

# The effect of alcohol consumption on ART adherence and sexual risk behaviours among men who have sex with men

## Questions

- What is the impact of alcohol use/binge drinking on antiretroviral adherence, sexual risk behaviours and overall health in men who have sex with men?
- What effective interventions address alcohol use/binge drinking among men who have sex with men?

## Key Take-Home Messages

- Among people living with HIV, alcohol consumption can have an impact on viral load and CD4 counts (1-3) and affect adherence to antiretroviral regimens (1, 4).
- Many studies have found a link between alcohol use and sexual risk behaviours, but no causal relationship has been established (5, 6).
- The complex relationship between alcohol use and sexual risk behaviours may be affected by other factors such as sexual arousal, sexual sensation seeking (7, 8) and age (9).
- Few interventions have been designed specifically to address alcohol use and sexual risk. Those interventions designed to reduce condomless anal intercourse and substance use are most effective for men who did not have serious substance use issues (10).

## The Issue and Why It's Important

Alcohol has different effects on different people, depending on each person's drinking pattern (i.e. how much and how often he or she drinks) (11). However, there are two key risks associated with alcohol:

## References

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4. Hendershot CS, Stoner SA, Pantalone DW, Simoni JM. Alcohol use and antiretroviral adherence: Review and meta-analysis. *Journal of Acquired Immune Deficiency Syndromes*. 2009;52(2):180-202.
5. Hess KL, Chavez PR, Kanny D, DiNenno E, Lansky A, Paz-Bailey G. Binge drinking and risky sexual behavior among HIV-negative and unknown HIV status men who have sex with men, 20 US cities. *Drug and Alcohol Dependence*. 2015;147:46-52.

- It can impair judgement and decision making, which may make it more likely that people will engage in high-risk sexual behaviours (12-14) or affect their ability to take medication consistently (i.e. adherence).
- It can have a negative effect on the immune system (viral load and CD4 counts), increasing the risk of disease progression (15).

The link between alcohol use and sexual risk is especially important for men who have sex with men, who account for more than half of all new HIV infections in Canada and the United States (16, 17) and who are at high risk of HIV infection through unprotected receptive anal intercourse (18).

Substance use has been shown to be more prevalent among men who have sex with men than in the general population (19); however, one recent study found that men who have sex with men do not necessarily consume more alcohol than heterosexual men (20). Despite this, the literature continues to draw links between alcohol consumption and unprotected anal intercourse among men who have sex with men but the relationship or interaction between these two variables is unclear (5).

Addressing alcohol use and binge drinking among men who have sex with men may lead to better HIV-related outcomes and identifying ways to reduce sexual risk behaviours may improve the overall health and well-being of this population.

## What We Found

### Alcohol use and antiretroviral therapy adherence

We found little research discussing alcohol use and HIV disease progression specifically among men who have sex with men. However, we found one review that suggested heavy alcohol consumption might impact the biological and behavioral mechanisms of HIV among people living with HIV, thereby contributing to disease progression (15).

Studies looking at the impact of alcohol on biological markers, such as viral load and CD4 counts, have had mixed results. Studies conducted pre-1996 did not show an association (15); however, more recent studies have identified a link between alcohol consumption and biological changes:

- In a longitudinal study conducted over 30 months, participants living with HIV (n=231) who consumed two or more drinks daily were almost three times as likely to have a CD4 count that declined to  $\leq 200$  cells/ $\mu$ l (HR=2.91, 95%

6. Allen VC, Jr., Myers HF, Ray L. The association between alcohol consumption and condom use: Considering correlates of HIV risk among black men who have sex with men. *AIDS & Behavior*. 2015;19(9):1689-700.

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CI: 1.23-6.85; p=0.015) (1). This risk was higher for those not on antiretroviral therapy (HR=7.76, 95% CI: 1.2-49.2; p=0.038).

- In a study of 1,957 people living with HIV in Baltimore, hazardous drinkers were almost 25% less likely than non-drinkers to have a suppressed viral load (AOR=0.76, 95% CI=0.57-0.99) (2).

Alcohol consumption also affects adherence to antiretroviral medications (1). A 2009 meta-analysis found a link between alcohol use and non-adherence to antiretroviral medications among diverse populations of people living with HIV (4). In a longitudinal study of 356 HIV-positive men who have sex with men in the San Francisco Bay area, men who drank less (i.e. non-hazardous drinkers) were more likely to achieve 100% adherence for 30 days than those who were hazardous drinkers. That study also looked at the impact of the men's partners' drinking and found that men who had partners who were hazardous drinkers were more likely to have a detectable viral load (3).

