Moderation of Risks to Sexual Health by Substance Use in College Students With ADHD

Ashley M. Rohacek, BS[a]; Madison K. Firkey, MS[a]; Sarah E. Woolf-King, PhD, MPH[a]; and Kevin M. Antshel, PhD[a,*]

ABSTRACT

Objective: Poor sexual health is a public health concern for college students and individuals with attention-deficit/hyperactivity disorder (ADHD), yet limited information is available on the sexual health of college students with ADHD. Here, the sexual health of college students with and without ADHD was described and moderators of risk to sexual health were identified.

Methods: A secondary data analysis of the National College Health Assessment III (Fall 2019, Spring 2020, and Fall 2020 administrations) was conducted using a sample of sexually active undergraduate students (N = 36,236). Logistic regressions were used to compare sexual behaviors and health outcomes of college students with and without self-reported ADHD and test for interactions between ADHD and substance use–related moderators of risk to sexual health (ie, alcohol use, binge drinking, and cannabis use).

Results: Compared to non-ADHD peers, college students with ADHD reported more past-year sexual partners (adjusted odds ratio [aOR] = 1.27; $P < .01$), lower rates of condom use (aOR = 0.77; $P < .001$), and higher rates of condomless sex while drinking (aOR = 1.52; $P < .001$). College students with ADHD reported more sexually transmitted infection diagnoses (aOR = 1.29; $P < .01$), a greater number of unplanned pregnancies (aOR = 1.72; $P < .001$), and more emergency contraception use (aOR = 1.19; $P < .001$). Alcohol use, binge drinking, and cannabis use moderated the relationship between ADHD and sexual health.

Conclusions: College students with ADHD represent a vulnerable population for poor sexual health and are differentially impacted by substance use. Indicated sexual health prevention strategies and treatment for college students with ADHD are warranted.

J Clin Psychiatry 2022;83(4):21m14240

To cite: Rohacek AM, Firkey MK, Woolf-King SE, et al. Moderation of risks to sexual health by substance use in college students with ADHD. *J Clin Psychiatry.* 2022;83(4):21m14240.

To share: https://doi.org/10.4088/JCP.21m14240

[a]Department of Psychology, Syracuse University, Syracuse, New York

**Corresponding author:* Kevin M. Antshel, PhD, Department of Psychology, 430 Huntington Hall, Syracuse University, Syracuse, NY 13244 (kmantshe@syr.edu).

Attention-deficit/hyperactivity disorder (ADHD) is the most common neurodevelopmental disorder on college campuses, with a prevalence of approximately 11% in college students.[1] The adverse impact of ADHD on college students' academic, occupational, and social functioning has been well-documented.[2,3] An additional adverse outcome associated with ADHD that may be of particular concern for college students is poor sexual health.

College Student Sexual Health

College students experience unique developmental and contextual factors that influence sexual health. Sexual health, defined as a state of well-being, encompasses the absence of diseases and engagement in safe sexual experiences.[4] The life stage between ages 18 and 25 years is characterized by increased independence of personal sexual health.[5] In tandem with greater sexual autonomy, college students are exposed to contextual factors, such as alcohol and cannabis use, that facilitate sexual activity.[6,7] While engagement in sexual activity is normative and healthy among college students, some behaviors (eg, condomless sex) increase risk for poor sexual health (eg, sexually transmitted infections [STIs]) and may be more prevalent among college students with ADHD.

ADHD and sexual health. A growing body of literature has focused on the link between ADHD and poor sexual health in adolescent populations. Longitudinal studies report that individuals with childhood ADHD are more likely to report earlier sexual debut, increased casual sex (ie, sex when not in a relationship), and infrequent condom use in adulthood compared to non-clinical control groups.[8–15] Consequently, adolescents and young adults with ADHD have a higher prevalence of lifetime STIs[16,17] and unplanned pregnancies compared to those without ADHD.[10,13]

These findings align with the framework of expected utility in decision theory, which proposes that risky decisions, such as condomless sex, result from overweighing potential benefits (eg, sexual arousal) and underweighing potential losses (eg, STI acquisition).[18] Inhibitory control and delay discounting deficits in ADHD may create challenges in accurately evaluating the expected utility of a risky behavior, and perceived benefits have been shown to mediate the relationship between ADHD, condomless sex, and substance use.[19,20] Although theoretical and empirical evidence suggests that college students with ADHD may be at increased risk for poor sexual health, only two studies[16,21] have examined sexual health in the college student ADHD population.

Huggins and colleagues[21] compared the sexual health of 63 sexually active college students with and without ADHD and found that female college students with ADHD were less likely to use a condom during sex compared to male college students with ADHD and those without ADHD.[21] No additional differences in sexual

Clinical Points

- Poor sexual health is a public health concern for college students, yet limited information is available about sexual health in college students with attention-deficit/hyperactivity disorder (ADHD) or how substance use affects sexual health in college students.
- College students with ADHD who use substances are at increased risk for poor sexual health outcomes.
- Indicated poor sexual health prevention strategies should target individuals with ADHD who report substance use.

behavior emerged between college students with and without ADHD.[21] Although this study was the first to describe sexual health in a sample of college students with ADHD, the generalizability of these results is limited by the small sample (N = 63) ascertained from a single Mid-Atlantic university. Further, several variables were infrequently endorsed (ie, 2 students endorsed past-year acquisition of an STI; 2 students endorsed ever being pregnant/impregnating), preventing comparisons of these sexual health outcomes across groups.

