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Illicit drug use and sexually transmitted infections among young adults in the US: evidence from a nationally representative survey

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Abstract

Young people aged 15–24 years account for half of all new sexually transmitted infections (STIs) in the United States. The aim of this study was to examine the cross-sectional associations of factors linked to STIs among US young adults (18–25 years). This study used the 2015–2018 pooled National Survey on Drug Use and Health data on 55,690 young adults. Almost 3.4% of the respondents reported having an STI in the past year. Among the participants, 38.4% used illicit drugs and 3.7% reported a history of delinquency in the past year. In the survey-weighted logistic regression model, odds for contracting STIs in the preceding year was higher among adults aged 22–25 versus 18–21 years (OR:1.26, 95% CI:1.12–1.42); male versus female (OR:2.44, 95% CI:2.11–2.82); non-Hispanic African American versus non-Hispanic White (OR:1.77, 95% CI:1.55–2.02); widowed/separated/divorced (OR:1.93, 95% CI:1.36–2.75) and never married (OR:1.29, 95% CI:1.07–1.55) versus married; full-time/part-time employed (aOR:1.17, 95% CI:1.04–1.31) compared to unemployed/other; history of delinquency (OR:2.31, 95% CI:1.89–2.83); and use of illicit drugs in the last year (OR:3.10, 95% CI:2.77–3.47). High incidence of illicit drug use by the young adults and its strong association with STI incidence in recent years warrant special attention. Tailored preventive measures should be focused on key predictors.

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Authors' Contributions

MRH conceived the idea and designed the study. MRH was responsible for data management, analysis, and wrote and edited the manuscript. CK, MJB, MBF, and IC were involved in study design, contributed to the intellectual content and drafted and edited the manuscript. All authors reviewed and approved the final manuscript.

Declaration of conflicting interests

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Keywords

Sexually transmitted diseases; young adults; illicit drugs; delinquency

Introduction

Although young people (aged 15-24 years) are only one-quarter of the sexually active population, they disproportionately constitute about half of the 20 million new sexually transmitted infections (STIs) that occur in the US each year.¹ Common STIs include chlamydia, gonorrhea, chancroid, syphilis, genital herpes, human papillomavirus (HPV), hepatitis B and C, and HIV.² The number of combined reported cases of gonorrhea, syphilis, and chlamydia increased from 1.8 million in 2013 to 2.4 million in 2018 in the United States (US)³ with young adults aged 15–24 years acquiring half of all new STIs.⁴ Since these estimates include only reported cases, the true burden of STIs among young adults is most likely underestimated.

In comparison to older adults, sexually active adolescents (15-19 years) and young adults (20-24 years) are at a higher risk of getting infected with STIs due to various biological, behavioral, and cultural factors.⁵ In addition, some STIs, like chlamydia, affect adolescent and young females more because they have columnar cells (called cervical ectopy) located on the outer surface of the cervix increasing susceptibility to chlamydia.⁵ Studies show that one in every four sexually active adolescent females in the US has an STI.⁶

Illicit drug use has been found to be positively associated with STIs. For example, use of methamphetamines, ketamine, and inhalants was found to be positively associated with high HIV-STI coinfection among urban men who have sex with men (MSM).⁷ Furthermore, both injectable and non-injectable drug users are at a higher risk of contracting STI.⁸ Sharing needles and reusing drug paraphernalia increase the chance of blood-borne infections, while the influence of illicit drugs may increase the likelihood of engaging in unsafe sexual behavior, such as engaging in condomless sex, sex with multiple partners, and selling sex to pay for drugs.⁹

This paper contributes to the body of literature by focusing on the possible link between illicit drug use, presentation of STIs among young adults who are disproportionately impacted in the US and examining the association with other broader established demographic and behavioral factors. This study assessed the cross-sectional associations of such factors with increased sexual risk for STI among young adults using the latest available National Survey on Drug Use and Health data. Given the continued increase in STIs in the target population, this study finds that novel strategies are warranted to address the increased chance of acquiring STIs among youth, particularly men (youth who identify as having same sex relations) and those employed. Concerted efforts addressing adequate access to STI and drug use prevention services as well as confidentiality issues are key in designing contextually relevant prevention programs.