## Alcohol use and sexual risk behaviour

### Evidence for an association: Methodological challenges

Ethically and practically, it is difficult to design a controlled experiment that examines exactly how alcohol intake influences sexual risk behaviours (13). Instead, the literature relies mainly on observational studies that found a correlation between alcohol and risk even if we cannot completely understand the complex relationship (21-23). For example:

- A survey of a large cohort of men who have sex with men (n=6,680) assessed drinking patterns and condomless anal intercourse among partners who were HIV-positive or of unknown status (i.e. 'discordant') (5). Compared to non-binge drinkers, binge drinkers (i.e.  $\geq 5$  drinks on  $\geq 1$  occasion in the past 30 days) were more likely to have engaged in receptive and insertive condomless anal intercourse with a discordant partner at last sex – however, we do not know that binge drinking and sexual risk behaviour occurred on the same occasion.
- A recent study of 109 urban men who have sex with men who were living with HIV and attending a community health centre in the U.S. assessed day-level alcohol use and sexual behaviours (24). The findings? The odds of engaging in unprotected anal intercourse doubled when the men consumed 5-11 drinks and tripled when they consumed 12 or more drinks.

12. Centers for Disease Control and Prevention. HIV among gay and bisexual men. [http://www.cdc.gov/hiv/pdf/risk\\_gender\\_238900B\\_HIV\\_Gay\\_Bisexual\\_MSM\\_FS\\_final.pdf](http://www.cdc.gov/hiv/pdf/risk_gender_238900B_HIV_Gay_Bisexual_MSM_FS_final.pdf) (accessed September 26, 2016). 2013

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- In a 2015 study investigating substance use, sexual engagement and condomless anal intercourse among 371 highly sexually active gay and bisexual men from New York City, heavy drinking (i.e. five or more alcoholic drinks) was associated with an increase in the odds of engaging in condomless anal sex.
- A systematic review of studies about substance use and sexual risk behaviours among men who have sex with men in high-income countries from 1996–2010 (25) found that binge drinking (defined as five or more drinks on one occasion) was consistently associated with sexual risk behaviour.

## The complex relationship between alcohol and risk

More rigorous investigation is required to understand the relationship between alcohol consumption and sexual risk behaviours (22, 23, 26). There is some evidence other factors may affect the impact of alcohol on sexual risk, including: sexual arousal, sexual sensation seeking (the tendency to pursue novel and varied sexual experiences) (38, 39, 40) and age.

- One study that investigated the relationship between alcohol consumption and condom use randomized 117 men between the ages of 21–50 from Syracuse and Boston who have sex with men to different experimental settings that manipulated alcohol consumption (i.e. water, placebo or alcohol) and sexual arousal (i.e. viewing erotic or non-erotic film clips). Participants were then asked to respond to interactive scenarios depicting high-risk sex, and complete a questionnaire that measured their risk perception. Results showed that sexual arousal interacted with alcohol to increase sexual risk.
- In a longitudinal study with 114 men between the ages of 16–20 from the American Midwest, men who had higher sensation seeking scores were more likely to report high alcohol use and frequent unprotected sex (7).
- A New York study with 181 men (ages 18–75) who have sex with men used mathematical modelling to explore the relationship between sexual sensation seeking and alcohol use in the context of anal intercourse with a casual partner (8). Individuals with higher sensation seeking scores were more likely to engage in unprotected anal intercourse if they were under the influence of alcohol three hours prior to intercourse.
- In a study with 137 American men who have sex with men (ranging in age from 16–40), alcohol use was only associated

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with higher likelihood of engaging in unprotected sex in younger men who have sex with men. The younger the participant, the stronger the association between drinking and sexual risk (9).

- In another study in a US setting, 143 participants used a daily diary to record number of drinks consumed, sexual partners and sexual behaviours. The odds of having a sexual partner increased by 18% for each alcoholic drink consumed; however, unlike the previous study, the correlation between alcohol and sexual risk was stronger for older men (26).
- A 2012 literature review examining substance use and high risk sexual behaviours found that older men might be more likely than younger men to engage in high-risk sexual behaviour when drinking alcohol (23).

These findings indicate that it may not be enough to target alcohol use to reduce risk behaviours. Interventions may also need to address other factors that interact with alcohol.

## Interventions to address alcohol use and sexual risk behaviours among men who have sex with men

A 2016 systematic review assessed 12 randomized control trials of interventions designed to reduce condomless anal intercourse among substance-using men who have sex with men (10).