More recently, an examination of sexual health among college students with disabilities (ie, ADHD, learning disability, chronic illness, or psychiatric condition)[16] found that those with ADHD reported a higher prevalence of STIs, greater engagement in condomless sex and sex while drinking, and more sexual partners. These findings provide evidence of increased risk for poor sexual health among college students with ADHD; however, no consideration was given to psychosocial or behavioral variables that may moderate risk. It remains unclear how well-established predictors of sexual health, such as alcohol and cannabis use, in college students differentially impact students with ADHD compared to non-clinical control groups. Investigating moderators of risk for poor sexual health in college students with ADHD may help identify individuals at elevated risk for STI acquisition and inform the development and implementation of preventative efforts for the ADHD population.

Moderators of risk. Alcohol use is a well-documented risk factor for poor sexual health. There is compelling support in the experimental literature that acute alcohol intoxication causes greater intentions to engage in condomless sex.[22] For example, event-level methodology has revealed that college women are less likely to use a condom during sex after engaging in heavy drinking.[23] Alcohol-related sexual risk is most commonly explained by Alcohol Myopia Theory,[24] which specifies that alcohol limits one's capacity to attend to distal inhibitory cues (eg, risk of STI acquisition), thereby biasing attention to more proximal situational cues (eg, sexual arousal). In support of Alcohol Myopia Theory, research has indicated that college students who have been drinking express greater intentions to engage in condomless sex[25,26] and are less able to delay rewards[27] as compared to sober control participants. Attentional and delay discounting deficits facilitated by alcohol intoxication may be more pronounced among individuals with ADHD given that both cognitive impairments are characteristic of ADHD.[28] Notably, college students with ADHD are 1.77 times more likely to routinely drink (ie, ≥ 3 times/wk),[29] over 2 times more likely to frequently binge drink (ie, defined as ≥ 4 [women] or ≥ 5 [men] drinks over 2 hours),[30] and 3 times more likely to endorse alcohol dependence compared to non-clinical groups.[31] Therefore, alcohol use may be a moderator of poor sexual health among college students with ADHD because (1) college students with ADHD are more likely to engage in problematic alcohol use relative to their peers without ADHD and (2) alcohol inhibits attentional capacity and delay discounting (already impaired in the ADHD population) and consequently increases risk for engagement in sexual behavior that confers risk for STI acquisition.

The second most commonly used substance among college students—cannabis—may influence engagement in condomless or casual sex among college students with ADHD through a pathway similar to that for alcohol. Compared to those who have never used cannabis, cannabis users are more likely to have multiple concurrent sexual partners and less likely to use condoms during sexual intercourse.[32] Those with ADHD are over 3 times more likely to have ever used cannabis[31] and 1.65 times more likely to regularly smoke cannabis relative to the general college student population.[29] The delta-9-tetrahydrocannabinol (THC) found in cannabis may produce pharmacologic effects on sexual decision-making similar to those of alcohol.[33,34] For example, THC has been found to impair the capacity to inhibit already initiated responses[35] and increase impulsivity and risk-taking.[35,36] Such effects may be exacerbated among those with ADHD, who already exhibit reduced behavioral inhibition[37] and higher trait-level impulsivity[38] compared to non-clinical populations. Therefore, cannabis use may also moderate the ADHD–sexual risk link.

Purpose of the Present Study

The present study is a secondary data analysis designed to characterize the sexual health of college students with and without ADHD and to examine alcohol and cannabis use as potential moderators of risk for poor sexual health. The American College Health Association–National College Health Assessment III (ACHA-NCHA III) survey was used to test the following hypotheses: (1) college students with ADHD would report more frequent condomless sex and sex while drinking, a greater number of past sexual partners, and a higher prevalence of STIs and unplanned pregnancies compared to college students without ADHD; (2) college students with ADHD would report less use of preventative sexual health care (eg, routine gynecologic examinations) compared to college students without ADHD; and (3) any alcohol use, binge drinking, or cannabis use would moderate the association between ADHD and sexual health.

METHODS

Study Design and Sample

A secondary data analysis of the ACHA-NCHA III was conducted. Between Fall 2019 and Fall 2020 (with

administrations in Fall 2019, Spring 2020, and Fall 2020), as part of the ACHA-NCHA III Survey, online survey data were collected among college students from 155 colleges and universities in the United States. The ACHA-NCHA is a valuable tool for examining substance use and health behaviors and group differences among college students[39] because of the use of random sampling in participating institutions, the regular administration of the survey (eg, administered twice per year), and the large reference groups.[40] The use of unweighted NCHA data is precise enough for use in prevalence estimates.[40]

In total, 102,359 participants completed the survey. For the current study, the sample was restricted to sexually active (ie, ≥1 lifetime sexual partner), cis-gender, heterosexual undergraduate college students between the ages 18 and 25 years (N = 36,236). Because ACHA-NCHA III data were used without any identifiers, the current study is exempt from Institutional Review Board approval.

Measures

Demographic profile. Data on participants' age, race, ethnicity, gender, sexual orientation, and current relationship status (ie, single or in a relationship) were collected.

