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Concordance between self-reported substance use and toxicology among HIV-infected and uninfected at risk youth

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ABSTRACT

Background: Substance use by youth living with HIV (YLWH) is a concern, given potential interactions with virus-associated immune suppression and adverse effects on risk behaviors, neurocognition, and adherence. Self-report substance use measures provide efficient cost-effective assessments. Analyses describe self-reported substance use among YLWH and examine agreement with toxicology assays.
Methods: Seventy-eight youth age 18–24 years (87% male, 71% African–American) with behaviorally acquired HIV-1 infection and 55 uninfected youth completed the Alcohol, Smoking, and Substance Involvement Screening Test to assess drug use frequency, including tobacco, marijuana, cocaine, and alcohol, over the prior three months. Elisa-based toxicology assays were used to detect 27 substances in plasma. Chi-square tests compared substance use between YLWH and uninfected youth; Kappa statistics compared agreement between self-report and toxicology.
Results: YLWH reported marijuana (49%), tobacco (56%), and alcohol (87%) use, with 20%, 28% and 3% reporting daily use of each substance, respectively; other substance use was uncommon. Uninfected youth reported less tobacco use but otherwise similar substance use. All youth who reported daily use of marijuana or tobacco had positive plasma toxicology results, while concordance decreased with less frequent self-reported use. Among youth reporting no substance use, few tested positive (4% YLWH, 2% uninfected youth for cannabis; 8%YLWH for tobacco).
Conclusions: Youth report high rates of marijuana, tobacco, and alcohol use. Concordance between self-report and toxicology for marijuana and tobacco use, particularly for daily users, supports self-report as a valid indicator of substance use in research studies of youth with or without HIV-1 infection.

1. Introduction

Substance use is one of the most critical issues facing late adolescents and young adults ("youth"; Centers for Disease Control and Prevention, 2012) with or at risk for HIV infection and clinicians who work with them. Substance use is prevalent among youth in general, with a shift towards greater use and acceptance of marijuana (Brasseux et al., 1998), daily use of which is greater than at any other time in the last 30 years (Johnston et al., 2012) among high-school age youth.

A primary reason for concern regarding substance use among youth with HIV is its potential for contributing to disease progression, morbidity and transmission. Recent studies of changes in and patterns of substance use among youth with behaviorally acquired HIV, however, are lacking. Youth, who make up the largest group of new HIV infections (Centers for Disease Control and Prevention, 2011), may be at greater risk than adults for negative central nervous system outcomes related to substance use due to their ongoing brain development (Sowell et al., 2003) and the potentially greater impact of substance use during adolescence than adulthood (Squeglia et al., 2009). Interactions of the immune and central nervous system effects of cannabis and other substances of abuse with those of HIV in youth are a growing concern. Youth are also

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characterized by higher rates of sexual risk behaviors (Eaton et al., 2012) and poor medication adherence (Tanney et al., 2010); exacerbation of these risk behaviors by substance use has implications for HIV prevention and treatment outcome. In addition, tobacco use is higher among individuals with HIV than in the general population (Webb et al., 2007), and is an important contributor to non-AIDS-defining as well as AIDS-defining illness and mortality in this population (Helleberg et al., 2013; Shirley et al., 2013). Accurate assessment of substance use among youth with HIV has great importance for research on HIV treatment and outcomes as well as for clinical care.

Self-report is an efficient and cost effective means of assessing substance use and is particularly appropriate for studies where substance use is not the primary study outcome. However, concern that societal, family and legal pressures against drug and alcohol use may lead to underreporting by adolescents raises questions about the validity of using self-report. Concerns have been raised about under-reporting in studies to validate self-report substance use measures by comparison with biological measures in adults; however, a recent meta-analysis suggests validity of self-report for individual substances in mental health settings (Large et al., 2012). Relatively few studies have focused systematically on youth self-report, and those that have varied widely in methodology, drugs of focus, setting, and findings. The majority of studies have been conducted with youth who have or are at risk for substance use disorders. These studies have reported a range of findings, including under-reporting the frequency of cocaine use over six months compared to hair analysis (Delaney-Black et al., 2010), both under- and over-reported marijuana use over 48 h in comparison with urine toxicology screens (Akinci et al., 2001), and generally acceptable agreement (Solbergsdottir et al., 2004). A study of youth enrolled in or referred for substance abuse treatment showed both under- and over-reporting of substance use in structured interviews compared with urine toxicology, concluding that self-report has only fair validity (Williams and Nowatzki, 2005).

Efforts have been made to maximize likelihood of honest reporting by youth in research settings by measures designed to protect the confidentiality of their self-report. For example, Certificates of Confidentiality allow research sites to maintain privacy of substance use data. Computer-based interviews can transmit de-identified youth self-report directly to central data processing organizations so that site personnel are not aware of the participants' responses to the interview. By using such self-report methods designed to minimize confidentiality concerns, Fendrich and colleagues (2005) compared self-report using audio computer-assisted self-interview (ACASI) with toxicology measures in an examination of tobacco use in a community sample of individuals age 18 and older. They found that under-reporting of tobacco use was uncommon, but was higher compared to previous studies, which the authors speculated might be related to increasing social undesirability of smoking.

