in Montourcy et al. [24].

Participants

The participants were recruited within the EVALADD cohort. For the present study, we selected patients who were referred for SA between April 2011 and September 2020 (232 outpatients). After exclusion of those (i) who did not reach the cut-off for SA diagnosis according to the SAST, (ii) with Parkinson’s disease, as the use of dopamine replacement therapy is known to potentially induce hypersexuality [25, 26], and (iii) for whom the ADHD status was impossible to determine because of missing data on the WURS-C questionnaire, the final sample was composed of 185 patients. The flowchart describing patient selection is provided in Figure 1.

Measures

Sociodemographic Characteristics

The following sociodemographic characteristics were collected: age, sex, marital status, educational level, and employment status.

Sex Addiction

Patients completed the SAST self-report questionnaire designed by Carnes et al. [1] to establish the presence of SA. A

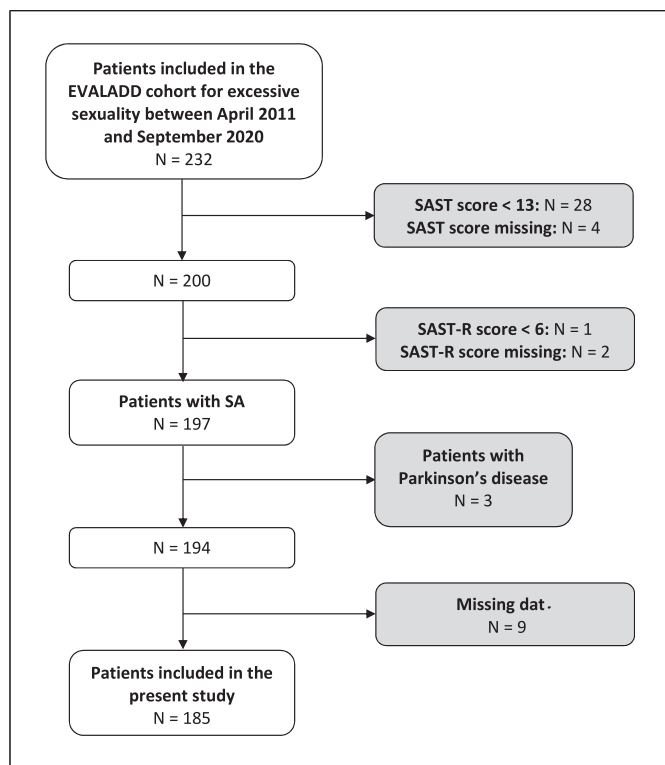


Fig. 1. Flowchart of the patient selection procedure.

revised version of the SAST (the SAST-R) was developed and validated by Carnes et al. [27] to take into account culturally normal sexual behaviours and core attributes of sexual addiction. We thus switched to the SAST-R during data collection to use the most up-to-date version. From April 2011 to October 2017 ($n = 111$), we used the original French version of the SAST, which was composed of 25 items and one core dimension that allows to identify addictive sexual behaviour (score greater or equal to 13) [28]. Then, we implemented the revised version of the SAST (SAST-R) [27] from November 2017 to September 2020 ($n = 74$). The SAST-R is composed of 45 items, and includes several scales and dimensions. The core item scale is composed of 20 items that allows discriminating between addictive and nonaddictive sexual behaviour. Carnes et al. [27] suggested using the cut-off of 6 “yes” responses to identify individuals with a SA. Four subscales of 6 items each (internet, men, women, homosexual) and four addictive dimensions of 4 or 5 items each (preoccupation, loss of control, relationship disturbance, affect disturbance) can also be used for a more detailed description of sexual behaviours. The internal consistency of the original SAST was poor, whereas the one in the SAST-R was good in the present sample (Cronbach’s alpha = 0.42 and 0.72, respectively).

