EPIDEMIOLOGY & RISK FACTORS

Association Between Marijuana Use and Sexual Frequency in the United States: A Population-Based Study

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ABSTRACT

Background: Marijuana use is increasingly prevalent in the United States. Effects of marijuana use on sexual function are unclear, with contradictory reports of enhancement and detriment existing.

Aim: To elucidate whether a relation between marijuana use and sexual frequency exists using a nationally representative sample of reproductive-age men and women.

Methods: We analyzed data from cycle 6 (2002), cycle 7 (2006−2010), and continuous survey (2011−2015) administrations of the National Survey of Family Growth, a nationally representative cross-sectional survey. We used a multivariable model, controlling for demographic, socioeconomic, and anthropographic characteristics, to evaluate whether a relationship between marijuana use and sexual frequency exists.

Outcomes: Sexual frequency within the 4 weeks preceding survey administration related to marijuana use and frequency in the year preceding survey administration.

Results: The results of 28,176 women (average age = 29.9 years) and 22,943 men (average age = 29.5) were analyzed. More than 60% of men and women were Caucasian, and 76.1% of men and 80.4% of women reported at least a high school education. After adjustment, female monthly (incidence rate ratio [IRR] = 1.34, 95% CI = 1.07−1.68, P = .012), weekly (IRR = 1.36, 95% CI = 1.15−1.60, P < .001), and daily (IRR = 1.16, 95% CI = 1.01−1.32, P = .035) marijuana users had significantly higher sexual frequency compared with never users. Male weekly (IRR = 1.22, 95% CI = 1.06−1.41, P = .006) and daily (IRR = 1.36, 95% CI = 1.21−1.53, P < .001) users had significantly higher sexual frequency compared with never users. An overall trend for men (IRR = 1.08, 95% CI = 1.05−1.11, P < .001) and women (IRR = 1.07, 95% CI = 1.04−1.10, P < .001) was identified showing that higher marijuana use was associated with increased coital frequency.

Clinical Implications: Marijuana use is independently associated with increased sexual frequency and does not appear to impair sexual function.

Strengths and Limitations: Our study used a large well-controlled cohort and clearly defined end points to describe a novel association between marijuana use and sexual frequency. However, survey responses were self-reported and represent participants only at a specific point in time. Participants who did not answer questions related to marijuana use and sexual frequency were excluded.

Conclusion: A positive association between marijuana use and sexual frequency is seen in men and women across all demographic groups. Although reassuring, the effects of marijuana use on sexual function warrant further study. **Sun AJ, Eisenberg ML. Association Between Marijuana Use and Sexual Frequency in the United States: A Population-Based Study. J Sex Med 2017;14:1342−1347.**

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Key Words: Sexual Behavior; Cannabis; Sexual and Gender Disorders; Marijuana Abuse

INTRODUCTION

The association between sexual function and marijuana use has been a subject of debate. In the United States, it is estimated that there are more than 22 million current users of marijuana.[1] Moreover, in the past 21 years, 29 states have legalized marijuana for recreational or medical purposes. Although use is common, sparse data exist on the impact of marijuana use on sexual

function. Contradictory reports of enhancement and detriment to sexual functioning have arisen.[2] A review of subjective assessments of marijuana users reflects this discrepancy, with 51.3% reporting increased sexual arousal compared with 26.4% reporting a decrease.[3] It should be noted that 73.5% in the same studies believed marijuana use increased sexual pleasure. Although these studies appear to suggest increased sexual desire and pleasure, a correlation between marijuana use and erectile dysfunction also has been described.[2,4] A dose-dependent model for marijuana use could help explain these findings, with two studies suggesting that small amounts of marijuana can enhance sexual function, whereas larger quantities can have an inhibitory effect.[5,6]

Although there has been much interest in the effects of cannabinoids on sexuality, there is a paucity of data that provide a direct link to human sexual activity. As outlined previously, current research has almost exclusively been based on subjective responses of cannabis users.[4] To obtain a more comprehensive view on this issue, we evaluated nationally representative survey data from 2002 to 2015 of reproductive-age men and women in the United States. Given the prevalence of use of marijuana in the United States and conflicting data in the literature, our goal was to determine the association between marijuana use and sexual frequency.

