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Attention deficit hyperactivity disorder symptoms and risky sexual behaviours in university students: the i-Share study

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ABSTRACT

Background Risky sexual behaviours (RSB) and attention deficit hyperactivity disorder (ADHD) are both major concerns among university students. However, their association remains insufficiently understood. This study aimed to evaluate the relationship between ADHD symptoms and a broad range of RSB in university students.

Methods A total of 13 085 French students enrolled in the i-Share (Internet-based Students' Health Research Enterprise study (mean age: 20.6 years, SD=2.4) completed self-reported questionnaires assessing ADHD symptoms (Adult Self-Report Scale V.1.1), RSB, sociodemographic characteristics and alcohol and cannabis use. Logistic and Poisson regression models were used to examine the cross-sectional associations between ADHD symptoms and RSB, adjusting for relevant confounders.

Results A high level of ADHD symptoms was observed in 5.3% of students. In multivariable models, ADHD symptoms were associated with a wide range of RSB, including early first sexual intercourse (adjusted odds ratio (aOR) 1.26; 95% CI 1.06 to 1.51), inconsistent condom use in the last 12 months (aOR 1.26; 95% CI 1.05 to 1.51), diagnosis of a sexually transmitted infection in the last 12 months (aOR 1.49; 95% CI 1.08 to 2.07) and having had a higher number of sexual partners in the last 12 months (adjusted incidence rate ratio 1.20; 95% CI 1.14 to 1.27). Among female students, ADHD symptoms were associated with lower current use of any form of contraception (aOR 0.59; 95% CI 0.48 to 0.71), and higher odds of having ever used emergency contraception (aOR 1.22; 95% CI 1.02 to 1.47), and having ever had an abortion (aOR 1.77; 95% CI 1.21 to 2.58).

Conclusions University students with a high level of ADHD symptoms are at increased risk of engaging in a wide range of RSB. Targeted preventive strategies may be particularly beneficial for this population.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Attention deficit hyperactivity disorder (ADHD) is associated with increased risky sexual behaviours (RSB), but this link remains understudied in university students. Prior research inconsistently adjusted for confounders and examined limited RSB outcomes.

WHAT THIS STUDY ADDS

⇒ ADHD symptoms are associated with higher levels of RSB among university students, particularly in females, including: lower contraceptive use, higher emergency contraception use history and increased abortion history.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ These findings highlight the need for targeted prevention and screening programmes for university students with ADHD to reduce RSB risks.

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INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is characterised by a persistent pattern of inattention and/or hyperactivity–impulsivity that interferes with development, well-being and social, academic and professional functioning. Individuals with ADHD are at an increased risk of engaging in risky behaviours that can impact them both in the short term and throughout their lives. These behaviours include the use of alcohol and other psychoactive substances, reckless driving and, of particular interest to the present study, risky sexual behaviours (RSB).[1] Indeed, people with ADHD are more likely to have multiple sexual partners and select high-risk partners,[2] initiate sexual activity at an earlier age[3] and use contraception less frequently.[4] As a result, they also exhibit higher rates of sexually transmitted infections[5] and unplanned or teenage pregnancies.[6]

However, there are at least two major limitations in the existing literature on the relationship between ADHD and RSB. First, the selection and number of RSB analysed vary across studies, with no consensus on how to assess them. This inconsistency is partly due to the absence of comprehensive and robust psychometric measures for RSB, and some important outcomes (eg, abortion) remain understudied.[7] Second, despite the fact that a significant proportion of young adults have their first sexual experiences on entering university,

making this a critical period for the development of RSB, only a limited number of studies have focused on university students with ADHD. Moreover, these few studies are often characterised by methodological limitations,[8 9] such as small sample sizes and inadequate control for confounding factors, particularly other risky behaviours like alcohol or cannabis use, which may increase RSB.

A deeper understanding of the relationship between ADHD and RSB in university students could provide valuable insights for the prevention of risky behaviours among young adults with ADHD. The present study, based on data from the Internet-based Students' Health Research Enterprise (i-Share) cohort, one of the largest epidemiological studies among French students, offers a unique opportunity to investigate how ADHD symptoms are associated with engagement in RSB. Our objective was to assess the associations between ADHD symptoms and various RSB indicators in French university students, while accounting for a wide range of confounding factors.