As the SAST-R was not validated in French, we conducted a validation study for the French version. We first translated the 45 items from the original English version into French, with permission from the authors. A back-translation was then performed from French to English by an independent professional translator. Discrepancies between the original and the back-translated

versions were then discussed, which led to the adaptation of several formulations. The validity and psychometric properties of the final French version, especially of the core item scale, were then analysed on a distinct sample of 87 patients referred for SA within the EVALADD cohort and 8 participants recruited in the general population from the BANCO2 study (NCT03967418) [29].

Attention-Deficit Hyperactivity Disorder

The WURS-C [22, 30], a self-report questionnaire, was used to perform a retrospective screening of ADHD in childhood. It is composed of 25 items rated on a Likert scale from “not at all or very slightly” (0 point) to “very much” (4 points). According to the scoring proposed by Ward et al. [22], the patients with a WURS-C score greater than or equal to 46 were classified into the ADHD+ group (patients with a history of probable ADHD), and other patients were classified into the ADHD-group (patients with no history of ADHD).

Moreover, patients completed the ASRS-v1.1 self-report questionnaire [23, 31]. We used only the results of the ASRS-v1.1 Screener, which is composed of the 6 items that are most predictive of ADHD, to screen ADHD in adulthood. Kessler et al. [23] proposed a matrix of scoring to identify positive items among the 6 questions, with a cut-off of 4 positive items to detect probable ADHD in adulthood. Minors did not complete this questionnaire because, by definition, it is not validated under the age of 18. Among patients with a history of probable ADHD, we identified two subgroups: patients with probable ADHD only in childhood (“ADHD-desistor”) and patients with probable ADHD that persisted into adulthood (“ADHD-persistor”). Both the WURS-C and the ASRS displayed good internal consistency in the present sample (Cronbach’s alpha = 0.92 and 0.89, respectively).

Characteristics of SA

Patients were asked about the age at which they were initiated in sexuality and the age at which their sexual behaviour became problematic. They also responded to questions about their sexual habits and preferences: (i) their preferred sexual behaviour: sexual viewing, sexual exchanges, multiple sexual acts, masturbation alone, and paraphilic behaviours (from the list of 8 paraphilic disorders included in the DSM-5 [32]); (ii) their preferred sexual medium (Internet/in real life); (iii) the current (previous 12 months) presence of each of the 8 paraphilic disorders; and (iv) use of psychoactive substances in association with the sexual behaviour.

Psychiatric and Addictive Comorbidities

The MINI 5.0 [33] was used to explore the main psychiatric disorders at inclusion: anxiety disorders, mood disorders, current risk of suicide (last month), and substance use disorders. As the MINI does not explore addictive disorders without substance use (i.e., behavioural addictions), specific evaluations have been added to explore gambling disorder and gaming disorder [32, 34–37]. All disorders were explored over the lifetime and the current periods.

Personality

The patients completed the 125-item Temperament and Character Inventory (TCI-125) [38, 39]. This self-report scale was

designed to explore four temperament traits (novelty seeking [NS], harm avoidance, reward dependence, and persistence) and three character traits (self-directedness, cooperation, and self-transcendence). Estimated Cronbach's alphas were all acceptable in our sample (0.72 for NS, 0.84 for harm avoidance, 0.60 for reward dependence, 0.66 for persistence, 0.81 for self-directedness, 0.75 for cooperation, and 0.80 for self-transcendence).

Impulsivity

We used the impulsivity behaviour scale (UPPS) to investigate different facets of impulsivity through 4 dimensions ("urgency," "lack of premeditation," "lack of perseverance," and "sensation seeking") [40, 41]. During data collection, we switched from the UPPS to the UPPS-P, a shorter 5-dimension version. A "positive urgency" dimension was added, in opposition to the original "urgency" dimension that referred to "negative urgency." As the "positive urgency" score was not available in the original UPPS version, and in order to allow comparisons between patients, we did not use this dimension in the present analysis. Estimated Cronbach's alphas were all above 0.70 in our sample (0.86 for urgency, 0.85 for lack of premeditation, 0.85 for lack of perseverance, and 0.77 for sensation seeking).