ADHD diagnosis. Participants who self-reported currently having or receiving treatment for ADHD in the past year were classified as the ADHD group.

Sexual health. Participants reported on their past-year sexual partners, past-month condom use, and past-year sexual health outcomes. The time frame for these variables (ie, past-month versus past-year) matched the temporal frames used in the NCHA survey questions. Consistent with other sexual health research with this population, number of past-year sexual partners was dichotomized as "3 or more partners" indicating high risk and "2 or fewer partners" indicating low risk.[16] Past-month condom use was reported on a 5-point Likert scale ranging from "always" to "never." A response of "sometimes," "most of the time," or "always" was dichotomized as condom use, and a response of "rarely" or "never" was considered inconsistent condom use. Participants also reported ("yes"/"no") on past-year engagement in condomless sex while drinking.

Participants who engaged in vaginal intercourse were asked to report if they or a partner (1) had used birth control the last time they engaged in vaginal intercourse, (2) had used an emergency contraceptive (eg, Plan B), or (3) had become pregnant in the past year. Participants also reported on any past-year STI diagnoses. An omnibus "any STI" variable was created for participants who endorsed diagnosis of any STI. Last, participants reported on engagement in preventative sexual health care, which included their vaccination status for human papilloma virus (HPV) and whether they had received a gynecologic examination (female participants only) in the past year. These variables were all reported as dichotomous ("yes"/"no") outcomes.

Alcohol and cannabis use. Participants reported on frequency of past-month alcohol and cannabis use using a 5-point Likert scale ranging from "always" to "never."

Table 1. Participant Demographic Characteristics for Participants With (n=3,232) and Without (n=33,004) ADHD[a]

Variable	ADHD	No ADHD
Age, mean (SD), y	20.40 (1.71)	20.15 (1.57)
Gender*		
Female	1,907 (59.0)	22,403 (67.9)
Male	1,325 (41.0)	10,601 (32.1)
Race*		
White	2,583 (80.9)	23,528 (71.3)
Hispanic	397 (12.3)	4,854 (14.7)
Asian	158 (4.9)	3,094 (9.4)
Black	172 (5.3)	2,594 (7.9)
Biracial	139 (4.3)	1,246 (3.8)
Native American	158 (4.9)	796 (2.4)
Middle Eastern	56 (1.7)	348 (1.1)
Pacific Islander	18 (0.6)	197 (0.6)
Relationship status*		
Not in a relationship	1,487 (46.0)	13,977 (42.3)
In a relationship	1,743 (51.5)	18,980 (55.4)
Substance use		
Alcohol use[b]	2,634 (81.5)*	25,798 (78.2)
Binge drinking[c]	1,447 (44.8)*	12,874 (39.0)
Cannabis use[b]	1,516 (47.0)**	11,317 (34.2)

[a]Values are shown as n (%) unless otherwise noted. Percentages may not equal 100% due to missing data (eg, participants declining to answer items). For race, participants were able to select multiple identities that best describe them.
[b]Based on past-month use.
[c]Based on past-2-week use.
*$P < .01$. **$P < .001$.
Abbreviation: ADHD = attention-deficit/hyperactivity disorder.

Participants who endorsed past-month alcohol use were also asked to report how many times they binge drank in the past 2 weeks, with response options ranging from "none" to "10 or more." These variables were used as continuous moderators in analyses of sexual health behaviors and outcomes.

Data Analysis Plan

All analyses were conducted using SPSS version 23.[41] Descriptive statistics were used to summarize study variables. To ensure data quality, participants with greater than 25% missing data were excluded from analyses, and the Little missing-at-random test found that missing data were random. Logistic regressions were used to compare sexual health outcomes (dependent variable) among college students with and without ADHD (independent variable). Logistic regressions were also used to examine the moderating effects of alcohol use, cannabis use, and binge drinking on sexual health outcomes. Additional variables that have been shown to affect sexual activity (ie, age, gender, and relationships status) were included in all analyses as covariates.[42,43] To account for family-wise error rate, the criterion for statistical significance was set to an α level of < .01.

RESULTS

Demographic Profile

Table 1 displays sample demographic information. At the time of the study, 8.9% of participants (n = 3,232) reported a diagnosis of ADHD. Participants were a mean (SD) of 20.17 (1.58) years old. Most participants identified as non-Hispanic White (72.1%) females (67.1%) who were currently in a relationship (55.1%).

Table 2. Comparison of Sexual Behaviors and Health of College Students With and Without ADHD[a]

Variable	ADHD, n (%)	No ADHD, n (%)	Total, n (%)	aOR (95% CI)	*P* Value
≥ 3 Sexual partners[b]	864 (29.0)	6,174 (18.7)	7,038 (20.9)	1.27 (0.55–2.92)	.010
Condomless vaginal intercourse[c]	991 (48.1)	8,356 (41.6)	9,347 (27.2)	0.77 (0.70–0.84)	<.001
Condomless sex while drinking[b]	700 (24.4)	4,931 (17.5)	5,631 (17.5)	1.52 (1.39–1.67)	<.001
Contraceptive use[b]	2,479 (88.8)	24,483 (74.2)	26,962 (90.8)	0.95 (0.82–1.09)	.438
Emergency contraception[b]	611 (18.9)	5,308 (16.1)	5,919 (20.0)	1.19 (1.08–1.31)	<.001
Received HPV vaccine[d]	2,011 (62.6)	19,546 (59.3)	21,557 (80.8)	1.21 (1.08–1.35)	<.001
Attended gynecologic examination[b]	1,447 (44.8)	14,327 (43.4)	15,774 (47.8)	1.53 (1.39–1.68)	<.001
Any STI[b]	190 (4.5)	1,280 (3.3)	1,470 (3.5)	1.29 (1.08–1.55)	.005
Unplanned pregnancy[b]	47 (1.5)	268 (1.0)	315 (1.0)	1.72 (1.26–2.35)	<.001