METHODS

Study Population

We analyzed data from cycle 6 (2002), cycle 7 (2006—2010), and continuous survey (2011—2015) administrations of the National Survey of Family Growth (NSFG). The NSFG is conducted by the National Center for Health Statistics and uses a multistage probability-based model to sample US men and women 15 to 44 years old to create reliable national-level data pertaining to family structures, sexual practices, and childbearing. Respondents were recruited from screening interviews in selected households, and the survey was administered using laptop computers. Within each household, only a single member of the family was sampled. Subjects are not followed over time. Oversampling of African-Americans, Hispanics, and teens was done to achieve adequate sampling for meaningful comparisons between groups. All respondents provided informed consent, with the exception of those younger than 18 years, in which case parental permission was granted. Response rates for women and men ranged from 71.2% to 80% and 67.1% to 78%, respectively. Institutional review board review is not required for secondary analysis of a de-identified national dataset.

Description of Variables

Outcome

Sexual frequency was determined by asking surveyed men, "Now please think about the past 4 weeks. How many times have you had sexual intercourse with a woman in the past 4 weeks?" For women, surveyors asked, "Now please think about the past 4 weeks. How many times have you had sexual intercourse with a man in the past 4 weeks?" Homosexual encounters were excluded based on the phrasing of these questions. Penetrative sex was implied in these questions because sexual intercourse was previously explained in the survey as "sometimes this is called making love, having sex, or going all the way." Respondents who declined to answer this question were excluded from the study.

Exposure

Marijuana use was assessed by asking respondents, "During the past 12 months, how often have you smoked marijuana?" Responses were listed as never, once or twice during a year, several times during the year, approximately once a month, approximately once a week, and at least once a day. For the purposes of this study, we narrowed this to never, less than once a month, monthly, weekly, and daily. These categories were assessed for association with sexual frequency using univariate and multivariable analyses.

Other Variables

Demographic, socioeconomic, and anthropomorphic data were analyzed as potential confounders and to confirm that any correlation between sexual frequency and marijuana use was consistent across our population. Variables included in the multivariable analysis were age (continuous), marital status (categorical: married, cohabitating, not living together), body mass index (continuous), children (dichotomous: yes or no), poverty status (percentile relative to poverty line: <150th, 150—300th, >300th) , ethnicity (categorical: white, black, Hispanic, other), education level (categorical: less than high school, high school or graduate equivalency diploma, some college, at least college graduate), current overall health (categorical: excellent, very good, good, fair, poor), current pregnancy status (dichotomous: yes or no, only for women), and religion (categorical: Catholic, Protestant, none, other). These variables were selected based on variables known in the literature to be associated with coital frequency in our age groups. All responses are self-reported by participants (eg, overall health was assessed by asking participants, "In general, how is your health? Would you say it is …?").

Data Analysis

We developed our multivariate model to assess sexual frequency in American adults 25 to 45 years old a priori based on existing literature. We did not select predictors for inclusion based on bi-variable screening because important confounding can be missed using this methodology.[7] All analyses accounted for the complex survey design of the NSFG. The α value was set at 0.05. We first assessed for the association between sexual frequency and marijuana using a univariate analysis. However, analysis of sexual frequency showed this variable was skewed and over-dispersed (ie, variance > mean). Negative binomial regression is appropriate in cases with over-dispersed count data,[8] as is

the case with coital frequency. We calculated incidence rate ratios (IRRs) with CIs for the previously described levels of marijuana use and how they relate to sexual frequency. We performed a stratified analysis based on covariates to examine for the presence of interaction. Specifically, this was done for the variables age (<35 or >35 years), marital status, children, ethnicity, education level, and income. All tests were two-sided and a P value less than or equal to .05 was considered statistically significant. All analyses accounted for the complex survey design of the NSFG. All analyses were performed using STATA 10 (StataCorp LP, College Station, TX, USA).

RESULTS

The results of 28,176 women (average age = 29.9 years) and 22,943 men (average age = 29.5 years) were available for analysis. More than 60% of the participants identified as Caucasian, and 76.1% of men and 80.4% of women reported at least a high school education (Table 1). In all, 24.5% of men and 14.5% of women reported ever using marijuana.