METHOD

Study design and participants

The data used in this study were obtained from a cohort of students enrolled in higher education institutions in France, as part of the i-Share, which began in February 2013. The primary objectives of i-Share are to investigate students' health by assessing mental health, risky behaviours, substance use and sociodemographic factors over a 10-year period. To be eligible for participation, students had to be officially enrolled at a university or higher education institution in France, be at least 18 years old, be able to read and understand French, and provide informed consent. A large-scale promotional campaign, combining both digital and physical communication strategies, was implemented to encourage student participation. This included information stands during registration, social media outreach, conferences, leaflets, promotional items and newsletters (see www.i-Share.fr). Additionally, on various campuses, student ambassadors facilitated peer-to-peer communication about the study and assisted in collecting basic registration information.

The study included participants in two stages. First, student volunteers preregistered online to receive a login and password granting access to the study website (www.i-Share.fr). Second, they completed and validated a baseline self-reported questionnaire during the formal enrolment process. Our study used inclusion data from the baseline questionnaire, collected between February 2013 and October 2023. The i-Share project was approved by the Commission Nationale de l'Informatique et des Libertés (CNIL) (DR-2013–019).

Measures

Outcome: risky sexual behaviours

To analyse a set of RSB based on the baseline questionnaire and existing literature,[10–12] we selected seven items reflecting risk-taking in sexual health. First, participants were asked: 'Have you ever had sex?' with response options: 'Yes', 'No' or 'Prefer not to answer'. Those who answered 'Yes' were then presented with a series of questions related to their sexual activity. The survey included the following questions: 'At what age did you have your first sexual intercourse?' (in years); 'During the last 12 months, how many partners have you had?' (number); 'During these encounters, were condoms used?' (yes, every time/yes but not every time/no); 'During the last 12 months, has a doctor diagnosed you with a sexually transmitted infection (Chlamydia, gonorrhea, condyloma, syphilis, herpes)?' (yes/no). All female participants could also answer questions relative to contraception and abortion: 'Are you currently using oral contraception (ie, the pill)' (yes/no); 'Are you currently using another mean of contraception (ie, implant, condom, intrauterine device, other)?' (yes/no); 'Have you ever used emergency contraception (eg, morning-after pill, etc.)?' (yes/no); 'Have you ever had an abortion (voluntary termination of pregnancy)?' (yes/no). To assess risk-taking in condom use during the last 12 months, we created a new variable 'inconsistent condom use' ((yes=inconsistent condom uses with multiple partners/no=all other cases (including consistent condom use with one or multiple partners or not using/irregular condom use with the regular partner)). This allowed us to build the following outcome variables: early first sexual intercourse (>15 years/≤15 years); Inconsistent condom use (yes/no); Diagnosis of sexually transmitted infection (yes/no); Multiple sexual partners (number); Current use of any means of contraception (yes/no); History of emergency contraception (yes/no); History of abortion (yes/no). Although contraception is not a RSB per se, we included it in our analyses since lower rates of contraception use are associated with unintended pregnancies,[13] and persons with ADHD could present lower rates of oral contraception.[14]

