

# The Role of Marijuana in Sexual Assault

***Anthony S. Floyd, PhD, Research Scientist***

## Highlights

### What we know:

- Sexual assault is underreported, and substance use during sexual assault is further underreported.
- Marijuana is the most common drug reported (other than alcohol) when drugs are present in sexual assault.
- Marijuana is often used together with alcohol in sexual assault.
- Marijuana and alcohol combined may have a greater effect on cognitive functioning than either substance alone. Cognitive functioning includes a person's ability to recognize and react to risky situations.

### Where there are gaps in research knowledge:

- College students have been well studied in large surveys, but sexual assault among other groups has much less evidence.
- Many studies combine marijuana with other drugs which makes the impact of marijuana alone unclear.
- Studies that do include data on marijuana use tend to describe past use history of use, but often exclude recent use, or use at the time of the sexual assault.
- Research using objective methods, like blood testing, have been inconsistent in the way the tests are conducted and do not always test for the presence of marijuana in the time period, making it difficult to tell the difference between past use and current use.
- Research related to marijuana's potency and the effect on cognitive function needs to be updated in light of the higher potency products now available in states with legalized marijuana.

### Needs for future research:

Newer research is needed to systematically improve research methodology, such that data collected clearly distinguishes marijuana from alcohol and other drugs, and makes use of objective measures, like blood testing, in a manner that is most sensitive to time periods of current use.

## Summary

Prior studies have documented that alcohol is the most common substance used in cases of sexual assault where victims are incapacitated (unwanted sexual contact occurring when a victim is unable to provide consent or stop what is happening). Marijuana has been cited as the second most common substance used (Slaughter 2000; Lawyer et al. 2010). Additionally, peak marijuana use is said to occur in later adolescence through early adulthood, overlapping in age range with the highest rates of forcible and incapacitated sex offenses (Stone et al. 2012; Washington Association of Sheriffs and Police Chiefs 2014). With decriminalization and legalization of marijuana in some US states and an anticipated increase in recreational use, it is important to understand the role of marijuana in these cases.

Research in the area of sexual assault and the role that alcohol and other drugs play is robust, involving many disciplines and methodologies. The literature has discussed alcohol and drug use in sexual assault and rape as

primarily 1) substance-facilitated (substance is given by a perpetrator to a potential victim without permission for the purpose of committing sexual assault—also known as a “date rape” drug) or 2) substance-incapacitated (sexual assault perpetrated on a victim who voluntarily consumes substances and becomes too intoxicated unable to provide consent or resist the assault) (Kilpatrick, et al. 2007).

This review focuses on incapacitated sexual assault, however, this review also tries to understand how marijuana is studied in relation to sexual assault generally, regardless of perpetrator intent. The literature discusses sexual assault across a spectrum from verbal coercion (pressure or threats), to unwanted touching, to rape (intercourse without consent). Incapacitated sexual assault is often differentiated from forced or forcible sexual assault, as the latter can refer to assault when the victim is capable of resisting. The implication is that forced sexual assault is more violent than opportunistic, and the severity of the injury is often greater. Some terms are based on legal definitions and some carry forward from prior research. In some cases, categories of sexual assault are combined, and this review largely uses the broad term sexual assault to mean the spectrum of unwanted sexual contact unless a particular meaning is attached in the original manuscripts.

The methodological approaches that were most common included self-reports via surveys or interviews, retrospective chart reviews from victims admitted to hospitals or related trauma centers, and toxicological screening of urine and/or blood samples collected from victims near the time of victimization. Less common were experimental studies related to risk perception using vignettes designed to determine whether substance use played a role in either the detection of, or reaction to risky sexual assault scenarios. Adding to this understanding, coming in part from literature related to impaired driving, were studies looking at cognitive impairment resulting from alcohol and/or marijuana consumption at different doses. This latter point becomes particularly relevant as it may relate to inhibitory responses of perpetrators and risk detection and resistance responding by victims (Abbey et al. 2001).

While not in scope for this review, many studies also looked at statistical relationships between prior substance use and victimization history and current or future victimization. Of note, few studies look at men as victims (McLean, 2013; Peterson, Voller, Polusny, & Murdoch, 2011), with some looking specifically at perpetration (Abbey & Jacques-Tiura, 2011; Rothman, Linden, Baughman, Kaczmarzsky, & Thompson, 2016). There is also larger literature related to adolescent substance use and sexual assault beyond the examples provided in this review.

The research in this area points to the recurring theme that sexual assault occurs frequently and that substance involvement is a significant factor. Alcohol use in sexual assault is by far most common, well understood and measured. Substances other than alcohol, however, are less well studied, and frequently combined into a single illicit drug category which may or may not differentiate concurrent alcohol use. When measured as a separate substance, marijuana is typically the most common illicit substance. When taken together alcohol and marijuana may have the potential to increase impairment and decrease risk detection, leading to an increase in the risk of sexual victimization.

With frequent marijuana use, it is difficult in even toxicological studies to differentiate regular use from use specific to the commission of sexual assault. Future research should further differentiate marijuana from “other drugs” in cases of sexual assault due to the frequent concurrent use with alcohol and the rising potency of currently available marijuana (Pacula & Sevigny, 2014). In addition, technological solutions, needed in laws related to impaired driving for detecting recent marijuana use, would aid in the understanding of marijuana in the commission of sexual assault.