[a]Age, gender, and relationship status were included as covariates in all models. Percentages represent the percent of individuals in each group (ADHD [n = 3,232], No ADHD [n = 33,004], or the total sample [n = 36,236]) who endorsed each item. The "No ADHD" group serves as the reference group for these analyses. Percentages may not equal 100% due to missing data (eg, participants declining to answer items).
[b]Based on reported occurrence in the past year.
[c]Based on reported occurrence in the past month.
[d]Based on reported current status.
Abbreviations: ADHD = attention-deficit/hyperactivity disorder, aOR = adjusted odds ratio, CI = confidence interval, HPV = human papilloma virus, STI = sexually transmitted infection.

Sexual Behavior and Health

Descriptive and statistical details on sexual health can be found in Table 2. College students with ADHD reported more past-year sexual partners, past-month condomless vaginal intercourse, and past-year condomless sex while drinking compared to college students without ADHD. No significant differences emerged in contraceptive use between groups; however, college students with ADHD reported greater use of emergency contraception and number of unplanned pregnancies compared to college students without ADHD. College students with ADHD were more likely to report having been diagnosed with any STI in the past year compared to those without ADHD. Contrary to our hypothesis, college students with ADHD were more likely to engage in preventative sexual health care compared to their peers, including both having attended a gynecologic examination in the past year and having received the HPV vaccine.

Moderators of Risk

Descriptive and statistical details on substance use behavior can be found in Table 1. Results of moderation analyses can be found in Table 3.

Alcohol and ADHD. Past-month alcohol use moderated the relationship between ADHD and number of sexual partners, condomless vaginal intercourse, condomless sex while drinking, contraception use, emergency contraception use, and diagnosis of any STI. Specifically, college students with ADHD were differentially impacted by alcohol use, more than non-ADHD peers who also consumed alcohol, such that they endorsed more sexual partners, condomless sex while drinking, emergency contraception use, and STI diagnoses. Similarly, past-2-week binge drinking moderated the relationship between ADHD and condomless vaginal intercourse, condomless sex while drinking, contraception and emergency contraceptive use, and diagnosis of any STI. College students with ADHD who engaged in greater binge drinking reported more condomless sex while drinking, contraception use, emergency contraception use, and diagnoses of STI compared to non-ADHD peers who also reported binge drinking.

Cannabis and ADHD. Past-year cannabis use moderated the relationship between ADHD and contraceptive and emergency contraceptive use and diagnosis of any STI. College students with ADHD who engaged in greater cannabis use reported less condomless sex during vaginal intercourse and more condomless sex while drinking, more contraceptive and emergency contraceptive use, and diagnoses of STI compared to non-ADHD peers who also used cannabis.

DISCUSSION

Adolescents and young adults with ADHD are at elevated risk for poor sexual health, including STI acquisition[16,17] and unplanned pregnancies.[10,13] Here, based on a nationally representative sample, we found that college students with ADHD engaged in lower rates of condom use during vaginal intercourse and higher rates of condomless sex while drinking and reported a greater number of sexual partners compared to their non-ADHD peers. College students with ADHD were also more likely to be diagnosed with an STI in the past year and reported greater use of emergency contraception and a greater number of unplanned pregnancies relative to their non-ADHD peers.

It is likely that the core symptoms of ADHD and associated interpersonal factors play prominent roles in the link between ADHD and sexual risk. For example, individuals with ADHD demonstrate marked inhibitory control deficits,[37] which may lead to greater difficulty pausing a sexual encounter to access and use a condom. Flory and colleagues[10] further theorized that interpersonal factors, such as associating with peers who favor involvement in non-conventional activities, may promote engagement in risky behavior among individuals with ADHD. Moreover, adults with ADHD often have short-lived and discordant

Table 3. Logistic Regression Analyses of Predictors of Sexual Health Outcomes Among College Students With and Without ADHD[a]