Main explanatory variable: attention deficit hyperactivity disorder symptoms

To assess ADHD symptoms, participants completed the 6-item French version of the 'Adult Self-Report Scale' (ASRS V.1.1) at the time of study inclusion. The WHO ASRS is a self-report screening tool designed to assess ADHD symptoms in adults in both research and clinical settings,[15] based on Diagnostic and Statistical Manual of Mental Disorders-IV criteria. It demonstrates good psychometric properties and has been shown to correlate well with clinical ADHD diagnoses.[16] The ASRS consists of six questions that assess how frequently specific ADHD symptoms have been experienced over the past 6 months. The six items were as follows: 'How often do you find it difficult to finalize the last details of a project once the most challenging parts have been done?'; 'How often do you have difficulty putting things in order when you have to do something that requires organization?'; 'How often do you find it difficult to remember your appointments or obligations?'; 'When you have to do something that requires a lot of thought, how often do you avoid doing it or put it off?'; 'How often do you fidget or twist your hands or feet when you have to sit for a prolonged period of time?'; 'How often do you feel overly active and compelled to do something, as if you are being driven by a motor?' Responses are measured using a 5-point Likert scale (0=never, 1=rarely, 2=sometimes, 3=often, 4=very often). The total ASRS score is calculated as the sum of responses across all six items, resulting in a score ranging from 0 to 24. A score between 18 and 24 is considered a strong predictor for identifying ADHD diagnosis.[17] In this study, we dichotomised the total ASRS score as follows: score ≥18: high level of ADHD symptoms, compatible with ADHD; Score <18: low level of ADHD symptoms. While some RSBs refer to longer time frames (eg, the past 12 months) or past events (eg, age at first sexual intercourse), we assume recent ADHD symptoms are representative of challenges experienced during adolescence.

Covariates

We used a direct acyclic graph to identify the covariates to include in the multivariable models, based on previous studies[9 10] (see online supplemental figure S1). Covariates included: (1)

sociodemographic data: sex (male/female), age in years; (2) student-related variables: family socioeconomic status (SES) during childhood (high to moderate (very comfortable/comfortable/adequate) vs low (difficult and very difficult)), alcohol use in the past 12 months (≥1 per week versus <1 per week or never), cannabis use in the past 12 months (no, ≤1 per month and >1 per month).

Statistical analysis

First, we described the overall characteristics of the study sample and compared them based on the presence or absence of a high level of ADHD symptoms using the χ^2 test or Fisher's exact test for categorical variables, and the t-test or Mann-Whitney test for continuous variables, depending on the distribution and Wilcoxon test for discrete data. Second, we conducted univariable logistic and Poisson regression analyses to examine associations between ADHD symptoms and RSB outcomes. Third, we performed multivariable logistic and Poisson regression analyses with two levels of adjustment: (1) Model 1: adjusted for sex, age, SES during childhood; (2) Model 2: further adjusted for alcohol and cannabis use, except for outcomes where the temporal sequence was unclear (ie, early sexual intercourse, history of emergency contraception and history of abortion). To avoid circularity, age was not included as a covariate in the model where early first sexual intercourse was the outcome, and sex was not included as a covariate in models based on sex-specific outcomes. The primary analyses excluded participants who had not engaged in sexual intercourse. We conducted sensitivity analyses: (1) including all participants, even those who had not engaged in sexual intercourse; and (2) treating ADHD symptoms as a standardised continuous variable (per 1-SD increase).

Multiple imputation for missing covariates was performed using the MICE (multiple imputation by chained equations) algorithm, with 100 iterations. The imputation model incorporated all RSB outcomes, ADHD symptoms and relevant covariates (sex, age, SES, alcohol use and cannabis use). We tested for statistical interactions between ADHD symptoms and sex, alcohol and cannabis. Unadjusted and adjusted ORs (aORs) and incidence rate ratio (aIRR) with 95% CIs were reported to quantify the strength of associations. Multicollinearity was assessed using the variance inflation factor. The Hosmer-Lemeshow test was used to assess the goodness-of-fit for the models. A two-sided significance level of 0.05 was applied for all statistical tests. All analyses were conducted using R software (V.4.3.3).

RESULTS

Sample description

The analytic sample comprised 13 085 participants (see Flowchart in the online supplemental figure S2) who completed the baseline questionnaire and met the inclusion criteria (table 1). Among them, 5.3% (n=695) had a high level of ADHD symptoms. The study population consisted of 75.6% women (n=9895) and 24.4% men (n=3190), aged 18–30 years, with a mean age of 20.63 years (SD=2.35). As shown in table 1, participants with a high level of ADHD symptoms were more likely to have been raised in a family with a low SES and to have used alcohol and cannabis in the last 12 months. In table 2, we can see that participants with a high level of ADHD symptoms were also more likely to have had their first sexual intercourse at age 15 or younger, to use condoms inconsistently in the last 12 months, to have been diagnosed with a sexually transmitted infection in the last 12 months, and to have had a higher number of sexual