## Surveys and Interviews

College women have been well studied with regard to sexual assault victimization, having been subjects of both smaller interview-based research and larger national surveys administered repeatedly over a number of college campuses, including rates of sexual assault and circumstances that affect attitudes toward sexual assault on college

campuses (Armstrong, Hamilton, & Sweeney, 2006; Cantor & Fisher, 2015). Sinozich and Langton showed a decline in rape and sexual assault from 1997 to 2013, though the overall rate remains high. Women aged 18-24 were most likely to be victims of rape or sexual assault. Non-students were more likely than students to be victimized. Perceived offender alcohol and/or drug use was slightly higher with students, but drugs and alcohol were combined into a single category (Sinozich & Langston, 2014). Earlier studies were less specific about the type of illicit substances used, either focusing on alcohol, or drugs as a broad category.

Alcohol involvement in sexual assault victimization is prevalent and well documented, though the proximal pathways are not completely understood (Abbey et al, 2004b). Combs-Lane and Smith, studying a sample of 126 college women through questionnaires administered 5½ months apart found that heavy drinking by the victim, but not illicit drug use, to be related to sexual assault victimization at the second time point (Combs-Lane & Smith, 2002). Schwartz et al. showed a relationship between substance use and being sexually assaulted in a sample of 1835 college women, though drugs were described as recreational without specifying the substance (Schwartz, DeKeseredy, Tait, & Alvi, 2001).

In a sample of 89 college women describing prior sexual assault, Kahn et al (2003) reported over 60% reported being unable to resist the assault because of alcohol or drugs, though there was no statistically significant difference between those women who labeled their incident as rape (63.6% of 33) and not rape (62.5% of 56) (Kahn et al, 2003)). Testa et al. conducted in-person interviews, with 249 women reporting forcible (when the victim was sober enough to resist) or incapacitated rape (when the victim was too intoxicated to resist). Incapacitated rape was associated with greater alcohol use and drug and alcohol use combined than forcible rape, but not drug use only. Drugs, however, were grouped together, not identified as individual substances (Testa, Livingston, Vanzile-Tamsen, & Frone, 2003). Abbey et al. used computer assisted self-interviews with 139 victims of sexual assault. Of the respondents, 29 (21%) reported being too intoxicated to consent. All of those too intoxicated reported alcohol use, with 45% also reporting other drug use including marijuana (Abbey et al 2004a). Rothman and Silverman, in a study of a college intervention designed to reduce sexual victimization, showed that assault was associated with alcohol use and binge drinking, though drug use was not assessed (Rothman & Silverman, 2015)

Early large-scale studies also looked at substance use history as a background variable associated with sexual assault. Mohler-Kuo et al. (2004) using College Alcohol Survey (CAS) data from 1997 (N=8567), 1999 (N=8425) and 2001 (N=6988) looked at rates of rape while intoxicated over time and found no statistical differences at the three-time points. Pooling data from the three time points to look at individual characteristics, victims who were raped while intoxicated were more statistically more likely to have had heavy episodic drinking in high school and in college, and drug use in the past year. While marijuana was included in the survey questions, results across drugs were collapsed in the manuscript. The number of students reporting ever using also increased significantly from 41.3% to 47.2% (Mohler-Kuo, Dowdall, Koss, & Wechsler, 2004). In a later manuscript using CAS data from 1993-2001, Mohler-Kuo, Lee and Wechsler look at marijuana use over time. Use in the past 30 days increased significantly from 12.5% to 16.9% and use in the past year increased significantly from 23.2% to 29.7% (Mohler-Kuo, Lee, & Wechsler, 2010). Krebs et al. found in a sample of 5361 college women responding to an internet survey, 525 reported incapacitated sexual assault. Factors significantly associated with incapacitated sexual assault since entering college included getting drunk, being given drugs without the victims knowledge, using marijuana and being drunk during sex. Using drugs other than marijuana was negatively related to incapacitated sexual assault, though not statistically significant. None of these factors were related to forced sexual assault. Attending fraternity parties was also significantly related to incapacitated sexual assault, but not forced sexual assault (C. P. Krebs, Lindquist, Warner, Fisher, & Martin, 2009). Krebs et al. using the Campus Sexual Assault (CSA) study show a majority of sexual assaults to be incapacitated, most alcohol or other drug enabled. The report did not differentiate alcohol from other drugs (C. Krebs, Lindquist, Tara, Fisher, & Martin, 2007).

Later studies that did not specify marijuana did further distinguish alcohol from other drugs as having separate effects. Littleton, Grills-Tauchel, and Axsom (2009) surveyed 340 college women regarding characteristics of their

sexual assault. Of the women reporting substance involvement, 41% reported being impaired, and 21% incapacitated. Binge drinking by the victim occurred in 75.4% of cases in which the victim was impaired, and 84.7% of cases in which the victim was incapacitated. Binge drinking was also the case with the majority of assailants. By comparison, drug use occurred in 16.7% of cases in which the victim was impaired, and 18.1% of cases in which the victim was incapacitated. The study did not specify the drugs used or whether they were used in combination with alcohol (Littleton, Grills-Tauchel, & Axsom, 2009). McCauley et al. using structured phone interviews with a sample of 1763 adolescent girls aged 12-17 found 11.8% reporting sexual assault, with 2.1% reporting drug-facilitated sexual assault. However substance type was not differentiated (McCauley et al., 2009).

