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Racial/Ethnic differences in the rates and correlates of HIV risk behaviors among drug abusers

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Abstract

This study examined racial/ethnic differences in the rates of HIV risk behaviors and whether the relationship between HIV risk factors and HIV risk behaviors varies by race/ethnicity in clients participating in NIDA Clinical Trials Network multi-site trials. The sample was 41% non-Hispanic White, 32% non-Hispanic Black, and 27% Hispanic (N=2,063). HIV risk behaviors and measures of substance and psychosocial HIV risk factors in the past month were obtained. Non-Hispanic Blacks engaged in less HIV sexual risk behaviors overall than non-Hispanic Whites. While non-Hispanic Whites were the most likely to report any injection drug use, Hispanics engaged in the most HIV drug risk behaviors. Specific risk factors were differentially predictive of HIV risk behavior by race/ethnicity. Alcohol use severity was related to engaging in higher sex risk behaviors for non-Hispanic Blacks and non-Hispanic Whites. Greater psychiatric severity was related to engaging in higher sex risk behaviors for non-Hispanic Whites. Drug use severity was associated with engaging in higher risk drug behaviors for non-Hispanic Whites and Hispanics with the magnitude of the relationship stronger for Hispanics. These findings highlight the need for further research testing HIV risk prevention interventions within racial/ethnic groups to identify target behaviors or risk factors that are salient for certain groups to inform HIV prevention interventions.

Keywords

racial differences; ethnic differences; HIV; HIV risk behaviors; HIV sex risk; HIV drug risk; HIV risk factors; substance abuse treatment

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Introduction

HIV infection continues to disproportionately impact minorities in the United States.[1] In a recent report, the incidence of HIV infection was estimated to be 7 times higher among African-Americans and 3 times higher in Hispanics than among Whites. African-Americans comprise 47% of persons living with HIV, followed by Whites (34%) and Hispanics (17%). While the most prevalent mode of transmission for persons living with HIV infection continues to be male-to-male sexual contact (MSM; 45%), high-risk heterosexual contact (27%) and injection drug use (22%) also contribute significantly to transmission. Furthermore, studies have found comparable HIV infection rates between injection and non-injection drug users.[2-4] Non-injection drug use (non-IDU) contributes to the increased likelihood of engaging high-risk heterosexual contact, such as unprotected intercourse and sex trading[5,6] and bridging between injection drug use (IDU) and non-IDU social and sexual networks[4], highlighting the importance of directing HIV prevention efforts toward drug users and drug treatment programs. Racial/ethnic differences in transmission routes further highlight the need to understand the complex interaction between race/ethnicity, drug use, and HIV risk behaviors. For example, in comparison to White men (14%), the route of transmission is more likely to be IDU-related or heterosexual sex for African American (35.7%) and Hispanic (26.6%) men infected with HIV.[7] Conversely, the route of HIV transmission is less likely to be heterosexual sex among White women (74.8%) in comparison to African American (86.7%) and Hispanic (83.5%) women.

The effectiveness of HIV risk reduction interventions may differ for racial/ethnic minority samples based on the intervention strategy employed. A comprehensive meta-analysis spanning 17 years and various intervention settings, target samples, and countries found that, while certain strategies were equally effective across racial/ethnic groups, persons of African backgrounds tended to benefit more from programs utilizing behavioral skills components, self-management skills training, and HIV-counseling and testing; while condom provision was more effective in White samples.[8] Recent reviews of HIV risk reduction interventions specifically focused on drug users and drug treatment programs suggest outcomes are somewhat mixed. A meta-analysis of interventions conducted in drug treatment programs found treatment effect sizes were lower and interventions less comprehensive in programs where participants were predominantly minorities.[9] In contrast a meta-analysis of HIV risk reduction interventions targeting injection drug users found no racial/ethnic differences in impact on sexual risk behaviors; however minority participants were more likely than Whites to decrease IDU behaviors following HIV risk reduction interventions.[10] Furthermore, a recent CDC survey of injection drug users found participation in behavioral interventions to be higher for African-Americans and Hispanics than Whites.[11]

Given the high incidence of HIV in minorities and evidence suggesting possible differential effectiveness of HIV risk reduction intervention strategies for minorities, studies examining ethnic differences in the prevalence and correlates of risk behaviors to inform program development are warranted. To date, this literature has been limited in a number of ways. Many studies in this area are more narrowly focused restricting samples to a single racial/ethnic group (e.g., within African-Americans) or within gender (e.g. African-American vs. White females). In addition, the racial/ethnic distribution in many studies is often too small to conduct valid comparisons and is often controlled for in the analyses.