Variable	≥ 3 Sexual Partners[b]		Condomless Vaginal Intercourse[c]		Condomless Sex While Drinking[b]		Contraceptive use[b]		Emergency Contraception[b]		Any STI[b]	
	aOR (95% CI)	*P* Value	aOR (95% CI)	*P* Value	aOR (95% CI)	*P* Value	aOR (95% CI)	*P* Value	aOR (95% CI)	*P* Value	aOR (95% CI)	*P* Value
Age	0.93 (0.66–1.29)	.646	0.85 (0.84–0.87)	**<.001**	0.96 (0.94–0.98)	**.001**	1.12 (1.09–1.15)	**<.001**	0.92 (0.86–0.98)	**<.001**	1.25 (1.20–1.30)	**<.001**
Gender	1.17 (0.37–3.76)	.791	1.43 (1.34–1.53)	**.002**	0.90 (0.85–0.96)	**.002**	0.93 (0.84–1.03)	.150	0.85 (0.79–0.91)	**<.001**	0.34 (0.28–0.40)	**.004**
Relationship status	4.12 (1.30–13.01)	.016	0.49 (0.46–0.53)	**.001**	1.13 (1.07–1.20)	**<.001**	0.84 (0.77–0.91)	**<.001**	0.92 (0.87–0.94)	**.010**	0.58 (0.51–0.66)	**<.001**
ADHD status	0.52 (0.74–3.6)	.508	0.95 (0.84–1.09)	.450	1.84 (0.94–3.60)	.262	1.34 (1.11–1.61)	**.002**	0.93 (0.81–1.07)	.293	1.07 (0.84–1.44)	.848
Past-month alcohol use	2.58 (0.53–12.41)	.236	1.0 (0.91–1.11)	.095	1.55 (1.37–1.74)	**.001**	0.81 (0.70–0.94)	**.004**	0.92 (0.87–1.07)	.489	0.99 (0.80–1.22)	.908
Alcohol use × ADHD status	1.12 (0.74–1.59)	**.009**	.095 (0.92–0.97)	**<.001**	1.05 (0.95–1.17)	**.001**	0.91 (0.88–0.94)	**<.001**	1.07 (1.04–1.09)	**<.001**	1.08 (0.98–1.10)	**.003**
Binge drinking	1.41 (0.60–3.32)	.434	0.96 (0.89–1.03)	.218	1.36 (1.28–1.46)	**.001**	0.93 (0.85–1.03)	.159	1.04 (0.97–1.12)	.239	1.05 (0.923–1.18)	.477
Binge drinking × ADHD status	1.13 (0.93–1.37)	.224	0.93 (0.92–0.95)	**<.001**	1.32 (1.29–1.34)	**<.001**	1.05 (1.02–1.07)	**<.001**	1.05 (1.02–1.07)	**<.001**	1.08 (1.03–1.09)	**<.001**
Past-month cannabis use	1.08 (0.53–2.21)	.283	0.86 (0.80–0.92)	**.001**	1.18 (1.11–1.26)	**<.001**	1.01 (0.91–1.11)	.870	1.03 (0.96–1.10)	.345	1.17 (1.04–1.33)	.012
Cannabis use × ADHD status	1.07 (0.90–1.26)	.245	0.82 (0.80–0.84)	**.010**	1.11 (1.10–1.13)	**.001**	1.05 (1.03–1.08)	**.001**	1.01 (0.99–1.03)	.256	1.08 (1.04–1.11)	**<.001**

[a]The "No ADHD" group and "No relationship" group serve as the reference groups for these analyses. Alcohol use, binge drinking, and cannabis use were included as continuous variables. Boldface indicates statistical significance.
[b]Based on reported occurrence in the past year.
[c]Based on reported occurrence in the past month.
Abbreviations: ADHD = attention-deficit/hyperactivity disorder, aOR = adjusted odds ratio, CI = confidence interval, STI = sexually transmitted infection.

romantic relationships, which may result in more lifetime sexual partners and, in turn, increased risk for STI acquisition.[44] Taken together, a combination of core ADHD symptoms and associated interpersonal factors may explain the observed relationship between ADHD and sexual risk behavior.

Contrary to our hypotheses, college students with ADHD were more likely to engage in preventative sexual health care compared to college students without ADHD. This finding may be related to the greater prevalence of STIs observed among college students with ADHD and the resultant connection to health care providers. Similarly, given that stimulant medication is the most common form of ADHD treatment for college students,[45] and that federal guidelines require routine medication management for Schedule II controlled substances (eg, stimulants),[46] it is likely that college students with ADHD are more connected to health care providers relative to their non-ADHD counterparts. Routine medical visits present more opportunities for preventative sexual health care services[47] and may explain the greater use of preventative sexual health services in college students with ADHD.

As hypothesized, any alcohol use, binge drinking, and cannabis use moderated the relationship between ADHD and several sexual health outcomes. College students with ADHD who consumed alcohol or cannabis or reported binge drinking endorsed greater engagement in condomless sex while drinking, use of emergency contraception, and diagnoses of STIs. Trait-level behavioral disinhibition characteristic of individuals with ADHD may underlie risk for problematic substance use.[48] In turn, acute alcohol intoxication may further narrow attentional focus to the most salient cues of a sexual encounter (eg, sexual arousal) and limit processing of less salient inhibitory cues (eg, risk for STI acquisition),[24] leading to more health-compromising behavior, such as condomless sex while drinking. Moreover, increased engagement in condomless sex while drinking may increase risk for emergency contraception use or STI acquisition. However, it is important to note that these data are cross-sectional, and thus temporal associations between ADHD, substance use, and sexual health cannot be determined.

Limitations, Future Directions, and Clinical Implications

As the ACHA-NCHA III was an existing dataset, we were limited to the survey items and questions administered. For example, there was a lack of content coverage on use of prescribed stimulants for ADHD treatment beyond individuals diagnosed with ADHD in the past year. Importantly, prescribed stimulants may reduce engagement in condomless or casual sex and alcohol use among adult males[49] and adolescents and children[50,51] with ADHD. As such, further research examining the association between prescribed stimulant and risk behavior (eg, substance use, sexual risk) in college students with ADHD is needed. Future ecological momentary design studies should assess for stimulant use on the day of a sexual encounter to lead to better understanding of how stimulants may affect engagement in sexual risk behavior in this vulnerable population.