Some studies did look at the rates and effects of marijuana consumption more directly. Messman-Moore et al. conducted a prospective study of 274 college women, with follow-ups at 4-time points over 8 months to determine incidence/prevalence of sexual assaults. The percentage of heavy drinkers (61.5%) was higher among rape victims than victims of verbal sexual coercion (46.9%), though not statistically significant. There was a statistical difference, however, in recent marijuana use with rape victims significantly higher (50%) than victims of verbal sexual coercion (Messman-Moore, Coates, Gaffey, & Johnson, 2008) (Messman-Moore & Brown, 2006). Lawyer et al. surveyed 314 college women regarding drug-related and forcible sexual assault. Of the 77 women reporting drug-related assaults, 96.1% (75) reported consuming alcohol, and 37.7% (29) reported using marijuana (the second most frequent). The majority of consumption was voluntary. Alcohol consumption was indicated more frequently in drug-facilitated (involuntary) sexual assault than marijuana or substances described as date-rape drugs (Lawyer, Resnick, Bakanic, Burkett, & Kilpatrick, 2010). Al et al. found, in a study of 483 incoming college women, 28% reported marijuana use in the month prior to the study year, with women with a prior history of incapacitated rape reporting significantly more days of use than women without an incapacitated rape history. However in multivariate analysis, prior marijuana use was not predictive of incapacitated rape during the school year (Al et al., 2011). O'Hara, Armeli and Tennen in a study of 876 college students using a diary of alcohol and cannabis use found cannabis use was associated with higher alcohol use and higher use of alcohol in the evening. The authors point to a complementary use of alcohol and cannabis (rather than as substitution), which leads to the need for more understanding about the effects of these substances together (O'Hara, Armeli, & Tennen, 2016)

Studies of perpetrators of sexual assault and rape have also looked at the role of substance use. Parkhill, Abbey, and Jacques-Tiura found in a sample of 163 men admitting to sexual assault differences in assault based on the level of intoxication during the incident. Compared to non-drinkers (N=41) and light drinkers (N=23), heavy drinkers (N=43) were more likely to misperceive the woman's sexual intention longer, use more isolating and controlling behaviors, use greater physical force, have the outcome of the assault be more severe (i.e. more likely to end in completed rape), perceive the seriousness of the incident, label the incident as a sexual offense, and attribute personal responsibility (Parkhill, Abbey, & Jacques-Tiura, 2009). Swartout and White (2010) in a prospective, longitudinal study of 851 incoming college men for sexual perpetration, sexual aggression decreased over time with the lowest levels by the 4<sup>th</sup> year of college. Increased drug use prior to sexual activity was associated with greater sexual aggression, as was increased frequency of marijuana use, controlling for alcohol use (Swartout & White, 2010).

Some studies found contrasting or mixed support for the relationship between substance use and sexual assault. Loh et al. found alcohol use was not related to sexually aggressive behavior (Loh, Gidycz, Lobo, & Luthra, 2005). Cecil and Matson, in a sample of 249 African American adolescents, found no significant relationship between marijuana use and experiencing sexual coercion as measured by the sexual experiences survey (SES), though high alcohol use was related to increased coercion (Cecil & Matson, 2006). Coker et al. (2016) found no difference in rates of sexual assault in a college sample (N=272) versus a sample of women who never attended college (N=687) (Coker, Follingstad, Bush, & Fisher, 2015). Lachenmeier and Rehm examined the relative toxicity of various illicit substances and found that toxicologically cannabis is regarded as a "low risk" substance relative to alcohol ("high risk"). The authors stress that this does not take into account social or environmental factors, or interactions among substances (Lachenmeier & Rehm, 2015)

Reporting of sexual assault is also affected by substance use, as underreporting remains a critical concern (Wolitzky-Taylor et al., 2011). Feldhaus, Houry, and Kaminsky surveyed 360 women from an emergency department of a Level I trauma center sample to determine lifetime prevalence of sexual assault. They found prevalence of 39%, with the mean age at the time of assault at 20.4 years. Of the women 94 who were assaulted, 70% knew the perpetrator. Less than half (46%) reported the incident to police. No information about alcohol or drug use was reported by the authors in this report (Feldhaus, Houry, & Kaminsky, 2000). Jones et al. conducted a survey of 424 victims of sexual assault to determine factors in reporting the incident. Women who did not report the incident were significantly more likely to have used alcohol or drugs within the past 24 hours (70%) than women who did report (51%). (Jones, Alexander, Wynn, Rossman, & Dunnuck, 2009).