At the same time, an extensive body of research has identified multiple risk factors for HIV risk behaviors in general, such as stimulant use,[5,12-16] homelessness or unstable housing,[17-20] psychological distress or co-occurring mental illness,[19,21-24] childhood abuse,[25-27] and recent incarceration,[28] with mixed findings for alcohol use.[16,29-35] However

investigators rarely examine whether these relationships vary with racial/ethnici group. For example, one study examined differences between Whites, African-Americans and Hispanics in psychosocial risk factors; however, whether these risk factors differentially impacted the likelihood of engaging in sexual risk behaviors was not examined.[36] Similarly, in a study of new drug users, African-American race, homelessness, childhood neglect, paranoia, and interpersonal conflict style predicted frequency of engaging in high risk sexual behavior; however the interaction between racial/ethnic group and individual risk factors was not examined.[37]

Other studies have examined the relationship between risk factors and HIV risk behaviors within racial/ethnic group. A relationship between alcohol use, crack use and combined alcohol and crack use and high risk sexual activities was found in an African-American only sample of non-injection drug users.[38] Lower education, crack use, and high risk sexual partners predicted HIV infection in rural African-Americans.[39] Alcohol use was related to both injection and sexual risk behaviors in a sample of injection drug users in Puerto Rico.[31]

Because of the relationship between drug use and HIV high risk sexual behaviors, as well as evidence that HIV risk factors and risk behaviors vary between racial/ethnic groups, it is important to better understand these differences within the context of drug abuse treatment programs. Drug abuse treatment programs provide an important treatment system portal in which HIV prevention interventions might effectively target individuals at high risk for HIV infection and transmission. The purpose of the present study was to examine racial/ethnic differences in the prevalence and correlates of sexual and drug-related HIV risk behaviors in a large sample of treatment-seeking individuals with substance use disorders participating in seven multi-site trials of the National Institute on Drug Abuse (NIDA) Clinical Trials Network (CTN). The CTN offers a unique opportunity to study racial/ethnic-related HIV transmission risk behaviors of persons entering substance abuse treatment.[40,41] By pooling data across trials, a large, demographically and geographically diverse treatment sample can be obtained. In addition, combining data across CTN trials allows us to systematically examine multiple HIV risk factors with a sufficient sample size to examine racial/ethnic differences. The design of this study parallels an earlier secondary data analysis of five CTN trials examining gender differences in the prevalence and correlates of HIV risk behaviors.[42] The specific aims of this study were to: (1) compare HIV risk behaviors among non-Hispanic Blacks, Hispanics, and non-Hispanic Whites in this large, geographically and demographically diverse sample of drug users, and (2) test whether the relationship between multiple HIV risk factors and HIV risk behaviors varies by racial/ethnic group. Specifically, this study examined whether race/ethnicity moderates the relationship of stimulant use, alcohol use, psychiatric symptoms, physical and sexual abuse history, family/social relations, housing stability, drug use severity, and legal involvement with HIV risk behaviors.

Well-documented economic and health care disparities for African-Americans coupled with the unique characteristics of their sexual network patterns[39] may make African-Americans particularly vulnerable to engaging in high risk behaviors. A similar constellation of economic and health care disparities as well as migration patterns and cultural factors also impact HIV transmission among Hispanics.[43,44] Accordingly, we hypothesized that the multiple HIV risk factors described above would be associated with engaging in greater HIV risk behaviors for African-Americans and Hispanics than Whites.

Methods

Participants and procedures

The NIDA CTN is a network of universities and community treatment programs that conduct multi-site effectiveness trials of promising evidence-based drug abuse treatments throughout the United States.[40,41] Consistent with National Institute of Health (NIH) data sharing policy, archived CTN data sets are available for secondary analysis (www.ctndatashare.org). Accompanying the data sets are guidelines and recommendations for appropriate use of the data sets.

In the present analysis, randomized participants in seven CTN multi-site controlled clinical trials were included (data downloaded May, 2007). Table 1 provides a brief summary of the trials and number of participating sites. Participants in 6 of the 7 trials were recruited into the CTN trial upon treatment entry (CTN-001, CTN-002, CTN-004, CTN-005, CTN-006, and CTN-021). In CTN-007 the sample was recruited from treatment-seeking methadone maintenance clients with an active stimulant use problem evidenced by stimulant positive urine toxicology. Detailed reports of the seven trials are also available from the CTN Dissemination Library (http://ctndisseminationlibrary.org). The seven trials utilized common assessment measures, affording an opportunity to examine HIV risk behaviors in treatment enrolled individuals across geographic locales in a large, demographically diverse sample. Because of the heterogeneity of the subjects enrolled in the seven trials (see Table 2), we controlled for participant demographic characteristics that varied between protocols in our analyses. IRB approval was obtained for the individual trials as well as for the present secondary analysis.