Table 1 Characteristics of the analytical sample: the i-Share study

	Total sample (n=13 085)	ADHD symptoms: Low level (n=12 390)	ADHD symptoms: High level (n=695)	P value
	n (%)	n (%)	n (%)	
Sex				0.294
Men	3190 (24.4)	3009 (24.3)	181 (26.0)	
Women	9895 (75.6)	9381 (75.7)	514 (74.0)	
Age*	20.63 (2.35)	20.63 (2.35)	20.53 (2.36)	0.177
SES				
Low	1260 (9.6)	1159 (9.4)	101 (14.5)	<0.001
Moderate to high	11 822 (90.4)	11 228 (90.6)	594 (85.5)	
Study level				0.100
First year	4378 (33.6)	4130 (33.5)	248 (35.8)	
Second year	2551 (19.6)	2397 (19.4)	154 (22.2)	
Third year	2160 (16.6)	2058 (16.7)	102 (14.7)	
Four or more	2352 (18.1)	2234 (18.1)	118 (17.0)	
Other	1583 (12.2)	1512 (12.3)	71 (10.2)	
Alcohol use				0.042
<1 per week	5322 (40.7)	5065 (40.9)	257 (37.0)	
≥1 per week	7763 (59.3)	7325 (59.1)	438 (63.0)	
Cannabis use				<0.001
No	7861 (61.2)	7542 (62.1)	319 (46.6)	
≤1 per month	3582 (27.9)	3359 (27.6)	223 (32.6)	
>1 per month	1395 (10.9)	1253 (10.3)	142 (20.8)	

P values from χ^2 tests (all variables except age) and Mann-Whitney test (for age).
*Age is shown as the mean (SD).
ADHD, attention deficit hyperactivity disorder; i-Share, Internet-based Students' Health Research Enterprise; SES, socioeconomic status.

Table 2 Description of risky sexual behaviours: the i-Share study

	Total sample (n=13 085)	ADHD symptoms: Low level (n=12 390)	ADHD symptoms: High level (n=695)	P value
	N (%) or mean (SD)	N (%) or mean (SD)	N (%) or mean (SD)	
Early first sexual intercourse (≤15 years)				0.005
No	8738 (75.1)	8297 (75.4)	441 (70.4)	
Yes	2895 (24.9)	2710 (24.6)	185 (29.6)	
Inconsistent condom use (last 12 months)				<0.001
No	8787 (75.1)	8366 (75.3)	421 (67.9)	
Yes	2921 (24.9)	2743 (24.7)	199 (32.1)	
Diagnosis of a sexually transmitted infection (last 12 months)				0.005
No	11 978 (95.8)	11 346 (95.9)	632 (93.6)	
Yes	530 (4.2)	487 (4.1)	43 (6.4)	
Multiple sexual partners (number) (last 12 months)	2.07 (3.12)	2.04 (2.89)	2.65 (5.79)	<0.001
Female sample				
Any form of contraception (current)				<0.001
No	2156 (21.8)	1989 (21.2)	167 (32.5)	
Yes	7729 (78.2)	7382 (78.8)	347 (67.5)	
History of emergency contraception (ever)				0.036
No	5185 (53.0)	4937 (53.3)	248 (48.5)	
Yes	4591 (47.0)	4328 (46.7)	263 (51.5)	
History of abortion (ever)				0.004
No	9408 (96.0)	8929 (96.1)	479 (93.6)	
Yes	391 (4.0)	358 (3.9)	33 (6.4)	

P values from χ^2 tests (all variables except multiple sexual partners) and Wilcoxon rank sum test (for multiple sexual partners).
ADHD, attention deficit hyperactivity disorder; i-Share, Internet-based Students' Health Research Enterprise.

partners in the last 12 months. Female participants with a high level of ADHD symptoms were also more likely to not currently use any form of contraception, to have ever used emergency contraception and to have ever had an abortion. Additional information is provided in the online supplemental table S1.