## Toxicological and Record Reviews

A different methodological approach from self-reported surveys and interviews involves a review of records from hospitals, police reports and rape crisis and support centers. This approach is particularly useful in cases of drug-facilitated or incapacitated sexual assault where details of the event may be less clear, or in cases where underreporting of substance use may be of concern. There is also an advantage of having very large sample sizes relative to smaller interview or survey designs. However, this kind of analysis is sensitive to collection and analysis timing to detect substances present and differentiate regular recreational use from use near the time of the incident. ElSohly and Salamone found that marijuana was the most common drug detected after marijuana from a nationwide sample of 1179 specimens from victims submitted from police, emergency departments and rape crisis centers across the country. Because of a 72-hour collection window, however, the sample cannot accurately assess whether drugs and alcohol were used to facilitate sexual assault (ElSohly & Salamone, 1999). This is similar to Slaughter's review of over 2000 samples, finding that alcohol was the most frequent substance in 63% of samples, followed by marijuana in 30% of samples (Slaughter, L. 2000). Hindmarch et al. analyzed 3303 urine samples submitted from law enforcement and rape crisis centers for possible drug-facilitated sexual assault. Samples were collected within 24-72 hours of the incident. Neither alcohol nor drugs were found in 38.7% of samples. Of the samples with substances detected, two-thirds (67%) were found to include alcohol (along or with other substances). Cannabis was the second most detected in 30.3% of positive samples: 9.6% alone and 7.6% in combination with alcohol (Hindmarch, ElSohly, Gambles, & Salamone, 2001). Read et al. reported substance use from 521 victims in a Baltimore-based sexual assault program for police reported incidents. Data were collected between 1997 and 1999. For this sample, 52.2% tested positive for cocaine and 43.6% for alcohol. Marijuana was fourth after opiates with 23.3% of victims testing positive for use (Read, Kufera, Jackson, & Dischinger, 2005). A smaller review by Hurley, Parker, and Wells in a sample of 76 cases of drug-facilitated sexual assault identified from records review, marijuana was detected in just 4 cases with the majority reporting alcohol (37% of cases) (Hurley, Parker, & Wells, 2006)

Beynon et al. in a broader review of research studying the substance facilitated sexual assault found 11 studies between 1996 and 2002 that included toxicological results of substances tested near the time of the incident. Rates of marijuana (cannabis) detected ranged from 17% to 35%. However, when reported, the testing window for urinalysis was 24-72 hours. This timeframe would not allow for accurate determination of recent use (Beynon, McVeigh, McVeigh, Leavey, & Bellis, 2008). Avegno, Mills, and Mills reviewed records of a sample of 1172 patients reporting to the emergency department of a large urban teaching hospital for sexual assault between 2001 and 2004. Of this sample, nearly 90% (89.3) linked the event to substance use. Over half (54%) reported drugs or alcohol during the incident. However, the report did not specify marijuana, alone or in combination with alcohol—"other" drugs were reported in 21.9% of cases. They noted that in three-quarters of the cases (76.6%) alcohol was involved (Avegno, Mills, & Mills, 2009). Richer et al. studied 390 sexual assault victims from a rape treatment center. Involuntary ingestion of marijuana was low (1.2%) compared to alcohol (13.8%), with marijuana ingestion unrelated to type of sexual assault (Richer et al., 2015)

International studies employing this methodology show similar trends with alcohol use, though differences with marijuana. Scott-Ham and Burton in a UK-based forensic study of 1014 cases of drug-facilitated sexual assault from 2000 to 2002 with blood and/or urine sample collected (72% with 24-hours). Alcohol alone was found 31% of cases (46% alone or combined with another substance), and cannabis was found in 26% of cases, either alone or with alcohol (Scott-Ham & Burton, 2006). Ingemann-Hansen et al. in a sample of 579 cases in Denmark found that drinking alcohol was associated with sexual assault in a public place, however, illicit drugs were included in the analysis (Ingemann-Hansen, Sabroe, Brink, Knudsen, & Charles, 2009). In a sample of 184 sexual assault victims from hospital-based sexual assault centers in Ontario, Canada, Du Mont (2010) found that cannabinoids were detected in a third of cases, slightly higher than for alcohol in this sample. More than half of victims reported that cannabinoids in toxicological results were unexpected, vs 2% reporting alcohol use. The study is limited, however by the timing of screening for drugs and alcohol and combinations of substances used (Du Mont et al., 2010) See also Du Mont et al. 2009. Hagemann et al. examined records retrospectively to in a sample of 264 victims treated a sexual assault center in Norway for indications of drug-facilitated sexual assault. Fifty-nine percent of the women in the sample showed evidence of drug or alcohol use in toxicological screening. Of the substances reported, the majority was alcohol (40%), while marijuana was present in 5% of cases. While 22% of the women in the sample suspected drug-facilitated sexual assault, 2% were found to have substances not accounted for by self-report (Hagemann et al., 2013).

## Cognitive Impairment

The research points to alcohol as the dominant substance related to sexual assault, with marijuana as a common secondary substance, but one that may be commonly co-ingested. As the landscape changes towards legalization the impact of marijuana, even as a secondary substance, may increase given changes in potency. Mehmedic et al. identified trends of increasing potency, doubling THC concentrations in confiscated cannabis samples from 1993 to 2008. (Mehmedic et al., 2010). This is echoed by Pacula and Sevigny in looking at the policy implications of marijuana legalization in California, pointing to the marked increase in non-fatal marijuana-involved hospitalizations as the potency of marijuana increased (ratio of THC to CBD) between 2000 and 2011. (Pacula & Sevigny, 2014). Making the situation more challenging is variability of accuracy and labeling of some marijuana products as markets develop (Vandrey et al. 2015). Because of the changes in potency, it is useful to consider both the cognitive effects of marijuana and issues impairment on sexual assault risk perception as factors related to incapacitated sexual assault (Bolla, Brown, Eldreth, Tate, & Cadet, 2002; Kirk & De Wit, 1999).