Further, the ACHA-NCHA does not provide information on the severity of ADHD symptoms; therefore, we could not investigate the association between ADHD severity and risk of poor sexual health outcomes. ADHD was self-reported as a dichotomous variable, yet other work indicates that a dimensional model of ADHD may allow for a greater understanding of ADHD on a continuum.[52] Future research should utilize validated, standardized self-report rating scales

to better capture the dimensionality of ADHD among college students. Additionally, this study did not control for psychiatric comorbidities, such as bipolar disorder[53] or borderline personality disorder,[54] that are associated with behaviors that may confer risk to sexual health. Because ADHD is commonly comorbid with these disorders,[55] future research should control for comorbid psychiatric disorders.

Of note, part of the second wave (March 2020–May 2020) and all the third wave (Fall 2020) of data for this study were collected during implementation of nationwide mitigation strategies to reduce the spread of the virus that causes coronavirus disease (COVID-19). As a result of pandemic-related social isolation guidelines, most college students reported a decrease in opportunities to have sex and in frequency of sexual activity.[56] Thus, it is possible that the sexual behavior of participants reported during these waves of this study is not representative of the typical sexual behavior of a college student population, both with and without ADHD.

Findings from this study present several directions for sexual health promotion, practice, and future research in college student ADHD populations. Notably, college students with ADHD are at high risk for multiple negative sexual health outcomes, and contextual factors common in college (ie, alcohol use, cannabis use) differentially increase risk for poor sexual health in students with ADHD. Indicated sexual health treatment (ie, targeting individuals with person-level risk-factors, such as ADHD and high rates of substance use) seems warranted, yet the authors of this article are unaware of indicated programs specifically designed for ADHD college students.[57] Presumably, college students with ADHD participate in existing universal interventions, but ADHD has not been examined as a moderator of these universal program outcomes.[57] While pharmacologic interventions are used commonly to treat ADHD symptoms, it is unlikely that medication alone will prevent college students from engaging in sexual risk behavior given the limited evidence for positive, generalizable long-term effects of medication on other key psychosocial outcomes.[58]

Sexual health interventions that extend beyond sexual education and incorporate teaching "point of performance" skills (eg, assessing pros and cons of a sexual encounter, how to pause a sexual encounter to access a condom, drinking in moderation) that can be employed during a sexual encounter may be particularly useful to college students with ADHD. Moving forward, efficacy trials of sexual health interventions should include examination of differential outcomes for college students with ADHD, especially college students with ADHD who engage in substance use, and assess the need for program adaptations to attain optimal outcomes for this vulnerable population.

Submitted: September 6, 2021; accepted January 12, 2022.

Published online: June 29, 2022.

Relevant financial relationships: None.

Funding/support: None.

Disclaimer: The opinions, findings, and conclusions presented/reported in this article/presentation are those of the author(s), and are in no way meant to represent the corporate opinions, views, or policies of the American College Health Association (ACHA). ACHA does not warrant nor assume any liability or responsibility for the accuracy, completeness, or usefulness of any information presented in this article/presentation.

Additional information: The original data set for the American College Health Association-National College Health Assessment III is available by contacting the American College Health Association (https://www.acha.org//NCHA).