Although under-reporting of substance use has been documented for adults with HIV (Hormes et al., 2012), few studies have reported validity of substance use self-report in an adolescent population with HIV. Murphy and colleagues (2000), in a study of high-risk youth age 13–20 both with and without HIV, used ACASI to query participants regarding the timing of their last marijuana use and compared their self-report with urine cannabinoid testing, about which participants had been informed in advance. This study found higher prevalence by self-report than by toxicological testing, and better agreement between self-report and urine toxicology when use was reported in the previous 5 or 7 than in the previous 2 day period. Agreement of self-report with toxicology was higher for HIV-infected than for uninfected participants. The authors concluded that self-report may more accurately reflect marijuana use over periods longer than 48 h than does urine cannabinoid testing, and for that reason has advantages for estimating prevalence of use; furthermore, self-report may be particularly advantageous for youth with HIV.

The purpose of the present analyses was to extend the findings of Murphy and colleagues by examining the relationship of self-report ACASI measures of substance use with plasma testing of a range of substances of abuse. The study cohort included individuals with HIV in the late adolescent/young adult age range (18–24) who were participating in a study of neurocognitive consequences of behaviorally acquired HIV infection. These analyses add to previous findings by addressing tobacco, alcohol and other drugs of abuse in addition to marijuana; using highly sensitive plasma toxicology assays; and assessing self-reported frequency of use over a longer time period. Because of concerns that youth who smoke cannabis in combination with tobacco would under-report tobacco use, analyses included co-use of marijuana and tobacco. Agreement of self-reported substance use and plasma toxicology also was analyzed for a group of similar HIV uninfected youth.

2. Methods

2.1. Participants

Youth aged 18–24 years with behaviorally acquired HIV-1 infection and CD4+ T cell counts >350 were enrolled from 15 Adolescent Medicine Trials Network for HIV/AIDS Interventions (ATN) and 12 International Maternal Pediatric Adolescent AIDS Clinical Trials (IMPAACT) sites located in largely urban settings across the US and Puerto Rico into a prospective longitudinal study (ATN 061) of the preservation and expansion of T-cell subsets following initiation of antiretroviral therapy (ART). Among the 102 youth enrolled in ATN 061, 78 co-enrolled in a longitudinal study of neurocognitive functioning that included self-report assessment of substance use (ATN 071). Self-report, clinical and laboratory data from these 78 participants, who constitute the YLWH group, obtained at study entry were used for analyses. Exclusion criteria included prior ART experience (other than less than 6 month duration to prevent mother-to-child transmission of HIV), pregnancy, active substance use or dependence to a degree judged likely to interfere with meeting study requirements, psychosis, or significant non-HIV related cognitive or motor impairment (e.g., cerebral palsy or severe traumatic brain injury). Learning disabilities and Attention-Deficit/Hyperactivity Disorder (ADHD) were allowed. Fluency in English or Spanish was required. HIV uninfected youth of similar age, gender and ethnicity to the YLWH group were recruited from a single urban site in Florida. These youth were volunteer university students and youth followed at adolescent care clinics who were self-declared to be healthy. Inclusion criteria included age 18 to 24, HIV-uninfected, and no recent systemic illnesses, vaccinations, or pregnancy. CD4 T cell counts were obtained at entry for all subjects and HIV RNA viral load, for the YLWH group, was abstracted from medical records or study visit case report forms. The study was approved by the Institutional Review Board (IRB) at all participating institutions; participants provided written informed consent in accordance with local IRB requirements prior to enrollment.

2.2. Study evaluations

2.2.1. Substance use self-report. YLWH completed the World Health Organization Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST; World Health Organization, 2002) via an audio computer-assisted self-interview (ACASI) conducted using a designated laptop computer in a private room. Data were transmitted immediately to a central data processing system and were not available to site personnel. The ASSIST was developed and validated as a substance use screening tool for individuals age 18 and above and has been used in studies of youth with HIV (Naar-King et al., 2010). It queries frequency of use during the past 3 months for tobacco products, alcohol, cannabis, cocaine, amphetamines, inhalants, sedatives, hallucinogens, opioids, and other, with frequency categories of "Never", "Once or Twice", "Monthly", "Weekly", and "Daily". Other questions about consequences of substance use (e.g., substance use leading to health, social, legal or financial problems), estimated lifetime use, and age of first use were not included in these analyses. YLWH completed the ASSIST and had blood samples drawn as part of their participation in separate studies and were not aware that the two would be compared. Uninfected youth completed a written version of the ASSIST questionnaire. For uninfected youth, plasma samples were obtained at the same visit and they were informed that toxicology assays for drugs would be performed.

2.2.2. Toxicology assays. Plasma samples were analyzed by Immunalysis Corporation (Pomona, CA; Immunalysis.com),utilizing enzyme-linked immunosorbent assays (ELISA) for 27 analytes including common over-the-counter, prescription, and illicit drugs. The cannabinoids (Δ9-tetrahydrocannabinol, THC) ELISA assay