Research with marijuana often used standardized products provided by the National Institutes of Health of relatively low potency by current standards. These studies also employed relatively small sample sizes in experimental design. However, the controlled conditions are valuable for understanding drug effects and combined substance effects that are less detailed in self-reports. Heishman, Arasteh, and Stitzer compared alcohol and marijuana (3.55% THC) with repeated administrations on cognitive tasks and mood. Both substances decreased performance relative to placebo, and with increased administrations. In this experiment, the substances were not combined. (Heishman, Arasteh, & Stitzer, 1997). Fant, et al. in a study of 10 male subjects, measured performance on cognitive tasks was reduced as marijuana dose increased (and relative to placebo). However, the “high” dose at the time of this study was only 3.6% delta-9 THC, well below the average level in currently sold legal marijuana. (Fant, Heishman, Bunker, & Pickworth, 1998). Later Ramaekers et al. studied 20 recreational marijuana users high dose (13% THC) showed greater impairment to cognitive functioning and impulse control than low dose (4% THC) (Ramaekers et al., 2006). More recently, Anderson et al. looked at effects of marijuana on 70 matched occasional users (35 men and 35 women) on cognitive tasks. While both sexes demonstrated acute effects of marijuana on cognitive tasks (active delta-9-THC 2.9%) no sex differences were present. While the potency was relatively low, the authors noted that women were unable to consume the same dose of marijuana as men and that a non-statistical trend emerged that women performed slightly worse on task-switching activities. (Anderson, Rizzo, Block, Pearson, & O’Leary, 2010)

The literature on impaired driving has been helpful in understanding the effects on cognitive functioning. Robbe looked at the effects of driving performance 24 subjects received lower doses of marijuana, alcohol, or the substances combined. The combination of substances leads to greater impairment, such that subjects under the legal limit of intoxication performed as if they were over the limit (Robbe, 1998). Ronen et al. also saw in driving tasks the combination of alcohol and marijuana led to greatest subjective impairment (Ronen et al., 2010), though Ballard and De Wit suggest that this relationship does not hold at lower doses (Ballard & de Wit, 2011). In a more contemporary study, Hartman et al. conducted a controlled experiment of alcohol or placebo, combined with low dose (2.9% THC) or high dose (6.7% THC) vaporized cannabis, finding that THC concentrations in blood and plasma markedly increased when combined with alcohol, pointing to an explanation for poorer cognitive task performance when co-ingestion occurs (Hartman et al., 2015). This may be closer to how co-ingestion is likely to occur today.

## Risk Perception

Finally the ability to detect or react to risky situations related to sexual assault may be impaired by substance use (Nurius, 2000; Soler-Baillo, Marx, & Sloan, 2005). Gidycz, McNamara, and Edwards in a review of the sexual assault literature looked at the role of alcohol (though not marijuana or other drugs) on risk perception. In the small number of studies at the time of the review that addressed this issue, through vignette and laboratory studies, they found that while women were able to identify risky situations, alcohol consumption decreased risk perception, such that women who consumed felt they were better able to manage risky situations. The summary does not address whether risk perception is similarly affected of marijuana, or the combination of alcohol and marijuana (Gidycz, McNamara, & Edwards, 2006). Loisel and Fuqua, in a placebo-controlled experiment, found moderate amounts of alcohol related to impaired decision making and detection of risk in sexual assault scenarios, though the lack of some significant results may have resulted from a small sample size (Loiselle & Fuqua, 2007). In a sample of 496 undergraduate women, Eshelman, Messman-Moore and Sheffer used vignettes to determine risk perception of forcible and substance-related sexual victimization. In the vignettes, women with substance-related sexual victimization histories were more likely to delay leaving the scenario than women with forcible victimization histories. They concluded that alcohol and marijuana use may play a role in delaying leaving risky settings, while heavy episodic drinking may additionally impair detection of risky situations (Eshelman, Messman-Moore, & Sheffer, 2014).

## Conclusion

In combination with alcohol consumption, there is evidence to suggest that potential victims may experience greater impairment, increasing the risk of victimization. However, more research is needed to understand marijuana's independent effects, especially with higher potency products. Limitations in the review include variation in the terminology of sexual assault categories and the combining of different illicit drug types into a single "other drug" category. This makes it challenging to apply particular substance use patterns to different assault scenarios. Better methods remain needed to differentiate recent from past marijuana consumption in order to improve understanding of the effects and prevalence of marijuana use at the time of a sexual assault. Finally, sexual assault prevention efforts should include discussion of the effects of using and combining substances in order to decrease the risk of victimization and occurrence of perpetration.

## References

- Abbey A, Beshears R, Clinton-Sherrod AM, McAuslan P. (2004a). Similarities and differences in women's sexual assault experiences based on tactics used by the perpetrator. *Psychology of Women Quarterly*, 28, 323–332.
- Abbey A, Jacques-Tiura AJ. (2011). Sexual assault perpetrators' tactics: associations with their personal characteristics and aspects of the incident. *Journal of Interpersonal Violence*, 26, 2866–2889.
- Abbey A, Zawacki T, Buck PO, Clinton AM, McAuslan P. (2004b). Sexual assault and alcohol consumption: What do we know about their relationship and what types of research are still needed? *Aggression and Violent Behavior*, 9(3), 271–303.