Associations between ADHD symptoms and RSB

Table 3 presents the associations between ADHD symptoms and RSB. In both unadjusted and fully adjusted models, ADHD symptoms were significantly associated with all RSB outcomes: early first sexual intercourse (aOR 1.26; 95% CI 1.06 to 1.51), inconsistent condom use (aOR 1.26; 95% CI 1.05 to 1.51), diagnosis of a sexually transmitted infection (aOR 1.49; 95% CI 1.08 to 2.07), multiple sexual partners (aIRR 1.20; 95% CI 1.14 to 1.27), any form of contraception (aOR 0.59; 95% CI 0.48 to 0.71), history of emergency contraception (aOR 1.22; 95% CI 1.02 to 1.47) and history of abortion (aOR 1.77; 95% CI 1.21 to 2.58). Finally, there was no significant interaction between

Table 3 Multivariable associations between ADHD symptoms and risky sexual behaviours: the i-Share study

	Early first sexual intercourse (≤15 years) N=11 633	Inconsistent condom use (last 12 months) N=11 708	Diagnosis of a sexually transmitted infection (last 12 months) N=12 508	Multiple sexual partners (last 12 months) N=10 827	Any form of contraception* (current) N=9885	History of emergency contraception* (ever) N=9776	History of abortion* (ever) N=9799
	OR (95% CI)	OR (95% CI)	OR (95% CI)	IRR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
ADHD unadjusted	1.28 (1.08 to 1.53)	1.45 (1.22 to 1.73)	1.59 (1.15 to 2.19)	1.30 (1.23 to 1.37)	0.56 (0.46 to 0.68)	1.21 (1.01 to 1.45)	1.72 (1.19 to 2.48)
ADHD and gender, age, SES	1.26 (1.06 to 1.51)	1.44 (1.21 to 1.72)	1.60 (1.16 to 2.22)	1.29 (1.23 to 1.36)	0.57 (0.47 to 0.69)	1.22 (1.02 to 1.47)	1.77 (1.21 to 2.58)
ADHD and gender, age, SES, alcohol, cannabis	–	1.26 (1.05 to 1.51)	1.49 (1.08 to 2.07)	1.20 (1.14 to 1.27)	0.59 (0.48 to 0.71)	–	–

Early first sexual intercourse is not adjusted for age.
*Female sample.
ADHD, attention deficit hyperactivity disorder; IRR, incidence rate ratio; i-Share, Internet-based Students' Health Research Enterprise; SES, socioeconomic status.

sex, alcohol, cannabis and ADHD symptoms in relation to RSB outcomes. Sensitivity analyses that included all participants, as well as analyses treating ADHD symptoms as a continuous variable, yielded similar results (see online supplemental tables S2 and S3).

DISCUSSION

Main results

In this large sample of more than 10 000 French university students, with a mean age of approximately 20 years, we found associations between a high level of ADHD symptoms and several RSB. These included having had first sexual intercourse at age 15 or younger, inconsistent condom use in the last 12 months, diagnosis with a sexually transmitted infection in the last 12 months and having had a higher number of sexual partners in the last 12 months. Among females, high ADHD symptoms were also associated with not currently using any form of contraception, having ever used emergency contraception and having ever had an abortion. aOR ranged from 1.3 to 1.8.

Comparisons with other studies and interpretation

Our findings align with previous research demonstrating significant associations between ADHD and early first sexual intercourse, inconsistent condom use, sexually transmitted infections and a higher number of sexual partners.[2–4 18] However, our study builds on this evidence by using a larger sample with a high proportion of women, and by adjusting for relevant confounders. It extends prior findings specifically to university students, a population for which data from European samples have been limited to date.[19] Our results also suggest that women with ADHD symptoms are more likely to have ever used emergency contraception. Consistent with this finding, a recent study reported a similar association between ADHD and emergency contraception use in students, with a similar strength of association.[20] An original contribution of our study is the significant association between ADHD symptoms and a lower likelihood of using any form of contraception. To date, this relationship has not been clearly established in the existing literature. However, some studies suggest that young women with ADHD who use oral contraception report more adverse effects than their non-ADHD peers, which may contribute to lower use.[14] Furthermore, evidence indicates that young women with ADHD are at increased risk of developing depression while using oral contraceptives, which could also explain lower adherence.[21] Another noteworthy finding is the association between ADHD symptoms and a history of abortion. Previous research on abortion in women with ADHD has primarily focused on the effects of ADHD medications during pregnancy, rather than voluntary abortion as a possible consequence of RSB.[22 23] Overall, these associations between ADHD symptoms and a broad range of RSB may be driven by intrinsic characteristics of ADHD, such as emotional dysregulation, impulsivity and oppositional symptoms.[24] It is noteworthy that, although alcohol and cannabis use slightly attenuated some of these associations, they remained statistically significant.[25]