Negative Life Events

We used the life events questionnaire (EVE) [42, 43]. For the present study, we only used data concerning the occurrence of lifetime sexual abuse (one single item).

Statistical Analysis

Validation of the French Version of the SAST-R

Exploratory factor analysis was performed to analyse the psychometric properties and estimate the structure of the core item scale from the SAST-R. Then, internal consistency was computed using Cronbach's alpha coefficient (α) [44]. Correlations between the SAST-R core item scale score and the number of symptoms in the Goodman diagnosis scale [13], which is one of the most recognized diagnosis scales for SA [45], were estimated with Pearson's correlations. Sensitivity and specificity with Goodman's criteria as the gold standard were also calculated. Finally, correlations between the 4 addictive subscales of the SAST-R (preoccupation, loss of control, relationship disturbance, and affect disturbance) and the number of symptoms on the Goodman diagnosis scale were estimated. Validation analyses were performed with Stata 16.0.

Main Analyses

For self-report questionnaires in which less than 50% of the items composing a dimension were missing, missing data were imputed by the mean of the corresponding dimension score. Before imputation, we verified that missing data were distributed randomly within the dataset, which is a condition for the imputation (Missing Completely At Random) [46]. Patients were removed from the analyses when imputation was not possible ($n = 9$).

The frequency of a history of probable ADHD in patients with SA was computed by calculating the proportion of patients with a positive screening based on the WURS-C. Then, we investigated the factors associated with the presence of probable ADHD in patients with SA using a two-step multivariate logistic regression. The first step consisted of performing simple logistic regressions for all variables. In the second step, only variables for which the p value was under 0.20 in the

first step were included in a multivariate logistic regression [47]. An optimization selection procedure based on the Akaike information criterion was then applied to select the optimal subset of predictors associated with the presence of a history of probable ADHD [48]. Odds ratios and 95% confidence intervals were estimated to quantify the strength of the associations between predictors and the presence of a history of probable ADHD.

Finally, we compared ADHD-desistors with ADHD-persistors on their sociodemographic, clinical, and SA characteristics. We used bivariate Mann-Whitney tests for quantitative variables and χ^2 tests of independence or Fisher's test for qualitative variables. To address the alpha risk inflation due to multiple comparisons, we used the Benjamini and Hochberg procedure to correct the p values [49]. The main analyses were performed in RStudio 4.0.2 (RStudio, Inc.).

Results

Validation of the French Version of the SAST-R

Detailed results of the validation of the French version of the SAST-R are provided in the online supplementary file (for all online suppl. material, see www.karger.com/doi/10.1159/000530110). Description of the sample is shown in the online supplementary Table 1. Exploratory factor analysis confirmed a one-dimensional structure of the core item scale that explained 58% of the total variance with good internal consistency ($\alpha = 0.84$ [0.79–0.88]) (online suppl. Fig. 1; Table 2). The correlation between the SAST-R core item scale scores and the number of symptoms in the Goodman diagnosis scale was good ($r = 0.68$, $p < 0.001$).

The sensitivity of the SAST-R was excellent ($Se = 1$), with 100% of true positives identified, whereas the specificity was low ($Sp = 0.22$) (online suppl. Table 3). The low specificity was expected, as the SAST-R is a screening tool to identify addictive behaviours, whereas Goodman's scale is used to establish the formal diagnosis of a disorder. Finally, the addictive subscale of the SAST-R that was most correlated with the number of symptoms in the Goodman diagnosis scale was the "loss of control" subscale ($r = 0.67$, $p < 0.001$) (online suppl. Table 4).

Frequency of a History of Probable ADHD in a Population of Patients with SA

According to the WURS-C, 35.7% (66/185) of the patients were identified as having a history of probable ADHD.