REFERENCES

1. American College Health Association. American College Health Association-National College Health Assessment III: Reference Group Executive Summary Fall 2020. https://www.acha.org/documents/ncha/NCHA-III_Fall_2020_Reference_Group_Executive_Summary_updated.pdf. 2020. Accessed December 29, 2021.
2. Arnold LE, Hodgkins P, Kahle J, et al. Long-term outcomes of ADHD: academic achievement and performance. *J Atten Disord*. 2020;24(1):73–85.
3. Weyandt L, DuPaul GJ, Verdi G, et al. The performance of college students with and without ADHD: neuropsychological, academic, and psychosocial functioning. *J Psychopathol Behav Assess*. 2013;35(4):421–435.
4. World Health Organization. Report of a Technical Consultation on Sexual Health. Geneva: World Health Organization; 2002:28-31.
5. Herbenick D, Reece M, Schick V, et al. Sexual behavior in the United States: results from a national probability sample of men and women ages 14–94. *J Sex Med*. 2010;7(suppl 5):255–265.
6. Fromme K, Stroot E, Kaplan D. Comprehensive effects of alcohol: development and psychometric assessment of a new expectancy questionnaire. *Psychol Assess*. 1993;5(1):19–26.
7. Kerr DCR, Washburn IJ, Morris MK, et al. Event-level associations of marijuana and heavy alcohol use with intercourse and condom use. *J Stud Alcohol Drugs*. 2015;76(5):733–737.
8. Barkley RA, Fischer M, Smallish L, et al. Young adult outcome of hyperactive children: adaptive functioning in major life activities. *J Am Acad Child Adolesc Psychiatry*. 2006;45(2):192–202.
9. Brown LK, Hadley W, Stewart A, et al; Project STYLE Study Group. Psychiatric disorders and sexual risk among adolescents in mental health treatment. *J Consult Clin Psychol*. 2010;78(4):590–597.
10. Flory K, Molina BSG, Pelham WE Jr, et al. Childhood ADHD predicts risky sexual behavior in young adulthood. *J Clin Child Adolesc Psychol*. 2006;35(4):571–577.
11. Galéra C, Messiah A, Melchior M, et al. Disruptive behaviors and early sexual intercourse: the GAZEL Youth Study. *Psychiatry Res*. 2010;177(3):361–363.
12. Hosain GMM, Berenson AB, Tennen H, et al. Attention deficit hyperactivity symptoms and risky sexual behavior in young adult women. *J Womens Health (Larchmt)*. 2012;21(4):463–468.
13. Isaksson J, Stickley A, Koposov R, et al. The danger of being inattentive - ADHD symptoms and risky sexual behaviour in Russian adolescents. *Eur Psychiatry*. 2018;47:42–48.
14. Sarver DE, McCart MR, Sheidow AJ, et al. ADHD and risky sexual behavior in adolescents: conduct problems and substance use as mediators of risk. *J Child Psychol Psychiatry*. 2014;55(12):1345–1353.
15. Rokeach A, Wiener J. The romantic relationships of adolescents With ADHD. *J Atten Disord*. 2018;22(1):35–45.
16. Argenyi MS, James TG. Sexual risk behavior and sexually transmitted infections among college students with disabilities. *Sex Transm Dis*. 2021;48(11):851–854.
17. Chen MH, Hsu JW, Huang KL, et al. Sexually transmitted infection among adolescents and young adults with attention-deficit/hyperactivity disorder: a nationwide longitudinal study. *J Am Acad Child Adolesc Psychiatry*. 2018;57(1):48–53.
18. Nigg JT. Annual Research Review: On the relations among self-regulation, self-control, executive functioning, effortful control, cognitive control, impulsivity, risk-taking, and inhibition for developmental psychopathology. *J Child Psychol Psychiatry*. 2017;58(4):361–383.
19. Shoham R, Sonuga-Barke EJS, Aloni H, et al. ADHD-associated risk taking is linked to exaggerated views of the benefits of positive outcomes. *Sci Rep*. 2016;6(1):34833.
20. Shoham R, Sonuga-Barke E, Yaniv I, et al. What drives risky behavior in ADHD: insensitivity to its risk or fascination with its potential benefits? *J Atten Disord*. 2021;25(14):1988–2002.
21. Huggins SP, Rooney ME, Chronis-Tuscano A. Risky sexual behavior among college students with ADHD: is the mother-child relationship