Strengths and limitations of the study

This study presents several strengths, including the specific population studied (ie, university students), the large sample size, the broad range of RSB explored and the consideration of multiple potential confounders in the regression models. However, several limitations should be acknowledged to correctly interpret the findings. First, the use of self-reported questionnaires may have introduced information bias. However, self-administered questionnaires have proven reliable in assessing both ADHD symptoms and RSB among adult respondents.[26–28] Second, the focus on French university students may limit the generalisability of our results to university students from other countries. Indeed, French students may be more diverse in terms of lifestyle, social environment and access to resources, given that tuition fees in France are significantly lower, particularly when compared with those in other Western countries such as the USA or Australia. Third, we did not analyse the heterogeneity of ADHD manifestations. ADHD can present as predominantly inattentive, predominantly hyperactive/impulsive or combined presentations, each potentially having different implications for RSB. Future research should examine the specific contributions of these ADHD presentations among students to further clarify and refine our findings. Fourth, the cross-sectional design and the temporal mismatch between ADHD symptoms assessment and RSB render our analyses associative and limit our ability to infer causality. Longitudinal studies are needed to establish temporal relationships between ADHD symptoms and RSB. Finally, other important factors, such as childhood adversities and trauma, or intercourse with same-sex partners, were not considered in this study, despite their potential influence on the development of RSB. Future studies should integrate these variables to provide a more comprehensive understanding of these associations.

Practical and research implications of the findings

The findings of this study, together with prior research in other populations, advocate for the implementation of prevention and screening campaigns targeting university students. To provide optimal support, university health services could integrate therapeutic education programmes and psychoeducational interventions for students with ADHD symptoms. Therapeutic education programmes have been shown to enhance transition-to-care skills in young people with ADHD, facilitating better self-management and access to appropriate healthcare services.[29] Psychoeducational interventions could also be offered, as they may help reduce both engagement in RSB and the psychiatric comorbidities commonly associated with ADHD.[30] Given the links between ADHD and RSB, further studies should expand the scope of RSB exploration by using longitudinal designs to establish follow-up and temporal trajectories. They should also ensure sex balance by including an equal number of men and women, as sex differences may influence both ADHD symptom expression and engagement in RSB. Finally, it would be relevant to investigate mediating factors during adolescence and early adulthood to better understand the pathways through which ADHD contributes to engagement in RSB. Identifying these mediators could provide valuable insights for targeted prevention strategies.

Conclusion

Our findings highlight significant associations between ADHD symptoms and various RSB among French university students, underscoring an important public health concern. Despite existing sexual health awareness campaigns, RSBs remain prevalent in this population, indicating a need for more effective interventions. Students with high levels of ADHD symptoms are particularly vulnerable, making it essential to develop targeted interventions addressing both ADHD management and sexual health education. Such initiatives could provide both individualised and collective support, helping reduce engagement in RSB. Moving forward, sexual health promotion efforts in universities

should place greater emphasis on individuals diagnosed with ADHD in childhood, as well as those exhibiting symptoms in early adulthood. Additionally, our findings highlight the need to raise awareness among healthcare professionals (eg, nurses, midwives, gynaecologists) about the possible presence of undiagnosed ADHD in young adults who seek care for unplanned pregnancies or sexually transmitted infections. Conversely, professionals specialising in ADHD management (eg, psychiatrists, psychologists, general practitioners) should also be aware of the increased risk of RSB among their patients. Recognising these risks can help guide preventive counselling and tailored interventions to better support individuals with ADHD.

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Patient consent for publication Not applicable.

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