Description of the Sample

The average age of the participants was 41 years ($SD = 11.7$). Around 97% of the sample was of male gender.

Nearly two-thirds (60.7%) of them were in a relationship. The majority were employed (70.3%) and had an education level higher than 12 years (81.6%).

Comorbidities were frequent, including mood disorders (65.4%), anxiety disorders (50.3%), and addictive disorders (42.2%). In addition, 45.0% of the patients had a current risk of suicide. Sexual viewing was the most reported preferred sexual behaviour (45.9%), followed by multiple sexual acts (22.2%), sexual exchanges without intercourse (13.5%), paraphilic behaviours (11.9%), and masturbation alone (6.5%). Finally, the preferred sexual medium was mainly the internet (57.8%), and 42.2% of patients reported having experienced at least one paraphilic disorder in the past 12 months. The comparison of sociodemographic, SA, and clinical variables across ADHD+ and ADHD- groups is shown in Table 1.

Factors Associated with the Presence of a History of Probable ADHD in SA Patients

Seventeen variables out of the 23 variables tested were retained for inclusion in the multivariate model. After the optimization procedure, seven variables remained associated with the presence of a history of probable ADHD at a 5% alpha risk: level of education >12 years, age at which sexual acts/relationships became problematic, addictive disorder, anxiety disorder, NS, negative urgency, and harm avoidance (Table 2).

Comparison of ADHD-Persistors and ADHD-Desistors

Only two variables differed significantly between ADHD-persistors ($n = 39$) and ADHD-desistors ($n = 26$): lack of perseverance (UPPS) ($p = 0.006$) and self-directedness (TCI-125) ($p = 0.035$). ADHD-persistors had a higher lack of perseverance score (mean = 10.3 +/- 2.7 vs. 8 +/- 2.0) and a lower self-directedness score (mean = 38.4 +/- 17.4 vs. 52.0 +/- 16.0).

Discussion

Main Results

The purpose of our study was to evaluate the frequency of a history of probable ADHD in a population of patients with SA, to explore the factors associated with the presence of a history of probable ADHD, and to compare ADHD-persistors with ADHD-desistors. Several key findings of this work should be highlighted.

First, we found a frequency of a history of probable ADHD in our sample that was close to the highest range found in the literature, probably because we used the

same screening tools. This high frequency could be explained by the fact that patients classified as having a history of probable ADHD were not diagnosed by a clinical interview but screened with the WURS-C self-questionnaire, which nevertheless shows good specificity (89.1%) [22].

Second, we identified factors associated with a history of probable ADHD among SA patients. One of the 7 factors that emerged from our study was a low education level. This result is consistent with the literature on ADHD. Indeed, children with ADHD have more difficulty in school and drop out earlier than children without ADHD [50]. Moreover, we found that a history of anxiety disorders was associated with a history of probable ADHD. A high frequency of anxiety disorders has been consistently found in individuals with SA (38%) [6]. In addition, the risk of having an anxiety disorder for individuals with ADHD is much higher than in the general population [51]. Additionally, patients with the combination of the two types of disorders are more likely to also have a substance use disorder than individuals with an anxiety disorder without ADHD [52]. Individuals with ADHD seek relief from their anxiety according to the self-medication hypothesis [17, 53]. The same assumption could be made with SA. Furthermore, a history of addictive disorders was also associated with a history of probable ADHD. This is consistent with the literature: patients with SA compared to those without SA have more addictive disorders [17], as is also the case for those with ADHD compared to those without ADHD [15, 16]. The association of ADHD and addictive disorders in patients with SA may also be explained by the self-medication hypothesis, with the addictive behaviour developing to cope with the symptoms and difficulties associated with ADHD [17, 53]. The fourth factor associated with a history of probable ADHD in patients with SA was a high negative urgency score. Indeed, impulsivity has been implicated in both ADHD and SA and thus may play a major role in this dual disorder [16, 54]. Impulsivity can be described along 4 dimensions (negative urgency, lack of premeditation, lack of perseverance, and sensation seeking) [55]. Studies have shown that the negative urgency dimension may play a major role in the development of online SA, compulsive buying, and problematic smartphone or internet use [56, 57]. Moreover, a high negative urgency score was also evidenced in people with ADHD [58]. Negative urgency is expressed by the tendency to show quick and strong reactions in the presence of negative emotions [55]. Thus, the SA-ADHD comorbidity could further accentuate the