All participants with complete data (2,063 out of 2,326, 89%) were included in the secondary analysis. A majority of the participants excluded from the analyses were missing one or more of the primary variables in the models (e.g., sex risk composite, gender, etc.). Due to the small sample size and heterogeneity, participants whose race/ethnicity was recorded as ‘other’ were dropped from the analyses (n=133).

Measures

HIV risk behaviors were assessed using the HIV Risk Behavior Scale (HRBS).[45,46] This 12-item instrument assesses the extent to which respondents have engaged in drug risk behaviors (6 items) and sex risk behaviors (6 items) during the prior 30 days. Items are rated on a 6-point scale with higher scores indicating higher risk. HRBS composite scores with demonstrated reliability and validity[47] may be calculated by summing the 6 individual drug and 5 of the 6 sex risk items. Drug risk behaviors assessed are frequency of injection drug use, receptive and distributive needle sharing, and needle cleaning. Sexual risk behaviors assessed are number of partners, sex trading, anal sex and condom use. In addition to sex and drug composite scores, the HRBS was used to examine ethnicity differences in specific HIV risk behaviors: 1) needle sharing, 2) needle cleaning, 3) sex with 2 or more partners, and 4) any unprotected sex.

Potential predictors of HIV risk behaviors and sociodemographic variables were obtained using the Addiction Severity Index-Lite (ASI-L revised from the fifth edition of the ASI).[48] The ASI-L is a standardized, multidimensional, semi-structured, comprehensive clinical interview that provides sociodemographic and substance use histories as well as ASI composite scores for six functional domains commonly affected in substance abusers: alcohol and drug use severity, medical, psychiatric, legal, family/social and employment/support. Sociodemographic variables included were gender, age, years of education, race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic), employment status (full-time, part-time, other), and living arrangement (with sexual partner or not). Due to the de-

identification procedures employed in creating the public datasets, it was not possible to identify Hispanic sub-groups or racial identity. As part of the de-identification process participants are coded only as non-Hispanic White, non-Hispanic Black, Hispanic, or other. Therefore, Hispanics in this study can be of any race.

Based on the available evidence and our research questions, ASI-L composite scores for alcohol severity, drug severity, family/social relationships (a measure of current conflicts and seriousness of interpersonal problems with both family and social network members), psychiatric symptom severity, and legal problems (a measure of current legal system involvement and engagement in illegal activities), were examined for association with HIV drug risk and sexual risk behaviors. Primary drug was defined as opioid users with no stimulant use, stimulant users with no opioid use, users of both opioids and stimulants, and a final "other" category included substance users who used neither opioids nor stimulants. Lifetime trauma was defined as lifetime physical abuse only, lifetime sexual abuse only, and both lifetime physical and sexual abuse. Housing stability was a continuous variable defined as length at present address.

Statistical Analyses

First, race/ethnicity differences in sociodemographic characteristics, HIV risk behaviors, and ASI composites were examined using chi-square tests for categorical variables and Kruskal-Wallis tests for continuous variables. Second, a series of models were conducted to identify variables associated with each of the two dependent variables: HIV drug risk and HIV sex risk (HRBS composite scores). In the first model we investigated the effect of race/ethnicity and whether the effect of race/ethnicity differed by gender, after adjusting for covariates. Eight predictor variables were considered in subsequent models: (1) ASI alcohol use severity composite, (2) ASI drug use severity composite, (3) ASI family/social relationships composite, (4) ASI psychiatric symptom severity composite, (5) ASI legal involvement severity composite, (6) any stimulant use, alone or combined opiate-stimulant use (versus reference category: opiates only or other drug), (7) trauma history, and (8) housing stability. ASI composites are scored on a scale from 0-1. In the present analyses, the ASI composite results are described using a clinically meaningful difference unit (0.1) as the measurement unit. In each model, both the main effect of the variable and its interaction with ethnicity were considered. When interaction between race/ethnicity and the variable was not statistically significant, it was omitted from the model. All models were adjusted for age, gender, years of education, employment status, and living arrangements as covariates known to be associated with HIV drug risk and HIV sex risk. While the models controlled for participant characteristics as a means for controlling for heterogeneity between protocols, the analyses were repeated including protocol and protocol by predictor interaction in the models. All statistical tests were two-sided. A p-value < 0.05 was considered statistically significant.

The frequency distribution of the HRBS sex risk composite was non-normal. Therefore, for the analyses, three categories of risk were created: (1) low risk – score less than 6 (29.6% of the sample), (2) moderate risk – score equal to 6 (53.2% of the sample), and (3) high risk – score greater than 6 (17.2% of the sample). Ordinal logistic regression analysis using partial proportional odds model was conducted to identify variables associated with sexual risk. Models of this type consider two or more logistic regression models simultaneously. In this case, the first model examined high versus moderate/low risk, and the second model examined high/moderate versus low risk. For each variable, the proportional odds assumption (i.e., whether the model coefficients were equal in both logistic regression models) was first tested. When this assumption was met, odds ratios were the same in both models. When this assumption was not met, separate odds ratios were estimated for each of the two models. Odds ratios greater than 1 indicate a positive association between the

variable and increased sex risk behavior, while odds ratios less than 1 indicate a negative association. 95% confidence intervals were also computed. The HRBS drug risk behavior composite was approximately normally distributed. Therefore, for this series of analyses, linear regression models were used to identify variables associated with drug risk.