A positive association between sexual frequency and marijuana was observed in men and women (Table 2). For example, women who reported no marijuana use during the past 12 months reported having sex 6.0 times on average during the past 4 weeks compared with 7.1 times for women who reported daily use. Similarly, male daily marijuana users reported sexual frequency as 6.9 times on average in the previous 4 weeks compared with 5.6 times in non-users. Moreover, this association was stable over all cycles of the NSFG (ie, 2002 to 2015).

This positive association between marijuana use and sexual frequency remained after adjustment that controlled for multiple socioeconomic and anthropomorphic factors (Table 3). For women, monthly (IRR = 1.34, 95% CI = 1.07−1.68, P = .012), weekly (IRR = 1.36, 95% CI = 1.15−1.60, P < .001), and daily (IRR = 1.16, 95% CI = 1.01−1.32, P = .035) marijuana users reported significantly higher sexual frequency compared with never users. For men, a significantly higher sexual frequency was reported for weekly (IRR = 1.22, 95% CI = 1.06−1.41, P = .006) and daily (IRR = 1.36, 95% CI = 1.21−1.53, P < .001) users compared with never users. The overall trend for men (IRR = 1.08, 95% CI = 1.05−1.11, P < .001) and women (IRR = 1.07, 95% CI = 1.04−1.10, P < .001) associated higher marijuana use with increased coital frequency in men and women.

After establishing this overall trend for the entire cohort, we investigated whether this relation was present throughout the demographic groups evaluated in this study (Table 4). Our analyses did not identify any interactions based on demographic characteristics, with a similar association between marijuana and sexual frequency identified in all sub-analyses (eg, age, marital status, children, race and ethnicity, religion, education, poverty

Table 1. Study population

	Men (n = 22,943)	Women (n = 28,176)
Age (y)		
Mean	29.5	29.9
15−24	33.5%	31.5%
25−29	16.8%	16.6%
30−34	16.4%	16.8%
35−39	16.4%	17.1%
40−44	17.0%	18.0%
BMI (kg/m²)		
Mean	27.6	27.1
<19	0.9%	2.0%
18−25	30.0%	41.6%
25−30	38.4%	26.3%
30−35	20.4%	15.3%
≥35	10.3%	14.9%
Race		
Caucasian	61.8%	61.5%
African-American	12.5%	14.2%
Hispanic	19.2%	6.5%
Other	6.6%	17.8%
Education		
Less than high school	23.9%	19.6%
High school or GED	48.2%	46.3%
Some college	21.2%	25.8%
At least college graduate	6.7%	8.2%
Poverty level percentile		
≥300	44.6%	38.0%
150−299	28.3%	27.4%
<150	27.2%	34.7%
Children		
No	54.3%	42.7%
Yes	45.8%	57.3%
Marital status		
Married	39.1%	42.6%
Living with partner	12.2%	12.4%
Not living with partner	48.8%	45.0%
Overall health		
Excellent	30.9%	29.2%
Very good	41.2%	40.4%
Good	22.4%	23.5%
Fair	4.7%	5.9%
Poor	0.8%	1.0%
Religion		
None	23.4%	17.6%
Catholic	24.9%	25.1%
Protestant	43.2%	49.6%
Other	8.6%	7.7%
Currently pregnant		
No	—	95.7%
Yes	—	4.3%

BMI = body mass index; GED = graduate equivalency diploma.

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Table 2. Sexual frequency and marijuana use

		Sexual frequency*				
	Marijuana use	2002	2006	2011	2013	Total
Men	Never	5.6	5.3	5.9	5.7	5.6
	<1 time/mo	5.5	5.7	5.0	5.8	5.5
	Monthly	5.1	6.2	6.7	5.1	5.7
	Weekly	5.6	6.7	5.3	6.4	6.0
	Daily	6.9	6.3	7.0	7.2	6.9
Women	Never	6.4	6.0	5.8	5.8	6.0
	<1 time/mo	6.2	5.8	6.2	6.0	6.0
	Monthly	6.5	7.6	7.8	5.0	6.7
	Weekly	8.8	7.1	7.9	5.7	7.3
	Daily	7.6	7.6	6.9	6.7	7.1

*Number of sexual encounters during the previous 4 weeks.

level), although statistical significance was not reached in a minority of groupings. Inclusion of alcohol use or cocaine use did not meaningfully change the point estimates or interpretation.