Table 1. Comparison of no history of ADHD and history of ADHD groups, according to sociodemographic, sexual addiction clinical variables

	Mean (SD) or percentage		OR	CI _{95%}	p value
	History of ADHD (n = 66)	No history of ADHD (n = 119)			
<i>Sociodemographic characteristics</i>					
Male, %	95.45	97.48			
Age, years	38.62 (11.14)	42.87 (11.80)	0.97	(0.94–0.99)	0.020*
Marital status					
Single, %	46.87	35.29	1.62	(0.88–3.00)	0.120*
In a relationship, %	53.03	64.71	–	–	–
High school graduates, %	72.73	86.55	0.41	(0.19–0.88)	0.022*
<i>Psychiatric and addictive comorbidities (MINI)</i>					
Mood disorder, current or past, %	78.79	57.98	2.69	(1.37–5.53)	0.005*
Anxiety disorder, current or past, %	71.21	38.66	3.93	(2.08–7.64)	<0.001*
Addictive disorder, current or past, %	59.09	32.77	2.96	(1.60–5.57)	<0.001*
<i>Impulsivity (UPPS/UPPS-P)</i>					
(Negative) urgency (/16)	11.85 (2.98)	9.50 (3.14)	1.28	(1.15–1.43)	<0.001*
Lack of premeditation (/16)	9.34 (2.79)	8.09 (2.47)	1.21	(1.07–1.37)	0.002*
Lack of perseverance (/16)	9.43 (2.71)	8.51 (2.57)	1.15	(1.02–1.29)	0.024*
Sensation seeking (/16)	10.87 (2.65)	10.29 (2.72)	1.09	(0.97–1.22)	0.200*
<i>Negative life events (EVE)</i>					
Lifetime sexual abuse, %	36.36	24.37	1.77	[0.92–3.41]	0.086*
<i>Personality (TCI-125)</i>					
Novelty seeking (/100)					
≥55, %	66.67	45.38	2.41	(1.30–4.56)	0.006*
<55, %	33.33	54.62	–	–	–
Harm avoidance (/100)	64.95 (22.21)	52.33 (25.95)	1.02	(1.01–1.04)	0.001*
Reward dependence (/100)	56.47 (18.56)	59.49 (17.53)	0.99	(0.97–1.01)	0.300
Persistence (/100)	50.23 (29.95)	48.28 (33.05)	1.00	(0.99–1.01)	0.700
Self-directedness (/100)	43.75 (17.83)	54.34 (21.64)	0.97	(0.96–0.99)	0.001*
Cooperation (/100)	67.78 (15.71)	76.79 (15.49)	0.97	(0.95–0.99)	0.001*
Self-transcendence (/100)	42.75 (23.91)	34.56 (23.56)	1.01	(1.00–1.03)	0.028*
<i>Sexual addiction characteristics</i>					
Age at initiation to sexuality, years	12.36 (2.95)	12.78 (2.89)	0.95	(0.95–1.05)	0.300
Age at start of problematic sexual behaviour, years	25.86 (11.31)	31.93 (13.75)	0.96	(0.93–0.99)	0.003*
Preferred sexual behaviour					
Sexual viewing, %	50.00	43.70			
Multiple sexual acts, %	22.73%	21.85			
Sexual exchanges, %	9.09	15.97			
Paraphilic behaviours, %	9.09	13.45			
Masturbation alone, %	9.09	5.05			
Preferred sexual medium					
In real life, %	40.91	42.86	0.92	(0.50–1.70)	0.800
Internet, %	59.09	57.14	–	–	–
Paraphilic disorder, current, %	42.42	42.02	1.02	(0.55–1.87)	>0.900
Substance use with the sexual behaviour, %	10.61	7.56	1.45	[0.50–4.09]	0.500

SD, standard deviation; OR, odds ratio; CI_{95%}, 95% confidence interval. The gender variable was not included in the analyses because of an unbalanced distribution. *p value ≤ 0.20.