protective? *J Atten Disord*. 2015;19(3):240–250.
22. Scott-Sheldon LAJ, Carey KB, Cunningham K, et al; MASH Research Team. Alcohol use predicts sexual decision-making: a systematic review and meta-analysis of the experimental literature. *AIDS Behav*. 2016;20(suppl 1):S19–S39.
23. Scott-Sheldon LAJ, Carey MP, Carey KB. Alcohol and risky sexual behavior among heavy drinking college students. *AIDS Behav*. 2010;14(4):845–853.
24. Steele CM, Josephs RA. Alcohol myopia. Its prized and dangerous effects. *Am Psychol*. 1990;45(8):921–933.
25. Abbey A, Saenz C, Buck PO, et al. The effects of acute alcohol consumption, cognitive reserve, partner risk, and gender on sexual decision making. *J Stud Alcohol*. 2006;67(1):113–121.
26. MacDonald T, Zanna M, Fong G. Why common sense goes out the window: effects of alcohol on intentions to use condoms. *Pers Soc Psychol Bull*. 1996;22(8):763–775.
27. Ortner CNM, MacDonald TK, Olmstead MC. Alcohol intoxication reduces impulsivity in the delay-discounting paradigm. *Alcohol Alcohol*. 2003;38(2):151–156.
28. Smith BH, Molina BSG, Pelham WE. The clinically meaningful link between alcohol use and attention deficit hyperactivity disorder. *Alcohol Res Health*. 2002;26(2):122–129.
29. Mochrie KD, Whited MC, Cellucci T, et al. ADHD, depression, and substance abuse risk among beginning college students. *J Am Coll Health*. 2020;68(1):6–10.
30. Garcia M, Rouchy E, Galéra C, et al. The relation between ADHD symptoms, perceived stress and binge drinking in college students. *Psychiatry Res*. 2020;284:112689.
31. Rooney M, Chronis-Tuscano A, Yoon Y. Substance use in college students with ADHD. *J Atten Disord*. 2012;16(3):221–234.
32. Andrade LF, Carroll KM, Petry NM. Marijuana use is associated with risky sexual behaviors in treatment-seeking polysubstance abusers. *Am J Drug Alcohol Abuse*. 2013;39(4):266–271.
33. Berry MS, Johnson MW. Does being drunk or high cause HIV sexual risk behavior? a systematic review of drug administration studies. *Pharmacol Biochem Behav*. 2018;164:125–138.
34. Green B, Kavanagh D, Young R. Being stoned: a review of self-reported cannabis effects. *Drug Alcohol Rev*. 2003;22(4):453–460.
35. Metrik J, Kahler CW, Reynolds B, et al. Balanced placebo design with marijuana: pharmacological and expectancy effects on impulsivity and risk taking. *Psychopharmacology (Berl)*. 2012;223(4):489–499.
36. Lane SD, Cherek DR, Tcheremissine OV, et al. Acute marijuana effects on human risk taking. *Neuropsychopharmacology*. 2005;30(4):800–809.
37. Alderson RM, Kasper LJ, Hudec KL, et al. Attention-deficit/hyperactivity disorder (ADHD) and working memory in adults: a meta-analytic review. *Neuropsychology*. 2013;27(3):287–302.
38. Miller DJ, Derefinko KJ, Lynam DR, et al. Impulsivity and attention deficit-hyperactivity disorder: subtype classification using the UPPS Impulsive Behavior Scale. *J Psychopathol Behav Assess*. 2010;32(3):323–332.
39. Bavarian N, Flay BR, Smit E. An exploratory multilevel analysis of nonprescription stimulant use in a sample of college students. *J Drug Issues*. 2014;44(2):132–149.
40. Kerr DCR, Bae H, Alley ZM. Enhancing gender and ethnic representativeness of NCHA-II data with survey weights: the examples of substance use prevalence and state marijuana legalization. *J Am Coll Health*. 2021;69(4):370–377.
41. IBM Corp. IBM SPSS Statistics for Windows, Version 23.0. IBM Corp; 2015.
42. Vasilenko SA, Linden-Carmichael A, Lanza ST, et al. Sexual behavior and heavy episodic drinking across the transition to adulthood: differences by college attendance. *J Res Adolesc*. 2018;28(2):473–487.
43. Ashenhurst JR, Wilhite ER, Harden KP, et al. Number of sexual partners and relationship status are associated with unprotected sex across emerging adulthood. *Arch Sex Behav*. 2017;46(2):419–432.
44. Wymbs BT, Canu WH, Sacchetti GM, et al. Adult ADHD and romantic relationships: what we know and what we can do to help. *J Marital Fam Ther*. 2021;47(3):664–681.
45. Kolar D, Keller A, Golfinopoulos M, et al. Treatment of adults with attention-deficit/hyperactivity disorder. *Neuropsychiatr Dis Treat*. 2008;4(2):389–403.
46. Preuss CV, Kalava A, King KC. Prescription of Controlled Substances: Benefits and Risks. In: *StatPearls*. StatPearls Publishing; 2021. https://www.ncbi.nlm.nih.gov/books/NBK537318/. Accessed August 4, 2021.
47. Jamison CD, Greenwood-Ericksen M, Richardson CR, et al. Association between Chlamydia and routine place for healthcare in the United States: NHANES 1999-2016. *PLoS One*. 2021;16(5):e0251113.
48. Charach A, Yeung E, Climans T, et al. Childhood attention-deficit/hyperactivity disorder and future substance use disorders: comparative meta-analyses. *J Am Acad Child Adolesc Psychiatry*. 2011;50(1):9–21.
49. Kumar S, Devendran Y, Madhumitha NS, et al. Correlates and treatment outcome of risky sexual behaviour in young males with ADHD and comorbid alcohol use disorder: a prospective study. *J Psychosexual Health*. 2019;1(1):62–69.
50. Chorniy A, Kitashima L. Sex, drugs, and ADHD: the effects of ADHD pharmacological treatment on teens' risky behaviors. *Labour Econ*. 2016;43:87–105.
51. Wilens TE, Faraone SV, Biederman J, et al. Does stimulant therapy of attention-deficit/hyperactivity disorder beget later substance abuse? a meta-analytic review of the literature. *Pediatrics*. 2003;111(1):179–185.
52. Coghill D, Sonuga-Barke EJS. Annual research review: categories versus dimensions in the classification and conceptualisation of child and adolescent mental disorders–implications of recent empirical study. *J Child Psychol Psychiatry*. 2012;53(5):469–489.
53. Chen SF, Wang LY, Chiang JH, et al. Bipolar disorder is associated with an increased risk of sexually transmitted infections: a nationwide population-based cohort study. *Sex Transm Dis*. 2018;45(11):735–740.
54. Chen EY, Brown MZ, Lo TTY, et al. Sexually transmitted disease rates and high-risk sexual behaviors in borderline personality disorder versus borderline personality disorder with substance use disorder. *J Nerv Ment Dis*. 2007;195(2):125–129.
55. Asherson P, Young AH, Eich-Höchli D, et al. Differential diagnosis, comorbidity, and treatment of attention-deficit/hyperactivity disorder in relation to bipolar disorder or borderline personality disorder in adults. *Curr Med Res Opin*. 2014;30(8):1657–1672.
56. Firkey MK, Sheinfil AZ, Woolf-King SE. Substance use, sexual behavior, and general well-being of US college students during the COVID-19 pandemic: A brief report. *J Am Coll Health*. 2021;1–7.
57. Schoenfelder EN, Kollins SH. Topical review: ADHD and health-risk behaviors: toward prevention and health promotion. *J Pediatr Psychol*. 2016;41(7):735–740.
58. Molina BSG, Hinshaw SP, Swanson JM, et al; MTA Cooperative Group. The MTA at 8 years: prospective follow-up of children treated for combined-type ADHD in a multisite study. *J Am Acad Child Adolesc Psychiatry*. 2009;48(5):484–500.