Materials and methods

Data source and study design

This study used the four-year (2015–2018) pooled data from the National Survey on Drug Use and Health (NSDUH). The NSDUH is a nationally representative cross-sectional survey of the non-institutionalized population in the US conducted annually by the Substance Abuse and Mental Health Services Administration (SAMHSA). The NSDUH collects data on the use of alcohol and illicit drugs, mental and substance use disorders, history of STI infection, and sources of most recently misused prescription drugs.¹⁰ Detailed data collection methods, survey design and sampling, and response validity have been reported elsewhere.¹¹

Since this study focused on STIs among young adults, it included information on participants aged 18–25 years. The total sample size for the study was 55,690 over a four-year period with an average annual sample of 13,923 individuals aged 18–25 years, which constituted about one-quarter (24.7%) of the total 226,632 respondents across 2015–2018 NSDUH. Survey weights were used to account for the NSDUH's complex survey design, and the nationally representative weighted pool includes 34,209,391 young adults. The sampling weights were calculated based on the stratified, five-stage design of NSDUH. Using a generalized exponential model (GEM) technique, the study's final analysis weights were derived. Detailed description of the sample weighting procedure can be found elsewhere.¹²

Dependent variable.

The outcome variable for this study was defined as having an STI in the past year. Respondents were asked if they had suffered from any STI in the year preceding the survey. The response was a dichotomous variable (yes/no).

Independent variables.

Based on previous literature, various independent variables were included in the study. They included demographic variables such as age (18–21, 22–25 years), gender (male, female), race/ethnicity (non-Hispanic White, non-Hispanic African American, non-Hispanic other, Hispanic), education (less than high school, high school, some college/associate degree, college or higher), marital status (married, never-married, and divorced/widowed/separated), employment status [full-time/part-time employed, unemployed/other (disabled, keeping house full-time, in school/training, retired, does not have a job for some other reason)], annual household income (<\$20,000, \$20,000–\$49,999, \$50,000–\$74,999, \$75,000). Other variables included residence (non-metro, metro), health insurance status (yes, no), physical health (bad, good), history of delinquency (yes, no), any illicit drug use in the past year (yes, no). NSDUH asks about the participants' use and non-use of various drugs (e.g., marijuana, heroin, cocaine, hallucinogens, inhalants, methamphetamine, and prescription pain relievers, tranquilizers, stimulants, and sedatives). A positive response to use of any illicit drugs, (e.g., cocaine, hallucinogens, heroin, inhalers, methamphetamine, and pain relievers, sedatives, stimulants, and tranquilizers not prescribed by a doctor), was defined as illicit drug use in the past year.¹³ History of delinquency in the past 12 months was generated by combining

two items: the number of times the respondent “stole or tried to steal anything worth >\$50” and “attacked someone with the intent to hurt them,” (coded 0 = none or 1 = any).¹⁴ However, we could not distinguish the temporal ordering of independent and dependent variables due to the lack of information.

Data analysis.

Survey-weighted descriptive, bivariate analyses and multivariable logistic regression were performed to assess the variables of interest. For descriptive statistics, we measured the frequency and percentage of respondents who had an STI in the past year. Bivariate analysis was performed using the unadjusted logistic regression models with STI as the outcome variable and other covariates as the exposure variables. Survey-weighted logistic regression model was used for multivariable analysis of factors associated with STI among the US young adult population. All analyses were performed with Stata 16.1.¹⁵

Results

Characteristics of the respondents with and without STIs

Overall, the sample comprised participants who were 22–25 years old (50.4%), male (50.2%), non-Hispanic White (54.3%), never been married (89.2%), resided in a metro area (87.3%), and had health insurance (86.0%); while, 41.0% had some college/associate degree, 67.7% had full-time/part-time employment, and 32.2% had an annual household income of \$20,000–\$49,999 (Table 1).