- Carey KB, Durney SE, Shepardson RL, Carey MP. (2015) Precollege predictors of incapacitated rape among female students in their first year of college. *Journal of Studies on Alcohol & Drugs*, 76(6):829-37.
- Anderson BM, Rizzo M, Block RI, Pearlson GD, O'Leary DS. (2010). Sex, drugs, and cognition: effects of marijuana. *Journal of Psychoactive Drugs*, 42(4), 413–24.
- Armstrong EA, Hamilton LT, Sweeney B. (2006). Sexual assault on campus: a multilevel, integrative approach to party rape. *Social Problems*, 53(4), 483–499.
- Avegno, J., Mills, T. J., & Mills, L. D. (2009). Sexual Assault Victims in the Emergency Department: Analysis by Demographic and Event Characteristics. *Journal of Emergency Medicine*, 37(3), 328–334.
- Ballard, M. E., & de Wit, H. (2011). Combined effects of acute, very-low-dose ethanol and delta(9)-tetrahydrocannabinol in healthy human volunteers. *Pharmacology, Biochemistry, and Behavior*, 97(4), 627–31.
- Beynon, C. M., McVeigh, C., McVeigh, J., Leavey, C., & Bellis, M. a. (2008). The involvement of drugs and alcohol in drug-facilitated sexual assault: a systematic review of the evidence. *Trauma, Violence & Abuse*, 9(3), 178–88.
- Bolla, K. I., Brown, K., Eldreth, D., Tate, K., & Cadet, J. L. (2002). Dose-related neurocognitive effects of marijuana use. *Neurology*, 59, 1337–1343.
- Cantor, D., et al. (2015). Report on the AAU Campus Climate Survey on Sexual Assault and Sexual Misconduct Assault. Report by Westat, Inc. for Harvard University. [http://sexualassaulttaskforce.harvard.edu/files/taskforce/files/final\\_report\\_harvard\\_9.21.15.pdf](http://sexualassaulttaskforce.harvard.edu/files/taskforce/files/final_report_harvard_9.21.15.pdf)
- Cecil, H., & Matson, S. C. (2006). Sexual victimization among African American adolescent females: examination of the reliability and validity of the Sexual Experiences Survey. *Journal of Interpersonal Violence*, 21(1), 89–104.
- Coker, A. L., Follingstad, D. R., Bush, H. M., & Fisher, B. S. (2015). Are interpersonal violence rates higher among young women in college compared with those never attending college? *Journal of Interpersonal Violence*.
- Combs-Lane, A. M., & Smith, D. W. (2002). Risk of sexual victimization in college women: The role of behavioral intentions and risk-taking behaviors. *Journal of Interpersonal Violence*, 17(2), 165–183.
- Du Mont, Janice, et al. Factors associated with suspected drug-facilitated sexual assault. *Canadian Medical Association Journal* 180.5 (2009): 513-519.
- Du Mont, J., MacDonald, S., Rotbard, N., Bainbridge, D., Asllani, E., Smith, N., & Cohen, M. M. (2010). Drug-facilitated sexual assault in Ontario, Canada: Toxicological and DNA findings. *Journal of Forensic and Legal Medicine*, 17(6), 333–338.
- ElSohly M.A. & Salamone SJ. (1999). Prevalence of drugs used in cases of alleged sexual assault. *Journal of Analytical Toxicology*, 23(3), 141–146.
- Eshelman, L. R., Messman-Moore, T. L., & Sheffer, N. (2014). The importance of substance-related sexual victimization: Impact on substance use and risk perception in female college students. *Journal of Interpersonal Violence*, 30(15), 2616–2635.
- Fant, R. V., Heishman, S. J., Bunker, E. B., & Pickworth, W. B. (1998). Acute and residual effects of marijuana in humans. *Pharmacology Biochemistry and Behavior*, 60(4), 777–784.
- Feldhaus, K. M., Houry, D., & Kaminsky, R. (2000). Lifetime sexual assault prevalence rates and reporting practices in an emergency department population. *Annals of Emergency Medicine*, 36(1), 23–27.
- Gidycz, C. A., McNamara, J. R., & Edwards, K. M. (2006). Women's risk perception and sexual victimization: A review of the literature. *Aggression and Violent Behavior*, 11(5), 441–456.
- Hagemann, C. T., Helland, A., Spigset, O., Espnes, K. A., Ormstad, K., & Schei, B. (2013). Ethanol and drug findings in women consulting a Sexual Assault Center - Associations with clinical characteristics and suspicions of drug-facilitated sexual assault. *Journal of Forensic and Legal Medicine*, 20(6), 777–784.
- Hartman, R. L., Brown, T. L., Milavetz, G., Spurgin, A., Gorelick, D. A., Gaffney, G., & Huestis, M. A. (2015). Controlled cannabis vaporizer administration: blood and plasma cannabinoids with and without alcohol. *Clinical Chemistry*, 869, clinchem.2015.238287–.
- Heishman, S. J., Arasteh, K., & Stitzer, M. L. (1997). Comparative effects of alcohol and marijuana on mood, memory, and performance. *Pharmacology, Biochemistry and Behavior*, 58(1), 93–101.
- Hindmarch, I., ElSohly, M., Gambles, J., & Salamone, S. (2001). Forensic urinalysis of drug use in cases of alleged sexual assault. *Journal of Clinical Forensic Medicine*, 8(4), 197–205.
- Hurley, M., Parker, H., & Wells, D. L. (2006). The epidemiology of drug facilitated sexual assault. *Journal of Clinical Forensic Medicine*, 13(4), 181–185.
- Ingemann-Hansen, O., Sabroe, S., Brink, O., Knudsen, M., & Charles, A. V. (2009). Characteristics of victims and assaults of sexual violence - Improving inquiries and prevention. *Journal of Forensic and Legal Medicine*, 16(4), 182–188.
- Jones, J. S., Alexander, C., Wynn, B. N., Rossman, L., & Dunnuck, C. (2009). Why women don't report sexual assault to the police: The influence of psychosocial variables and traumatic injury. *Journal of Emergency Medicine*, 36(4), 417–424.