DISCUSSION

In the present study, we identified a positive association between marijuana use and sexual frequency among reproductive-age men and women in the United States. Importantly, the association was present across all demographic strata (age, race and ethnicity, educational attainment, etc). Moreover, the findings appear constant during the past 14 years for which data are available. Previous research has suggested that low doses of marijuana are stimulating but that higher doses are inhibitory for sexual function.[5,6] However, these studies looked at the dose used in individual settings, rather than frequency of use. In contrast, the present study found that higher frequency of marijuana use is associated with increased sexual frequency.

Table 3. Multivariable* analysis of sexual frequency and marijuana use

	Marijuana use	Sexual frequency IRR	95% CI	P value
Men	Never	Reference	—	—
	<1 time/mo	1.09	1.00–1.18	.059
	Monthly	1.20	0.99–1.45	.066
	Weekly	1.22	1.06–1.41	.006
	Daily	1.36	1.21–1.53	<.001
	Overall trend	1.08	1.05–1.11	<.001
Women	Never	Reference	—	—
	<1 time/mo	1.14	1.04–1.26	.005
	Monthly	1.34	1.07–1.68	.012
	Weekly	1.36	1.15–1.60	<.001
	Daily	1.16	1.01–1.32	.035
	Overall trend	1.07	1.04–1.10	<.001

IRR = incidence rate ratio.
*Adjusted for age, marital status, body mass index, children, partner age, income, race, education, health, current pregnancy, and religion.

To our knowledge, we are the first to report an increase in sexual frequency linked to marijuana use. The strengths of our study include the use of a large well-controlled cohort and clearly defined end points. However, the NSFG is a cross-sectional survey that represents patients only at a single point in time. Marijuana use and sexual frequency can vary over time, as can other variables such as education level, income, and marital status. All data are self-reported and at risk for recall bias, exaggeration, or other misrepresentation by certain participants. In addition, respondents' partners were not surveyed. This would have helped control for any distorted perceptions of sex related to marijuana use. Potentially representing a unique group, non-respondents to questions about marijuana use or sexual frequency were excluded from our analysis. Individuals who engage in marijuana use, or would be open about use, might be more psychologically disinhibited in general than those who are not. This also might be reflected in their sex life, adding a potential confounder. Related to this, psychiatric diagnoses were not queried and could not be assessed. Importantly, alcohol and/or cocaine use did not materially change our conclusions. Because reproductive-age men and women composed the survey respondents, the applicability of our findings to other age groups is uncertain. Given the phrasing of the questions, we could examine only heterosexual sexual frequency. We caution that our study does not look at specific effects of marijuana on sexual function, and immediate clinical applicability is limited.

Despite these limitations, the findings of our study have significant implications. Marijuana use in the United States has steadily increased during the past two decades,[9] and, with increasing legalization and social acceptance, this trend is likely to continue. Indeed, in 2016, it was estimated that 13% of US adults were using marijuana compared with 7% in 2013.[10] Given the increasing use, the effects of marijuana use on adult health and function are increasingly relevant. Previous investigations into marijuana and health found improved or minimal impact on pulmonary function in marijuana smokers followed for more than 20 years.[11] Analyses of National Health and Nutrition Examination Survey (NHANES) data suggested marijuana users display improved insulin resistance, lower fasting insulin levels, smaller waist circumference, and lower prevalence of diabetes.[12,13] Given the association of marijuana with favorable health profiles, one could surmise no impact, or even benefit, from marijuana use on sexual function. Indeed, some investigators have proposed marijuana use as a potential treatment for sexual dysfunction.[4,14] However, the effects of marijuana use can be harmful. As the prevalence of marijuana use in pregnant women increased 62% from 2002 to 2014, concerns about potential deleterious effects to the child have surfaced.[15,16] In addition, Gundersen et al[17] reported that men who smoked more than once per week had significantly lower sperm counts compared with non-users.