Results

Participant characteristics

The sample included 838 non-Hispanic Whites (41%), 665 non-Hispanic Blacks (32%), and 560 Hispanics (27%). Participant characteristics by racial/ethnic group are presented in Table 3, and several group differences were statistically significant. Hispanics were the least likely to be female, had less education, were most likely to be employed full-time and most likely to be living with a sexual partner. Non-Hispanic Blacks had the oldest mean age. Primary drug also differed significantly by ethnicity. Non-Hispanic Blacks were the most likely to report combined opiate and stimulant use as the primary drug. In contrast Hispanics were the most likely to report other drug use as primary. Non-Hispanic Whites were the most likely to report use of heroin/other opiates only.

Participants also differed significantly on HIV risk behavior correlates. Alcohol use and legal severity was lowest in non-Hispanic Blacks and length at present address was the longest. Drug use severity and abuse history was lowest for Hispanics, while non-Hispanic Whites showed the greatest psychiatric severity.

HIV sexual and drug risk behavior by ethnicity

Table 4 presents the frequency of HIV sex and drug risk behaviors in the past 30 days by ethnicity. Almost two-thirds of the sample were sexually active. Non-Hispanic Blacks were the most likely to report multiple partners and least likely to have unprotected sex with casual partners. Non-Hispanic Blacks were the most likely to report trading sex. Hispanics were slightly more likely to have unprotected sex when trading sex; however, they were also less likely to be trading sex. No ethnicity differences were found for unprotected sex with a regular partner, unprotected sex during anal intercourse, or in the distribution of the sex risk composite score.

Overall, 20% of participants reported injection drug use in the past 30 days. Among injectors, 66% were daily users, 57% inconsistently cleaned needles before using, and 19% reported receptive needle sharing. Hispanics were less likely to report any injection drug use than non-Hispanic Blacks or non-Hispanic Whites. Among those injecting, non-Hispanic Blacks were less likely to report daily injection drug use or distributive needle sharing; they also had lower overall drug risk score while Hispanics had the highest overall drug risk score. No racial/ethnic differences were found in receptive needle sharing and needle cleaning.

Correlates of sexual risk behavior

In the analyses examining correlates of sexual and drug risk behavior, for each potential predictor variable of HIV drug risk and HIV sex risk behaviors, separate regression coefficients by race/ethnicity were considered only if interaction between the variable and race/ethnicity was significant at 0.05 level. The analyses of HRBS sexual risk behavior composite score included the 1261 participants who reported sexual activity in the past 30 days. Table 5 presents the results of the ordinal logistic regression analyses of the two outcomes: high risk versus moderate/low risk and high/moderate risk versus low risk. Separate odds ratios for the two outcomes are presented only if the proportional odds assumption was not met; otherwise, the odds ratios are the same in both models. Overall,

non-Hispanic Blacks were less likely to report high/moderate sexual risk versus low sexual risk behaviors than non-Hispanic Whites (p=0.0074). The association between race/ethnicity and sexual risk did not differ by gender. Significant interactions with ethnicity were found for alcohol severity (p=0.0031) and psychiatric severity (p=0.012). Non-Hispanic Blacks with greater alcohol use severity had 1.15 times higher odds (per 0.1 unit increase in alcohol use composite; 95% CI = 1.05-1.27) of reporting high sexual risk versus moderate/low sexual risk; while Non-Hispanic Whites with greater alcohol severity had 1.09 times higher odds (per 0.1 unit increase in alcohol use composite; 95% CI = 1.01-1.19) of reporting high/moderate versus low sexual risk. Non-Hispanic Whites with greater psychiatric severity were more likely to report high/moderate sexual risk versus low sexual risk (odds ratio per 0.1 unit increase in psychiatric composite 1.12; 95% CI = 1.03-1.22). Greater psychiatric severity was also possibly associated with high sexual risk versus moderate/low sexual risk for non-Hispanic Blacks and Hispanics (for both groups odds ratio per 0.1 unit increase in psychiatric composite 1.13; 95% CI = 1.02-1.25); however, this association was not statistically significant.

Additional variables associated with higher sexual risk that did not differ by race/ethnicity were stimulant use, drug use severity, sexual abuse history, physical abuse history, or both sexual and physical abuse history, and legal involvement severity. Housing stability and family/social composite were unrelated to sexual risk. The above finding for alcohol severity interaction was confirmed in the model that included protocol and protocol by alcohol severity interaction. However, the results for ethnicity and interaction of psychiatric severity and ethnicity were no longer statistically significant after adding protocol and interactions of these variables with protocol to the model.