- Kahn, A. S., Jackson, J., Kully, C., Badger, K., & Halvorsen, J. (2003). Calling it rape: Differences in experiences of women who do or do not label their sexual assault as rape. *Psychology of Women Quarterly, 27*(3), 233–242.
- Kilpatrick, D. G., Resnick, H. S., Ruggiero, K. J., Conoscenti, L. M., & McCauley, J. (2007). *Drug-facilitated, incapacitated, and forcible rape: A national study*. National Criminal Justice Reference Service.
- Kirk, J. M., & De Wit, H. (1999). Responses to oral Δ9-tetrahydrocannabinol in frequent and infrequent marijuana users. *Pharmacology Biochemistry and Behavior, 63*(1), 137–142.
- Krebs, C., Lindquist, C., Tara, W., Fisher, B., & Martin, S. (2007). The Campus Sexual Assault (CSA) Study. *National Institute of Justice, 111*.
- Krebs, C. P., Lindquist, C. H., Warner, T. D., Fisher, B. S., & Martin, S. L. (2009). The differential risk factors of physically forced and alcohol- or other drug-enabled sexual assault among university women. *Violence and Victims, 24*(3), 302–321.
- Lachenmeier, D. W., & Rehm, J. (2015). Comparative risk assessment of alcohol, tobacco, cannabis and other illicit drugs using the margin of exposure approach. *Scientific Reports, 5*, 8126.
- Lawyer, S., Resnick, H., Bakanic, V., Burkett, T., & Kilpatrick, D. (2010). Forcible, drug-facilitated, and incapacitated rape and sexual assault among undergraduate women. *Journal of American College Health, 58*(5), 453–460.
- Littleton, H., Grills-Taquechel, A., & Aksom, D. (2009). Impaired and incapacitated rape victims: Assault characteristics and post-assault experiences. *Violence and Victims, 24*(4), 439–457.
- Loh, C., Gidycz, C. A., Lobo, T. R., & Luthra, R. (2005). A prospective analysis of sexual assault perpetration: risk factors related to perpetrator characteristics. *Journal of Interpersonal Violence, 20*(10), 1325–1348.
- Loiselle, M., & Fuqua, W. R. (2007). Alcohol's effects on women's risk detection in a date-rape vignette. *Journal of American College Health : J of ACH, 55*(5), 261–6.
- Mccauley, J. L., Conoscenti, L. M., Ruggiero, K. J., Resnick, H. S., Saunders, B. E., & Kilpatrick, D. G. (2009). Prevalence and correlates of drug/alcohol facilitated and incapacitated sexual assault in a nationally representative sample of adolescent girls. *Journal of Clinical Child and Adolescent Psychology, 38*(2), 295–300.
- McLean, I. A. (2013). The male victim of sexual assault. *Best Practice and Research: Clinical Obstetrics and Gynaecology, 27*(1), 39–46.
- Mehmedic, Z., Chandra, S., Slade, D., Denham, H., Foster, S., Patel, A. S., ... ElSohly, M. A. (2010). Potency trends of Δ9-THC and other cannabinoids in confiscated cannabis preparations from 1993 to 2008. *Journal of Forensic Sciences, 55*(5), 1209–1217.
- Messman-Moore, T. L., & Brown, A. L. (2006). Risk perception, rape, and sexual revictimization: A prospective study of college women. *Psychology of Women Quarterly, 30*, 159–172.
- Messman-Moore TL, Coates AA, Gaffey KJ, Johnson CF. (2008) Sexuality, substance use, and susceptibility to victimization: risk for rape and sexual coercion in a prospective study of college women. *Journal of Interpersonal Violence, 23*(12):1730-46.
- Mohler-Kuo, M., Dowdall, G. W., Koss, M. P., & Wechsler, H. (2004). Correlates of Rape while Intoxicated in a National Sample of College Women. *Journal of Studies on Alcohol, 65*(1), 37–45.
- Mohler-Kuo, M., Lee, J. E., & Wechsler, H. (2010). Trends in marijuana and other illicit drug use among college students: results from 4 Harvard School of Public Health College Alcohol Study surveys: 1993-2001. *Journal of American College Health, 52*(1), 17–24.
- Nurius, P. S. (2000). Risk perception for acquaintance sexual aggression. *Aggression and Violent Behavior, 5*(1), 63–78.
- O'Hara, R. E., Armeli, S., & Tennen, H. (2016). Alcohol and cannabis use among college students: Substitutes or complements? *Addictive Behaviors, 58*, 1–6.
- Pacula, R. L., & Sevigny, E. L. (2014). Marijuana liberalization policies: Why we can't learn much from policy still in motion. *Journal of Policy Analysis and Management, 33*(1), 212–221.
- Parkhill, M. R., Abbey, A., & Jacques-Tiura, A. J. (2009). How do sexual assault characteristics vary as a function of perpetrators' level of intoxication? *Addictive Behaviors, 34*(3), 331–333.
- Peterson, zoë D., Voller, E. K., Polusny, M. A., & Murdoch, M. (2011). Prevalence and consequences of adult sexual assault of men: Review of empirical findings and state of the literature. *Clinical Psychology Review, 31*(1), 1–24.
- Ramaekers, J. G., Kauert, G., van Ruitenbeek, P., Theunissen, E. L., Schneider, E., & Moeller, M. R. (2006). High-potency marijuana impairs executive function and inhibitory motor control. *Neuropsychopharmacology: Official Publication of the American College of Neuropsychopharmacology, 31*(10), 2296–2303.
- Read, K. M., Kufera, J. A., Jackson, M. C., & Dischinger, P. C. (2005). Population-based study of police-reported sexual assault in Baltimore, Maryland. *American Journal of Emergency Medicine, 23*(3), 273–278.
- Richer, L. A., Fields, L., Bell, S., Heppner, J., Dodge, J., Boccellari, A., & Shumway, M. (2015). Characterizing Drug-Facilitated Sexual Assault Subtypes and Treatment Engagement of Victims at a Hospital-Based Rape Treatment Center. *Journal of Interpersonal Violence, 1*–19.
- Robbe H. (1998). Marijuana 's Impairing Effects on Driving are Moderate When Taken Alone But Severe When Combined with Alcohol. *Human Psychopharmacology: Clinical & Experimental, 78*, 70–78.