The biologic underpinnings of how marijuana modulates sexuality are not fully understood, but the presence of

Table 4. Overall trends between sexual frequency and marijuana use across demographic groups

	Men			Women		
	Sexual frequency IRR	95% CI	P value	Sexual frequency IRR	95% CI	P value
Age (y)						
<35	1.08	1.03–1.14	.004	1.07	0.98–1.15	.114
>35	1.08	1.05–1.11	<.001	1.07	1.03–1.15	<.001
Marital status						
Married	1.08	1.03–1.13	.002	1.00	0.96–1.15	.985
Living with partner	1.06	1.02–1.10	.003	1.04	1.00–1.15	.05
Not living with partner	1.11	1.06–1.15	<.001	1.12	1.06–1.15	<.001
Children						
No	1.08	1.05–1.12	<.001	1.07	1.02–1.15	.003
Yes	1.08	1.04–1.12	<.001	1.07	1.02–1.15	.004
Ethnicity						
Caucasian	1.07	1.04–1.11	<.001	1.05	1.01–1.15	.01
African-American	1.11	1.06–1.16	<.001	1.07	1.01–1.15	.023
Hispanic	1.05	0.99–1.11	.122	1.05	0.93–1.15	.457
Other	1.11	0.96–1.27	.148	1.11	1.05–2.15	<.001
Religion						
None	1.09	1.04–1.13	<.001	1.06	1.00–1.15	.047
Catholic	1.06	0.99–1.13	.109	1.06	1.00–1.15	.059
Protestant	1.09	1.05–1.13	<.001	1.08	1.03–1.15	.001
Other	1.13	1.02–1.26	.018	1.04	0.94–2.15	.434
Education						
Less than high school	1.12	1.05–1.19	.001	1.16	1.08–1.15	<.001
High school or GED	1.07	1.04–1.11	<.001	1.06	1.02–1.15	.003
Some college	1.08	1.03–1.13	.002	1.07	1.00–1.15	.062
At least college graduate	1.07	0.96–1.20	.226	1.07	0.94–2.15	.294
Poverty level percentile						
≥300	1.06	1.02–1.10	.005	1.06	1.00–1.15	.057
150–299	1.05	1.00–1.09	.04	1.06	1.01–0.15	.011
<150	1.16	1.10–1.21	<.001	1.08	1.03–2.15	.002

GED = graduate equivalency diploma; IRR = incidence rate ratio.

cannabinoid receptors in regions of the brain known to be active during sexual activity have been documented.[2,4] Indeed, in a non-copulating rat model, injection of anandamide (an endocannabinoid) induced sexual behavior in 50% of the population.[18] In humans, use of functional magnetic resonance imaging documented increased activation of the right nucleus accumbens (involved in translating motivational state into actions) in response to erotic images after cannabis use when serum prolactin was not increased (a potential effect of marijuana use). Nucleus accumbens activation in response to visual erotic stimuli has been linked to coital frequency.[19,20]

In humans, sex is not only a means to procreation but serves as an important source of physical pleasure and expression of emotional intimacy. Perhaps reflecting the importance of sex to our species, previous studies have linked sexual activity to overall health[21] and cardiovascular disease.[22–24] Given these findings, research into predictors of sexual frequency has been an area of interest. Prior work using a similar cohort to the present study found that height, less than a high school education, and younger age in men and being married in women were predictors of increased sexual activity.[25] The present report suggests marijuana use also is associated with sexual frequency. Overall, additional research is needed to further define this association and address critical questions regarding marijuana use and sexual function (eg, erectile function, ejaculatory time, orgasm frequency and intensity, vaginal lubrication), and fertility.

CONCLUSIONS

In the present study, we found marijuana use to be associated with increased sexual frequency. An overall trend of an increase in sexual frequency with increasing levels of marijuana use was found in men and women and across all demographic groups of our cohort. Although the present study does not support causation between marijuana use and sexual frequency, the data imply that regular marijuana use will not impair sexual function or desire. Importantly, the association of marijuana use and sexual function warrants further study.

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