Correlates of HIV drug risk behavior

The analyses of HRBS drug risk behavior composite score included the 412 participants who reported any IDU in the past 30 days. Table 6 presents the results of the linear regression models for HIV drug risk behavior. A significant interaction with race/ethnicity was found for drug use composite (p=0.023). Non-Hispanic Whites with greater drug use severity had higher HIV drug risk behavior (β = 1.12 per 0.1 unit increase in drug use composite; t=3.43, p=0.0007). In Hispanics greater drug use severity had a more pronounced association with higher HIV drug risk behavior (β = 1.70 per 0.1 unit increase in drug use composite; t=2.79, p=0.0055). Interaction between race/ethnicity and psychiatric composite was also statistically significant (p=0.040). Analyses results indicate that greater psychiatric severity was possibly associated with higher HIV drug risk behavior in non-Hispanic Whites and lower HIV drug risk behavior in non-Hispanic Blacks and Hispanics; however, this association was not statistically significant for any of the racial/ethnic groups. All other variables (gender-race/ethnicity interaction, alcohol use composite, stimulant use as primary drug, abuse history, family/social severity, housing stability, and legal involvement severity) were unrelated to HIV drug risk behavior. After adjusting for protocol and protocol by predictor interactions, the observed racial/ethnic group differences in the association of drug use severity and psychiatric severity with HIV drug risk behavior were no longer statistically significant.

Discussion

This study examined racial/ethnic differences in the rates and correlates of HIV drug and sex risk behaviors in a large, multi-site sample of individuals seeking treatment for substance abuse. Some differences in the prevalence of individual HIV risk behaviors were found. An important finding of this study was that the relationship between certain HIV risk factors and HIV risk behaviors differed between racial/ethnic groups. However, our results should be interpreted in light of the following limitations. The present study examined high risk

behaviors in the past 30 days which may not be a long enough time frame to obtain an adequate sampling of HIV risk behaviors. In addition, the sample consisted of persons entering or enrolled in treatment, which may decrease the likelihood of engaging in high risk behaviors and reduce the statistical power necessary to detect additional racial/ethnic differences. It was not possible to identify and, thus compare, Hispanic sub-groups or racial groups, therefore we could not determine if certain risk factors differ between Hispanic groups. The cross-sectional design of the present study also limits inferences of causality. Each of the seven CTN protocols included in our analysis targeted a specific sub-sample of substance abusers with varying eligibility criteria. However, this limitation was addressed by combining samples across protocols and sites to increase the heterogeneity of the sample and controlling for participant characteristics in the analyses, thereby increasing generalizability across treatment seeking individuals. A recent study examining gender and race/ethnicity differences in retention across 24 CTN trials, found a comparable demographic distribution between CTN study participants and national figures on substance use treatment reported by the Substance Abuse and Mental Health Services for gender and non-Hispanic White, non-Hispanic Black, and Hispanics.[49] However, the inability to replicate the findings for correlates of HIV drug risk behaviors when including protocol in the models suggests that protocol may be a surrogate for a confounding variable that we were unable to identify and accordingly, adjust for.

HIV sex risk behaviors

In terms of specific risk behaviors, non-Hispanic Blacks were more likely to have multiple partners and report trading sex but more likely to use protection in these encounters than non-Hispanic Whites or Hispanics. While Hispanics were less likely to report multiple partners or trading sex; they were less likely to use protection in these situations. Similar to our findings, Wright and colleagues[50] found trading sex more prevalent among African-Americans but inconsistent condom use to be less prevalent. In another study, African-American methamphetamine users were more likely to report anonymous sex than Whites and Hispanics, but there were no differences in unprotected sex between ethnic groups .[36] Elifson[37] found high risk sexual behaviors more prevalent in African-Americans; however the use of condoms during these encounters was not assessed. In contrast to our findings, another study[51] found condom use was lowest among African-American and Hispanic males in a large community-wide sample of men. While a study of unsafe sex practices in HIV positive individuals found no difference between ethnic groups.[34]

Despite higher rates of engaging in specific high risk sexual activities, non-Hispanic Blacks engaged in less HIV high risk sexual behaviors overall than non-Hispanic Whites, which may be attributable in part to the higher rates of using protection in high risk sexual activities. This finding would seem counterintuitive given the higher rates of HIV infection in African-Americans. One possible explanation might be the sexual network pattern found in African-Americans. Sexual network analysis posits that the high rate of concurrent partnerships and sexual activities bridging high risk populations within the African-American community is a critical element influencing the spread of not only HIV, but other sexually transmitted diseases and contributes to the high incidence of HIV.[39,52-54] However, the present study did not assess risk level of sexual partners. In a study of heterosexually transmitted HIV infection among African-Americans, a non-monogamous partner was associated with a greater likelihood of HIV infection.[53] Evidence for partner concurrency and bridging was found in a recent study of African-American males who did not self-identify as gay or bisexual, yet reported high rates of unprotected sex with both male and female partners.[55] In the present study, although no racial/ethnic differences were found, 73% of the sample reported unprotected sex with a regular partner. Given that the present

study did not assess characteristics of the sexual partner(s), it may be that partner status is a critical variable in HIV transmission in minorities and should be addressed in future studies.