Despite the abundance of observational research suggesting a link between alcohol use and sexual risk, only five of the 12 interventions included alcohol consumption when classifying substance use and only one (27) specifically addressed alcohol use in the context of sexual risk.

- A Personalized Cognitive Counselling (PCC) intervention designed to reduce substance use and HIV risk behaviours was tested with 326 at-risk men who have sex with men in San Francisco (28, 29). Participants were randomized to an individualized counselling session (30–50 minutes) plus HIV testing or HIV testing alone. Men who received the intervention were more likely to report abstaining from using alcohol, marijuana and erectile dysfunction drugs. Men who were not dependent on substances had significant reductions in condomless anal intercourse.
- One study that involved 1,686 men in U.S. urban centres compared a cognitive behavioural intervention (six 2-hour group sessions focused on reduction of sexual risk and substance use behaviours), an attention-control

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comparison (six 2-hour group sessions focused on community issues unrelated to sexual risk and substance use behaviours) and one non-randomized arm (standard HIV counselling and testing). Participants in all three groups reduced sexual risk behaviours and there were no significant differences between groups (30).

- A study in Los Angeles examined two different behavioural treatment arms for gay and bisexual men seeking treatment for stimulant and alcohol abuse (31). Participants were randomly assigned to a gay-specific cognitive behavioural therapy arm for 16 weeks or to gay-specific social support therapy for 16-weeks. All participants had a 200% reduction in substance use and sexual risk behaviours, but only those in the gay-specific cognitive behavioural therapy arm reduced their methamphetamine use.
- In an intervention with 515 Florida men who have sex with men who binge drank or used substances at least three times in the past 20 days and who reported unprotected anal intercourse in the past 90 days (32), participants were assigned to either a small group discussion (four small group sessions and one individual session on psychological empowerment) or individual counselling (one session of risk reduction counselling). There were no significant differences in reductions in substance use or sexual risk between the two groups; however, African American men who participated in the study reduced their risk behaviours more quickly than White or Latino men.
- Only one intervention focused specifically on alcohol use and unprotected sexual behaviours among men who have sex with men living with HIV who had an alcohol use disorder (27). Participants received either eight sessions of individual counselling and peer group education (the intervention) or were given a referral guide to community agencies and programs focusing on HIV, safe sex and alcoholism (control group). Both groups reported fewer drinks, drinking days and heavy drinking days, but participants who did not receive the intervention (control group) drank more frequently and consumed more alcohol in a 30-day period than men who did. Participants in the control group who reported more heavy drinking and unprotected-sex days at the beginning of the study (baseline) had a higher number of unprotected-sex days at follow-up than those who received the intervention.

It is important to note with all these interventions, that they were most effective with men whose did not have serious substance use issues.

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## What We Did

We searched Medline and PsycInfo using a combination of text terms (gay or men who have sex or homosexual\* or bisexual\* or MSM or queer) and [text terms (alcoholism or binge drinking or alcohol drinking or heavy drinking or alcoholic intoxication) or MeSH terms (Alcoholism or Binge Drinking or Alcohol Drinking or Alcoholic Intoxication or Alcohol Drinking Patterns or Alcohol Abuse or Chronic Alcoholic Intoxication or Acute Alcoholic Intoxication or Alcohol Intoxication or Sobriety or Alcoholism or Alcohol Withdrawal)]. Reference lists of identified literature reviews and systematic reviews were also searched. All searches were conducted on July 12, 2016 and results were limited to English articles published from 2000 to present in high-income countries. The search yielded 590 references from which 46 studies were included. Sample sizes of primary studies ranged from 64 to 6,680.



## Factors That May Impact Local Applicability

Almost all of the studies included were from men who have sex with men in urban US centres, except for three observational studies conducted in Australia (33), Canada (34), and Scotland (35) and should therefore be applicable to local Canadian contexts. It is important to note however that among the selected studies, there was variance in how the authors defined different levels of alcohol consumption (i.e. hazardous drinking, binge drinking, alcohol abuse) which may have introduced a bias across the studies.

## Rapid Response: Evidence into Action

The OHTN Rapid Response Service offers quick access to research evidence to help inform decision making, service delivery and advocacy. In response to a question from the field, the Rapid Response Team reviews the scientific and grey literature, consults with experts, and prepares a brief fact sheet summarizing the current evidence and its implications for policy and practice.

### Suggested Citation

Rapid Response Service. The effect of alcohol consumption on ART adherence and sexual risk behaviours among men who have sex with men. Toronto, ON: Ontario HIV Treatment Network; November, 2016.

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