About 3.6% of the respondents reported having an STI in the past year during the study period. Of those who had an STI in the past year, the majority were 22–25 years old (55.0%), female (68.1%), non-Hispanic White (50.8%), never been married (90.5%), resided in a metro area (87.8%), and had health insurance (86.5%); while, 45.7% had some college/associate degree, 71.1% had full-time/part-time employment, and 34.3% had an annual household income of \$20,000–\$49,999 (Table 1).

Among the respondents with no STI, the majority were 22–25 years old (50.3%), male (50.8%), non-Hispanic White (54.6%), never been married (89.1%), resided in a metro area (87.3%), and had health insurance (86.0%); whereas, 41.0% had some college/associate degree, 67.6% had full-time/part-time employment, and 32.1% had an annual household income of \$20,000–\$49,999 (Table 1).

About 65.8% of the respondents with an STI reported illicit drug in the past year compared to 37.4% of respondents without an STI; while 9.8% of the respondents with an STI reported having history of delinquency in the past year compared to only 3.4% of the respondents without STI (Table 1).

Results of bivariate analysis

In bivariate analysis, respondents with a history of illicit drug use (unadjusted odds ratio [OR]:3.22, 95% confidence interval [CI]:2.88–3.59) versus no history of illicit drug use in the past year; a history of delinquency (OR:3.05, 95% CI:2.50–3.73) versus no history of delinquency in the past year, had higher odds of reporting an STI (Table 2). Moreover, being

22–25 years compared to 18–21 years old was associated with higher odds of reporting an STI, (OR:1.21, 95% CI:1.08–1.35). In addition, higher odds of STIs were found among men compared to women (OR:2.20, 95% CI:1.89–2.55); non-Hispanic African American compared to non-Hispanic White (OR:1.83, 95% CI:1.62–2.06); widowed/separated/divorced (OR:2.86, 95% CI:2.04–4.03), never been married (OR:1.46, 95% CI:1.23–1.73) compared to married; full-time/part-time employed (OR:1.18, 95% CI:1.06–1.32) compared to unemployed/other. Furthermore, lower odds of STIs were associated with respondents who were non-Hispanic other compared to non-Hispanic White (OR:0.83, 95% CI:0.69–0.99); with annual household income of \$50,000–\$74,999 (OR:0.71, 95% CI:0.60–0.85) and \$75,000 (OR:0.72, 95% CI:0.61–0.84) compared to respondents with annual household income <\$20,000, and those who reported good physical health compared to those who had bad physical health (OR:0.75, 95% CI:0.62–0.90) (Table 2).

Multivariable analysis

Survey-weighted multivariable logistic regression results showed that respondents who had a history of illicit drug use (adjusted odds ratio [aOR]:3.10, 95% CI:2.77–3.47) and delinquency (aOR:2.31, 95% CI:1.89–2.83) had higher odds of having STIs compared with respondents with no history of illicit drug use and delinquency in the past year, respectively (Table 2).

Higher odds of having STIs were associated with 22–25 years of age compared to 18–21 (aOR:1.26, 95% CI:1.12–1.42); men compared to women (aOR:2.44, 95% CI:2.11–2.82); African American compared to non-Hispanic White (aOR:1.77, 95% CI:1.55–2.02); widowed/separated/divorced (aOR:1.93, 95% CI:1.36–2.75) and never been married (aOR:1.29, 95% CI:1.07–1.55) compared to married; and fulltime/part-time employed (aOR:1.17, 95% CI:1.04–1.31) compared to unemployed/other. In contrast, lower odds of having STIs included having an annual household income of \$50,000–\$74,999 (aOR:0.80, 95% CI:0.67–0.97), and \$75,000 (aOR:0.84, 95% CI:0.70–0.99) compared to an annual household income <\$20,000.