Correlates of HIV sex risk behaviors

Alcohol use severity was related to engaging in higher sex risk behaviors for non-Hispanic Blacks and non-Hispanic Whites. This relationship was not found for Hispanics. While studies examining the relationship between alcohol use and HIV risk behaviors have been mixed, this may be due in part to the variation in samples between studies, e.g., HIV positive individuals,[29,34] IDUs,[31,35] drug offenders.[30] Additionally, many studies control for race/ethnicity or merely report the racial/ethnic group distribution of the sample, possibly due to the small sample size of one or more racial/ethnic groups. However, in a study of African-American crack users, alcohol use was found to be related to HIV sex risk behaviors.[38] In a study of African-American males who did not self-identify as gay or bisexual but report sex with men and women, the likelihood of engaging in unprotected sex increased substantially with drug use, while alcohol use frequently preceded sexual encounters in general.[55] In a qualitative study of predominantly minority HIV positive gay and bisexual men, participants reported that alcohol use facilitated engaging in stigmatized or taboo sexual acts, such as sex with men (for bisexual men) or anal receptive sex.[56,57] Alcohol use was also viewed as part of the routine context of dating and sexual activity or leading to more spontaneous sexual activities. In addition, alcohol expectancies and sensation seeking have been shown to predict risky sexual behaviors.[58-60] Laboratory studies have consistently found a link between alcohol use and intent to engage in unsafe sex[61] and poor condom negotiation skills.[62] Further evidence of this link can be found in an event-level study of high risk sexual activities of IDUs. Alcohol use was associated with unprotected sex only when both parties were intoxicated leading the authors to conclude that the unimpaired partner may still be able to negotiate safe sex practices.[63] Future research on how these constructs operate within and between racial/ethnic groups may elucidate the nature of this relationship.

Greater psychiatric severity was related to engaging in higher sex risk behaviors for non-Hispanic Whites. The relationship between psychological disorders and HIV risk behaviors is well documented;[2219] however this relationship has not been examined by race/ethnicity in prior studies. The present findings support the need future research to clarify this relationship. While alcohol use and psychiatric severity interacted with race/ethnic group, it is unclear why other risk factors, such as abuse history or drug use severity, were associated with high risk sexual behaviors equally across racial/ethnic groups. Research on the context in which risk factors operate within racial/ethnic groups may shed light on why certain risk factors might place African-Americans at greater risk of engaging in high risk sexual activities. For example, few studies examine the role of protective factors in the context of engaging in HIV risk behaviors[36], which may provide a more comprehensive picture of the context of when and how these behaviors occur.

HIV drug risk behaviors

Several differences between racial/ethnic groups were found for drug risk behaviors. Similar to the results for HIV sex risk behaviors, non-Hispanic Blacks engaged in fewer high HIV risk drug behaviors overall. Non-Hispanic Whites were the most likely to report any injection drug use. However, Hispanics were the most likely to report daily IDU and distributive needle sharing and overall engaged in the highest HIV drug risk behaviors. In a study of HIV infection within Hispanic groups in the U.S., while there was an overall decrease in injection drug use as a cause of HIV infection, among Puerto Ricans rates of HIV infection through injection drug use remained relatively high.[43] These findings suggest IDU may still be an important factor in HIV transmission for at least sub-groups of Hispanics.

Drug use severity was associated with engaging in higher risk drug behaviors for both non-Hispanic Whites and Hispanics with the magnitude of the relationship stronger for Hispanics. The relationship was not present for non-Hispanic Blacks. However, most of the Hispanics in our study (78%) were from one protocol; therefore our finding may be due to unique characteristics associated with that particular protocol as the finding was non-significant when controlling for protocol. Future studies should attempt to confirm whether this relationship exists. However, reduced HIV risk perception among Mexican-American IDUs,[64] as well as other Hispanic sub-groups[65,66] has been found in other studies. Increased drug use in general was associated with reduced risk perception in these studies, indicating one possible target for HIV prevention interventions among Hispanics. Future research clarifying the link between HIV risk perception and subsequent high risk drug behaviors is also needed.