Table 2. Multivariate logistic regression analysis (final model) showing factors associated with a history of ADHD ($n = 185$)

	OR	CI _{95%}	<i>p</i> value
Anxiety disorder, current or past	3.70	(1.63–8.74)	0.002*
Novelty seeking (TCI-125)			
≥55	3.50	(1.50–8.62)	0.005*
<55	–	–	–
Addictive disorder, current or past	2.86	(1.34–6.29)	0.007*
Negative urgency (UPPS-P)	1.18	(1.04–1.36)	0.014*
Harm avoidance (TCI-125)	1.02	(1.00–1.04)	0.028*
Age at start of problematic sexual behaviour, years	0.95	(0.91–0.98)	0.003*
High school graduates	0.35	(0.12–0.94)	0.041*
Self-directedness (TCI-125)	1.02	(1.00–1.05)	0.111
Cooperation (TCI-125)	0.98	(0.95–1.01)	0.125

OR, odds ratio; CI_{95%}, 95% confidence interval. **p* value ≤ 0.05.

impaired functioning related to ADHD: individuals with SA and ADHD might feel overwhelmed when confronted with negative emotions and would adopt unsuitable strategies by engaging in excessive or inappropriate sexual behaviour to cope with these emotions. This strategy, which may be effective in the short term, could lead to negative long-term consequences, including poor decision-making skills [58]. Moreover, high scores on the NS and harm-avoidance (HA) temperaments were associated with a history of probable ADHD in patients with SA. However, ADHD has been found to be positively associated with high NS and HA scores [59]. According to Cloninger [39], individuals with high NS scores are curious, impulsive, disordered, and easily bored. These characteristics are often found in those with ADHD and illustrated by the fact that people with ADHD tend to have short and multiple sexual relationships [19]; thus, this could increase the risk of developing SA. At the same time, a high HA score represents a tendency to be easily worried, fearful, shy, and tired according to Cloninger [39]. This would fit the profile of individuals with ADHD with a predominantly inattentive subtype [60], which is the most represented subtype in individuals with AS-ADHD comorbidity [61–63]. Finally, the personality profile of patients with SA appears to be marked by low levels of NS and HA [64]. Thus, the presence of ADHD-SA comorbidity could increase the levels of NS and HA compared to individuals with SA only. The last factor associated with a history of probable ADHD in patients with SA was an earlier age of onset of SA. To our knowledge, this result has never been observed in this particular population. One can assume that individuals with ADHD would start their sexual life earlier than individuals without ADHD [65]. However, in our

sample, the age of sexual initiation was not different between the ADHD+ and ADHD– groups. As a consequence, a history of probable ADHD may be associated with a quicker switch to problematic sexual behaviour. The combination of specific personality traits (NS, HA, and negative urgency) in patients with a history of probable ADHD could induce lasting problems of adaptation, which may precipitate the development of SA and be reinforced by the anxiety component inherent in ADHD. ADHD could also affect sexual relationships, and learning about sexuality would then be more dysfunctional, leading to earlier entry into SA.