While good physical health was associated with lower odds of STI in bivariate analysis, it lost its significance in multivariable analysis. All covariates were consistently significant across both bivariate and multivariable analyses except for physical health. It signifies the stable association between the covariates and outcome variable even after controlling for other covariates.

Discussion

This study examined associated factors of STIs among young adults (18–25 years) in the US using data from a nationally representative sample. Findings reveal the extent to which risk factors vary across sociodemographic markers and behavioral predictors. Overall, findings demonstrate that youth, aged 22–24 years, men, unmarried and widowed/separated/divorced, and those full-time/part-time employed disproportionately reported a one-year history of STI diagnosis. Additionally, respondents with a history of illicit drug use and delinquency were more likely to present with STIs. These findings are supported by other national surveillance studies.^{5,16,17}

The study findings on the increased likelihood of STIs among African Americans concur with literature that indicates that they have the highest rates compared to other racial groups.^{5,16,18,19} In addition, literature highlights the juxtaposition of such high risk with sexual health (unaware of their STI status and limited access to STI education) and socioeconomic challenges (quality healthcare and inadequate housing) that exacerbate the problems with linkage to care and follow-up.^{5,16,20} Even though this study did not examine the association between socioeconomic and sexual health challenges with STI risk, future studies should examine such an interaction and include other multifaceted issues such as social construction of sexual partners, including sexual networks, and structural barriers.

Study findings indicate that respondents who were employed (full-time/part-time) had higher odds for STIs compared to those unemployed/with other type of employment. Study findings are contrary to previous findings that have found employment as a protective factor against STIs.²¹ Further, some studies affirm that compared to the employed, those that are unemployed tend to be at higher odds of acquiring STIs.²⁰ Future studies should investigate further the factors associated with the increased odds of STI acquisition among those who are employed. To motivate youths' interest in sexual health including STI prevention, it is critical to address hopelessness associated with poverty by focusing on social determinants such as income inequality, access to education, peer and family support, and safe neighborhoods within the larger context of preventive strategies

Regarding marital status, youth who reported as unmarried or widowed/separated/divorced were more likely to present with STIs compared to their married counterparts. This finding is supported by previous literature that indicates that unmarried individuals were more likely to report having concurrent and non-monogamous partners.²³ Such findings support surveillance data that claims that having multiple concurrent sexual partners is a risk factor for STIs.^{5,16} However, other studies did not find a significant association between marital status and increased likelihood of STIs.¹⁷

Men had a higher likelihood of reporting STIs compared to women. This finding contradicts previous research that indicates women are more likely to be infected with STIs compared to men.^{16,19,24} We speculate that the increased likelihood of men presenting with STIs could be related to sexual orientation in relation to MSM. Surveillance data indicates that sexual minorities such as MSM present with the highest rates of STIs, including HIV, in comparison to other sexual orientations.^{5,16}

Previous research supports the current finding that illicit drug use behavior is associated with STIs.^{16,25} Use of illicit drugs has been found to impair judgement and contribute to risky sexual behavior, such as condomless sex and multiple concurrent partners, which increases likelihood of STIs.⁸ Other studies have found that sexual intercourse is used in exchange for illicit drugs for those who cannot afford to purchase drugs.²⁵ Future studies can examine the extent to which illicit drug use is being used for self-medication against depressive symptoms, a risk factor for poverty and other socio-cultural and economic factors.^{26,27} Additionally, these findings support the development of sexual risk reduction campaigns among all illicit drug users to minimize transmission via sexual and parenteral contact.⁸

Respondents were asked about delinquent behavior which was operationalized in the survey as stealing or causing harm to someone. Study findings indicate that participants who exhibited delinquent behavior were likely to have STIs. These findings are supported by previous research that found that delinquent behavior during adolescence and childhood, coupled by peer rejection and association with delinquent peers, were predictors for risky sexual behaviors, defined by four indicators: age at first intercourse, diagnosis with an STI, number of sexual partners in last year, and number of sexual partners in the lifetime, across adolescence, young adulthood and adulthood, particularly among women.²⁸ However, our findings contradict other studies that did not find that delinquency predicts STI transmission risk among youth.²⁹ Future studies should explore the extent to which other societal and environmental factors influence sexual risk behaviors among delinquent youth.³⁰

Limitations.