- Ronen, A., Chassidim, H. S., Gershon, P., Parmet, Y., Rabinovich, A., Bar-Hamburger, R., ... Shinar, D. (2010). The effect of alcohol, THC and their combination on perceived effects, willingness to drive and performance of driving and non-driving tasks. *Accident Analysis and Prevention*, 42(6), 1855–1865.
- Rothman, E. F., Linden, J. A., Baughman, A. L., Kaczmarzky, C., & Thompson, M. (2016). “The Alcohol Just Pissed Me Off”: Views About How Alcohol and Marijuana Influence Adolescent Dating Violence Perpetration, Results of a Qualitative Study. *Youth & Society*, 48(3), 366–382.
- Rothman, E., & Silverman, J. (2015). The effect of a college sexual assault prevention program on first-year students’ victimization rates. *Journal of American College Health : J of ACH*, 55(5), 283–290.
- Schwartz, M. D., DeKeseredy, W. S., Tait, D., & Alvi, S. (2001). Male peer support and a feminist routine activities theory: Understanding sexual assault on the college campus. *Justice Quarterly*, 18(3), 623–648.
- Scott-Ham, M., & Burton, F. C. (2006). A study of blood and urine alcohol concentrations in cases of alleged drug-facilitated sexual assault in the United Kingdom over a 3-year period. *Journal of Clinical Forensic Medicine*, 13(3), 107–111.
- Soler-Baillo, J. M., Marx, B. P., & Sloan, D. M. (2005). The psychophysiological correlates of risk recognition among victims and non-victims of sexual assault. *Behaviour Research and Therapy*, 43(2), 169–181.
- Swartout, K. M., & White, J. W. (2010). The relationship between drug use and sexual aggression in men across time. *Journal of Interpersonal Violence*, 25(9), 1716–1735.
- Testa, M., Livingston, J. A., Vanzile-Tamsen, C., & Frone, M. R. (2003). The role of women’s substance use in vulnerability to forced and incapacitated rape. *Journal of Studies on Alcohol*, 64(6), 756–764.
- Vandrey, R., Raber, J. C., Raber, M. E., Douglass, B., Miller, C., & Bonn-Miller, M. O. (2015). Cannabinoid dose and label accuracy in edible medical cannabis products. *JAMA*, 313(24), 2491-2493.
- Wolitzky-Taylor, K. B., Resnick, H. S., McCauley, J. L., Amstadter, A. B., Kilpatrick, D. G., & Ruggiero, K. J. (2011). Is reporting of rape on the rise? A comparison of women with reported versus unreported rape experiences in the National Women’s Study-Replication. *Journal of Interpersonal Violence*, 26(4), 807–832.

**Citation:** Floyd AS. The Role of Marijuana in Sexual Assault. Alcohol & Drug Abuse Institute, University of Washington, June 2017. URL: [http://ada.i.uw.edu/pubs/pdf/2017mj\\_sexualassault.pdf](http://ada.i.uw.edu/pubs/pdf/2017mj_sexualassault.pdf)

This report was produced with support from the Washington State Dedicated Marijuana Fund for research at the University of Washington.