Conclusions

Despite the disproportionately high rate of HIV in minorities, few studies of HIV risk behaviors have identified factors associated with risk behaviors in minority populations. The present study provides a systematic examination of potential race/ethnicity differences in the relationship between psychosocial risk factors and HIV risk behaviors and highlights ethnic differences in prevalence of HIV sex and drug risk behaviors. In addition, after controlling for racial/ethnic differences in demographic characteristics significant correlates of HIV risk behaviors in persons entering treatment were identified. While not the primary focus of the present study, racial/ethnic differences in HIV risk factors were also found. The overall pattern of findings suggests that the relationship between race/ethnicity, HIV risk factors, and HIV risk behaviors is complex. While non-Hispanic Blacks engaged in more potentially high risk sexual behaviors, they also endorsed greater use of protection for these behaviors. Thus, non-Hispanic Blacks engaged in less high risk HIV sexual behaviors overall. In addition, non-Hispanic Blacks engaged less frequently in high risk drug behaviors. These findings may seem counterintuitive at first glance given the extremely high rate of HIV infection in African-Americans. However, not only have the HIV incidence rates remained stable in the U.S. in recent years,[67] transmission rates have declined[68] a possible indicator of the success of HIV prevention efforts. In addition, while African-Americans accounted for 49% of persons with new HIV diagnoses, [69] this may be due in part to increased and/or late testing in minorities.[11,70] For example, studies examining ethnic differences in HIV testing have consistently found higher testing rates for African-Americans and Hispanics in comparison to Whites.[69,71,72] Lastly, a recent study of heroin injection at drug treatment entry found a greater decrease in injections rates for African-Americans than Whites.[73]

The findings from the present study suggest that there is a context (or culture) in which HIV high risk behaviors occur within racial/ethnic groups as well as differences in the presence of risk factors associated with engaging in HIV risk behaviors. These findings are consistent with calls to culturally adapt evidence based interventions and the need to maintain core elements of the intervention when adapting the intervention for increased relevance to the new targets. [74,75] Cultural adaptation experts have focused on several concepts and processes when adapting for a specific cultural group. Resnicow and colleagues [76] conceptualize a culturally sensitive intervention as one that reflects the “ethnic/cultural characteristics, experiences, norms, values, behavioral patterns, and beliefs of a target population.” Others[77,78] have established criteria for identifying a culturally tailored intervention which include: ensuring 1) use of language, idioms, and expressions of the target group; 2) use of the symbols and concepts of the target population; 3) presentation of the material in a manner that is consistent with the knowledge, cultural values, and customs of the target group; 4) incorporation of activities that enhance ethnic identity; 5) use of materials that demonstrate an understanding of the social context that surrounds the behavior

and living situation of the target group. HIV prevention interventions conducted in substance abuse treatment settings often have ethnically diverse participants. Although the CDC has identified evidenced based HIV prevention interventions culturally tailored to either African Americans or Hispanics, there are none culturally adapted for racially and ethnically diverse groups.[79] Models for cultural adaptation of evidence based behavioral change interventions have not addressed how adaptation might best proceed for culturally diverse groups. A challenge that remains in conducting HIV prevention interventions in drug treatment settings is the ability to incorporate interventions targeting the unique needs of diverse participants. Based on the results of the present study, a culturally adapted intervention targeting men and women in substance abuse treatment might be one in which a cultural value for monogamy could be maximized for African Americans, while at the same time maximizing a cultural value for protection of self and family (use of condoms) for whites and Hispanics.