Even though the study utilized a national representative sample, there are some limitations. The nature of a cross-sectional secondary data analysis limits establishing causal associations between the behavioral and sociodemographic factors and their influence on STIs. Furthermore, our measures for STI and illicit drug use were based on self-report as there was no access to objective information such as biological measures offered through diagnostic STI testing or level of drugs in the blood. Also, given the reliance on self-reported information for the data, participants could have underreported or over-reported their behaviors based on their perception of socially acceptable responses. However, NSDUH uses audio computer-assisted self-interview (ACASI) for reporting illicit drug uses and STI diagnoses.³¹ One study conducted among STI clinic attendees suggested that ACASI was devoid of social desirability bias in comparison to traditional face-to-face interviewing.³² We also calculated the new cases among the 15–24-year-old US population in 2018 reported by CDC for the three STIs, e.g., chlamydia, gonorrhea, and syphilis, were 1,344,116,³³ which constitute 3.1% of the US population aged 15–24 years (42,342,000) in 2018.³⁴ In our analysis, we found that 3.4% young adults (18–25 years) reported having STIs in 2018. Given that this study sample is different from national estimates (18–25 vs. 15–24), other STIs are excluded in the national estimate, and the study population for this study excluded institutionalized populations, we can surmise that the reported annual incidence of STIs in NSDUH 2018 was fairly close.

Conclusions

In summary, these findings provide a broader context in understanding factors that influence adolescent sexual health vis-à-vis STIs. The implications of the study to the field and the preventive and treatment guidelines are such that there is a need for a concerted effort that employs a multidimensional approach going beyond the individual level factors and examines social, cultural, and economic factors affecting access to adequate and targeted STI and drug use prevention services. Particularly, a key focus on confidentiality issues when youth access sexual health care and treatment is paramount due to the nature of matters such as drug use, who has access to health insurance information due to youth being on their parent's insurance and stigma/discrimination associated with sexual orientation. In addition, it is necessary to rethink socioeconomic status such as employment whereby unemployment

has previously played a significant role in increasing the odds of STI acquisition, but study findings show that those who are employed are also at risk. Furthermore, given the increase in STI rates among MSM, more focus on men's health among youth is critical.

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Table 1. Characteristics of young adult US respondents with sexually transmitted infections in previous year: National Survey on Drug Use and Health (NSDUH) 2015-2018, (N = 55,287)

Characteristics	Total N=55,287 %	Respondents with an STI N = 1,977 (3.6%) %	Respondents with no STI N = 53,310 (96.4%) %
Age, in years			
18–21	49.6	45.0	49.7
22–25	50.4	55.0	50.3
Gender			
Female	49.8	68.1	49.2
Male	50.2	31.9	50.8
Race/ethnicity			
Non-Hispanic White	54.3	50.8	54.6
Non-Hispanic African American	14.1	23.3	13.7
Non-Hispanic Other	9.7	7.5	9.8
Hispanic	21.9	18.4	21.9
Education			
Less than high school	14.0	12.5	13.9
High school	30.6	28.0	30.7
Some college/associate degree	41.0	45.7	41.0
College graduate or higher	14.4	13.8	14.4
Marital status			
Married	9.3	6.5	9.4
Widowed/separated/divorced	1.6	3.0	1.5
Never been married	89.2	90.5	89.1
Employment status			
Unemployed/other	32.3	28.9	32.4
Full-time/part-time	67.7	71.1	67.6
Annual household income			
<\$20,000	27.7	32.0	27.5
\$20,000–\$49,999	32.2	34.3	32.1
\$50,000–\$74,999	13.8	11.6	14.0

