



## Review

Does being drunk or high cause HIV sexual risk behavior? A systematic review of drug administration studies<sup>☆</sup>

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## ABSTRACT

HIV sexual risk behavior is broadly associated with substance use. Yet critical questions remain regarding the potential causal link between substance use (e.g., intoxication) and HIV sexual risk behavior. The present systematic review was designed to examine and synthesize the existing literature regarding the effects of substance administration on HIV sexual risk behavior. Randomized controlled experiments investigating substance administration and HIV sexual risk behavior (e.g., likelihood of condom use in a casual sex scenario) were included. Across five databases, 2750 titles/abstracts were examined and forty-three total peer reviewed published manuscripts qualified (few were multi-study manuscripts, and those details are outlined in the text). The majority of articles investigated the causal role of acute alcohol administration on HIV sexual risk behavior, although one article investigated the effects of acute THC administration, one the effects of acute cocaine administration, and two the effects of bupropion. The results of this review suggest a causal role in acute alcohol intoxication increasing HIV sexual risk decision-making. Although evidence is limited with other substances, cocaine administration also appears to increase sexual risk, while acute cannabis and bupropion maintenance may decrease sexual risk. In the case of alcohol intoxication, the pharmacological effects independently contribute to HIV sexual risk decision-making, and these effects are exacerbated by alcohol expectancies, increased arousal, and delay to condom availability. Comparisons across studies showed that cocaine led to greater self-reported sexual arousal than alcohol, potentially suggesting a different risk profile. HIV prevention measures should take these substance administration effects into account. Increasing the amount of freely and easily accessible condoms to the public may attenuate the influence of acute intoxication on HIV sexual risk decision-making.

## 1. Introduction

Alcohol and other drug use (hereafter referred to as “substance” use) has been identified as a significant risk factor in HIV transmission through mechanisms such as sexual risk behavior (e.g., unprotected sex, multiple partners) and needle sharing (Centers for Disease Control and Prevention [CDC], 2015a, 2016a; Scott-Sheldon et al., 2016). Sexual risk behavior is widespread among drug users, including alcohol users (Kalichman et al., 2007; Meade et al., 2014; Molitor et al., 1998); injection drug use, however, is relatively rare within many drug-using populations (e.g., roughly 10% for cocaine users, Chaisson et al., 1989; Hudgins et al., 1995; Morissette et al., 2007; 2.5% for prescription opioid users, Meade et al., 2014), and nearly non-existent in alcohol using populations (Mahdi and McBride, 1999). Unprotected sex

perpetually accounts for the largest proportion of new HIV infections globally (70–80%; CDC, 2011). Among people living with HIV, substance use is prevalent (22–40% alcohol; 6–29% other substances) and is a significant predictor of unprotected, risky sex (Scott-Sheldon et al., 2016; Beckett et al., 2003). Taken together, these data suggest that risky sexual behavior, as opposed to injection drug use, is the most prominent HIV transmission mechanism – and substance use plays a role in driving risky sexual decision-making associated with HIV transmission.

Various methods have been used to examine relations between risky sex and substance use (Halpern-Felsher et al., 1996) including global correlational studies (i.e., lifetime associations between substance users and HIV incidence and sexual risk behavior, e.g., Staton et al., 1999), and situational covariation studies (e.g., substance use and HIV sexual

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risk behavior within the past 30 days; e.g., Biglan et al., 1990). Global correlational and situational covariation studies have extensively demonstrated broad associations between amphetamine, methamphetamine, cocaine, alcohol or opioid use and increased HIV incidence and sexual risk behaviors (Buchacz et al., 2005; Molitor et al., 1998; Booth et al., 1993; Booth et al., 2000; Friedman et al., 2017; McCoy et al., 2004; Shuper et al., 2009, 2010; Halpern-Felsher et al., 1996; Scott-Sheldon et al., 2016; for reviews see e.g., Lan et al., 2016; Li et al., 2010; Heath et al., 2012; Kalichman et al., 2007). In addition to correlational studies, event-level methods (e.g., ecological momentary assessments, Wray et al., 2015; diary methods; Bailey et al., 2008) have also been used. Event-level analyses incorporate naturalistic data collection to enable participant recording of substance use and HIV sexual risk behavior within a defined temporal window (e.g., responses to random prompts to record recent substance use and HIV sexual risk behavior via a study cellular phone). A causal link between acute substance use and HIV sexual risk behavior, however, cannot be inferred from correlational or event-level methodologies.

Critical questions remain regarding the potential causal mechanisms of substance use and HIV sexual risk behavior. For example, the influence of disinhibitory effects while intoxicated, increased sexual arousal while intoxicated, or expectancy effects of drugs or alcohol (Rhodes and Stimson, 1994) on HIV sexual risk decision-making have yet to be disentangled. These factors are difficult or impossible to address, manipulate, and control in naturalistic settings or with retrospective correlational analyses.