Third, we demonstrated that ADHD-persistors had higher levels of lack of perseverance and lower levels of self-directedness than ADHD-desistors. These findings are consistent with the literature on adults with ADHD. Indeed, Lopez et al. [66] found that lack of perseverance was associated with ADHD in adults and more specifically with the inattention subtype of ADHD, which is overrepresented in adulthood. Moreover, according to Park et al. [67], adults with ADHD have significantly lower self-directedness scores than adults without ADHD. Low scores on this trait have been associated with low self-esteem, which is often the case in individuals affected by ADHD [68]. Persistent ADHD may thus worsen both perseverance (ability to remain focused on a task over the short term) and self-directedness (self-determination to achieve personal goals over the long term) skills in patients with SA.

Strengths and Weaknesses

Our study has some limitations. The cross-sectional design does not allow causal links to be established, although ADHD is by definition a disorder that develops

during childhood, whereas addiction is a pathology that mainly affects adults. In addition, the retrospective nature of ADHD screening in childhood may have introduced memory bias, which can lead to both false positives and false negatives. The WURS-C provides only a screening for childhood ADHD, not a diagnosis. In addition, potentially interesting psychological factors could not be explored due to a lack of data, such as self-esteem. Nevertheless, the factors explored in our study covered a large number of sociodemographic and clinical characteristics relevant to the literature on the subject. Moreover, as the data collection was performed on a 9-years period, sexual behaviours patterns might have considerably evolved over time (e.g., offline to online behaviours). Finally, the results of our study are not necessarily generalizable to a population of people suffering from SA because this study only concerns people who are seeking care for SA.

Despite these limitations, this work has several strengths. The number of patients in this study is quite large in relation to the target population, i.e., patients with confirmed SA who come to the hospital for this reason. In addition, the assessments were carried out largely on the basis of face-to-face clinical interviews, increasing the validity of the data collected (compared to surveys conducted online with self-questionnaires only). Finally, the assessment carried out was multi-axial, including sociodemographic, psychopathological, and sexual characteristics. This multimodal assessment is favoured in recent models of addiction, namely, an approach combining both general predisposing factors and factors specific to addictive behaviour [69].

Conclusions

Probable ADHD, whether present only in childhood or persistent in adulthood, is common among patients seeking treatment for SA. There are factors associated with the presence of a history of probable ADHD that can alert the clinician to the presence of past or current ADHD. Management of ADHD in addition to SA, especially when ADHD persists into adulthood, may have beneficial effects on the course of SA, for example, by reducing the impulsivity frequently found in these patients. Similarly, a better knowledge of the factors associated with this comorbidity may make it possible to work on the psychopathological characteristics

associated with the presence of ADHD and to hope for a secondary improvement in the symptomatology of SA. In the future, it would be interesting to increase the sample size and explore more factors in this population to confirm the results found and evaluate other associations with ADHD in SA, especially self-esteem and the influence of taking ADHD medication on the development and maintenance of SA. The beneficial effects of starting ADHD medication in adulthood, when it has not been initiated in childhood, for patients with persistent ADHD associated with SA should also be explored in the future.

Statement of Ethics

The study was approved by the Local Ethics Committee (Groupe Nantais d'Éthique dans le Domaine de la Santé, GNEDS, Nantes), approval number ID-RCB: 2017-A03585-48. All participants provided written informed consent (and one of their legal representatives if appropriate). No compensation was given for participation.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

Study concept, design, and supervision: Benoît Schreck, Marie Grall-Bronnec, and Gaëlle Challet-Bouju; inclusion of patients: Benoît Schreck, Clémence Cabelguen, and Marie Grall-Bronnec; collection and processing of data: Camille Forcier and Juliette Leboucher; analysis and interpretation of data: Benoît Schreck, Camille Forcier, Marianne Balem, and Gaëlle Challet-Bouju; statistical analysis: Camille Forcier and Marianne Balem. All authors had full access to all data in the study, took responsibility for the integrity of the data and the accuracy of the data analysis, and gave feedback on and approved the manuscript.

Data Availability Statement

All data generated or analysed during this study are included in this article and its online supplementary material files. Further enquiries can be directed to the corresponding author.

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