Characteristics	Total N=55,287 %	Respondents with an STI N = 1,977 (3.6%) %	Respondents with no STI N = 53,310 (96.4%) %
\$75,000	26.3	22.1	26.4
Residence			
Non-metro	12.7	12.2	12.7
Metro	87.3	87.8	87.3
Health insurance			
No	14.0	13.5	14.0
Yes	86.0	86.5	86.0
Physical health			
Bad	6.9	8.9	6.8
Good	93.1	91.1	93.2
History of delinquency			
No	96.3	90.2	96.6
Yes	3.7	9.8	3.4
Illegal drug use last year			
No	61.6	34.2	62.6
Yes	38.4	65.8	37.4
Year			
2018	24.7	25.1	24.7
2017	24.9	23.9	24.9
2016	25.1	25.1	25.1
2015	25.3	25.9	25.3

STI: sexually transmitted infection.

Survey-weighted logistic regression model of sexually transmitted infections among young adult population in the United States (N = 54,366).

Table 2.

Characteristics	Unadjusted odds ratio	95% CI	Adjusted odds ratio	95% CI
Age, in years				
18–21	1.00	–	1.00	–
22–25	1.21**	1.08–1.35	1.26***	1.12–1.42
Gender				
Female	1.00	–	1.00	–
Male	2.20***	1.89–2.55	2.44***	2.11–2.82
Race/ethnicity				
Non-Hispanic White	1.00	–	1.00	–
Non-Hispanic African American	1.83***	1.62–2.06	1.77***	1.55–2.02
Non-Hispanic Other	0.83*	0.69–0.99	0.91	0.74–1.12
Hispanic	0.90	0.73–1.11	0.95	0.76–1.18
Education				
Less than high school	1.00	–	1.00	–
High school	0.94	0.70–1.26	1.10	0.79–1.53
Some college/associate degree	0.96	0.77–1.19	1.08	0.85–1.38
College graduate or higher	1.17	0.96–1.42	1.23	0.98–1.53
Marital status				
Married	1.00	–	1.00	–
Widowed/separated/divorced	2.86***	2.04–4.03	1.93***	1.36–2.75
Never been married	1.46***	1.23–1.73	1.29**	1.07–1.55
Employment status				
Unemployed/other	1.00	–	1.00	–
Full-time/part-time	1.18**	1.06–1.32	1.17**	1.04–1.31
Annual household income				
<\$20,000	1.00	–	1.00	–
\$20,000–\$49,999	0.92	0.79–1.06	0.99	0.85–1.15
\$50,000–\$74,999	0.71***	0.60–0.85	0.80*	0.67–0.97

Characteristics	Unadjusted odds ratio	95% CI	Adjusted odds ratio	95% CI
\$75,000	0.72 ***	0.61–0.84	0.84 *	0.70–0.99
Residence				
Non-metro	1.00	–	1.00	–
Metro	0.95	0.81–1.12	0.97	0.81–1.17
Health insurance				
No	1.00	–	1.00	–
Yes	1.04	0.86–1.25	1.04	0.86–1.26
Physical health				
Bad	1.00	–	1.00	–
Good	0.75 **	0.62–0.90	0.93	0.76–1.13
History of delinquency				
No	1.00	–	1.00	–
Yes	3.05 ***	2.50–3.73	2.31 ***	1.89–2.83
Illegal drug use last year				
No	1.00	–	1.00	–
Yes	3.22 ***	2.88–3.59	3.10 ***	2.77–3.47
Year				
2018	1.00	–	1.00	–
2017	0.94	0.80–1.12	0.95	0.79–1.14
2016	0.99	0.84–1.15	1.01	0.85–1.19
2015	1.00	0.86–1.18	1.00	0.85–1.19

* p-Value<0.05;

** p-Value<0.01;

*** p-Value<0.001.