Experimental drug administration methods constitute a complement to the correlational and naturalistic methods described above, and allow causal examination of the effects of drug and alcohol intoxication on HIV sexual risk behaviors. Drug administration experiments investigate hypothetical HIV sexual risk decision-making processes while under the influence of controlled doses of alcohol or other substances using placebo controlled designs to address potential influential variables (e.g., expectancy effects, arousal). For example, one decision-making model involves audio-video interactive role-play (e.g., Maisto et al., 2002), in which the participant is shown a video and asked how he/she might respond to the sexual situation presented, such as whether to have protected or unprotected sex with the partner in the video. Another example of a decision-making model involves isolating the influence of delay to condom availability on the likelihood of unprotected sex within the Sexual Delay Discounting Task (SDDT; Johnson et al., 2017). For example, one may prefer to use a condom with a casual partner because it decreases the risk of HIV transmission. However, if a condom is not immediately available, the same person might prefer immediate unprotected sex over waiting to obtain a condom, because the discounted value of delayed sex with a condom is lower than the immediate value of unprotected sex (Johnson and Bruner, 2012; Johnson et al., 2015). If acute substance use does indeed play a causal role in HIV sexual risk decision-making processes, then this would directly inform the development of interventions that could prevent HIV transmission.

The focus of this review, therefore, was on experimental laboratory methods explicitly designed to understand the causal pharmacological influences on sexual risk decision-making processes. For this reason we focus on acute substance administration in the context of controlled laboratory settings. The aim of this systematic review is to collate and synthesize studies investigating whether substance use, with specific emphasis on acute drug effects, causally influences HIV sexual risk decision-making.

## 1.1. Defining substance use and sexual risk behavior

### 1.1.1. Substance use

For the purposes of this review, substance use is defined as the use of a psychoactive substance, regardless of whether that use is in the context of a substance use disorder.

### 1.1.2. Sexual HIV risk behavior

Sexual HIV risk behavior can be defined as any sexual behavior putting individuals at risk for acquiring or transmitting HIV including sex with or without a condom with multiple partners, sex with or without a condom with unknown partners, and unprotected vaginal, anal, or oral sex (CDC, 2015b, 2013). Although the risk of transmitting HIV via oral sex is low, this risk increases if cuts or sores are present in the mouth or vagina, or on the penis, or if this behavior is repeated many times (CDC, 2016b). As condom protected as opposed to unprotected sex is a highly effective means of preventing HIV transmission among sexually active individuals (CDC, 2013), we place particular emphasis on reviewing studies that report decision-making processes related to condom use or unprotected sex, or likelihood of condom use or unprotected sex.

## 2. Methods

### 2.1. General search strategy

For this literature review, we conducted both automated and manual searches. Systematic searches were conducted across five psychology, health and multidisciplinary electronic databases (PsycINFO, GoogleScholar, PubMed, WorldCat, Catalyst) during October 2016 through January 2017. The search was conducted in conjunction with the guidelines for systematic reviews outlined by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher et al., 2009). The search was conducted using systematic search vocabulary as key words in the title and abstract across all databases. Search terms spanned specific topics and methods serving the objective of this review: (1) Substance use (e.g., alcohol, cocaine), (2) Acute administration of drug, and (3) HIV sexual risk behavior (e.g., unprotected sex), and decision-making. Systematic combinations of the following search terms were used:

- “substance use” “addiction” “drug use” “acute drug effects” “drug administration” “alcohol administration” “alcohol”
- “HIV risk behavior” “sexual risk behavior” “condom use” “unprotected sex”
- “decision-making” “sexual delay discounting”

The reference sections of relevant publications were also examined for potential inclusion in this review.

### 2.2. Inclusion criteria

For studies to qualify for inclusion, the published manuscripts were required to: 1) include a study abstract, 2) be published in English, 3) be a primary peer reviewed article, 4) present data on acute substance administration, 5) report data involving HIV sexual risk behavior while under the influence of substance in a controlled laboratory setting, 6) present data on decision-making processes related to condom use (e.g., likelihood of condom use, attitudes towards condom use, sexual abstinence, or similar metrics). To conduct the most inclusive literature review possible under the aforementioned criteria, no restrictions were placed on the type of substance administered within the experiment, the age of use, or the country or population of the study.

The first author reviewed the titles and abstracts of studies to determine initial relevance. In some cases the title and abstract did not provide sufficient information to determine relevance, and in these cases the first author reviewed and compared the study content to the inclusion criteria. To ensure accurate representation of the originally presented forms of drug use and HIV sexual risk behavior – original terms and concepts that were employed by the authors within the primary studies remain intact in this review (Heerde and Hemphill, 2016).

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