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References

1. CDC. HIV and AIDS in the United States: A picture of today's epidemic. 2008. http://www.cdc.gov/hiv/topics/surveillance/pdf/us_media.pdf
2. Des Jarlais DC, Braine N, Friedmann P. Unstable housing as a factor for increased injection risk behavior at US syringe exchange programs. AIDS Behav. Nov; 2007 11(6 Suppl):78–84. [PubMed: 17447132]
3. Strathdee SA, Sherman SG. The role of sexual transmission of HIV infection among injection and non-injection drug users. J. Urban Health. Dec; 2003 80(4 Suppl 3):iii7–14. [PubMed: 14713667]
4. Strathdee SA, Stockman JK. Epidemiology of HIV among injecting and non-injecting drug users: current trends and implications for interventions. Current HIV/AIDS Reports. May; 2010 7(2):99–106. [PubMed: 20425564]
5. Booth RE, Kwiatkowski CF, Chitwood DD. Sex related HIV risk behaviors: differential risks among injection drug users, crack smokers, and injection drug users who smoke crack. Drug Alcohol Depend. Mar 1; 2000 58(3):219–226. [PubMed: 10759032]
6. Chitwood DD, Comerford M, Sanchez J. Prevalence and risk factors for HIV among sniffers, short-term injectors, and long-term injectors of heroin. J. Psychoactive Drugs. Oct-Dec;2003 35(4):445–453. [PubMed: 14986873]
7. CDC. Diagnoses of HIV infection and AIDS in the United States and Dependent Areas, 2008. HIV Surveillance Report. 202009
8. Albarracin D, Gillette JC, Earl AN, Glasman LR, Durantini MR, Ho M-H. A test of major assumptions about behavior change: a comprehensive look at the effects of passive and active HIV-prevention interventions since the beginning of the epidemic. Psychol. Bull. Nov; 2005 131(6):856–897. [PubMed: 16351327]
9. Prendergast ML, Urada D, Podus D. Meta-analysis of HIV risk-reduction interventions within drug abuse treatment programs. J. Consult. Clin. Psychol. Jun; 2001 69(3):389–405. [PubMed: 11495169]
10. Copenhaver MM, Johnson BT, Lee IC, Harman JJ, Carey MP, Team SR. Behavioral HIV risk reduction among people who inject drugs: meta-analytic evidence of efficacy. J. Subst. Abuse Treat. Sep; 2006 31(2):163–171. [PubMed: 16919744]
11. CDC. HIV-associated behaviors among injecting-drug users--23 Cities, United States, May 2005-February 2006. MMWR - Morbidity & Mortality Weekly Report. Apr 10; 2009 58(13):329–332. [PubMed: 19357632]

12. Braine N, Des Jarlais DC, Goldblatt C, Zadoretzky C, Turner C. HIV risk behavior among amphetamine injectors at U.S. syringe exchange programs. AIDS Educ. Prev. Dec; 2005 17(6): 515–524. [PubMed: 16398574]
13. Buchanan D, Tooze JA, Shaw S, Kinzly M, Heimer R, Singer M. Demographic, HIV risk behavior, and health status characteristics of “crack” cocaine injectors compared to other injection drug users in three New England cities. Drug Alcohol Depend. Feb 28; 2006 81(3):221–229. [PubMed: 16171952]
14. Campsmith ML, Nakashima AK, Jones JL. Association between crack cocaine use and high-risk sexual behaviors after HIV diagnosis. Journal of Acquired Immune Deficiency Syndromes: JAIDS. Oct 1; 2000 25(2):192–198.
15. Lorvick J, Martinez A, Gee L, Kral AH. Sexual and injection risk among women who inject methamphetamine in San Francisco. J. Urban Health. May; 2006 83(3):497–505. [PubMed: 16739050]
16. Raj A, Saitz R, Cheng DM, Winter M, Samet JH. Associations between alcohol, heroin, and cocaine use and high risk sexual behaviors among detoxification patients. Am. J. Drug Alcohol Abuse. 2007; 33(1):169–178. [PubMed: 17366258]
17. Royse D, Leukefeld C, Logan TK, et al. Homelessness and gender in out-of-treatment drug users. Am. J. Drug Alcohol Abuse. May; 2000 26(2):283–296. [PubMed: 10852361]
18. Somlai AM, Kelly JA, Wagstaff DA, Whitson DP. Patterns, predictors, and situational contexts of HIV risk behaviors among homeless men and women. Soc. Work. Jan; 1998 43(1):7–20. [PubMed: 9465788]
19. Stein JA, Nyamathi AM, Zane JI. Situational, psychosocial, and physical health-related correlates of HIV/AIDS risk behaviors in homeless men. Am J Mens Health. Mar; 2009 3(1):25–35. [PubMed: 19430589]
20. Wenzel SL, Tucker JS, Elliott MN, et al. Prevalence and co-occurrence of violence, substance use and disorder, and HIV risk behavior: a comparison of sheltered and low-income housed women in Los Angeles County. Prev. Med. Sep; 2004 39(3):617–624. [PubMed: 15313103]
21. Carey MP, Carey KB, Maisto SA, Schroder KEE, Vanable PA, Gordon CM. HIV risk behavior among psychiatric outpatients: association with psychiatric disorder, substance use disorder, and gender. J. Nerv. Ment. Dis. Apr; 2004 192(4):289–296. [PubMed: 15060403]
22. Meade CS, Sikkema KJ. HIV risk behavior among adults with severe mental illness: a systematic review. Clin. Psychol. Rev. Jun; 2005 25(4):433–457. [PubMed: 15914265]
23. Reisner SL, Mimiaga MJ, Skeer M, Mayer KH. Beyond anal sex: sexual practices associated with HIV risk reduction among men who have sex with men in Boston, Massachusetts. Aids Patient Care STDS. Jul; 2009 23(7):545–550. [PubMed: 19534602]
24. Sterk CE, Theall KP, Elifson KW. The impact of emotional distress on HIV risk reduction among women. Subst. Use Misuse. 2006; 41(2):157–173. [PubMed: 16393740]
25. Arriola KRJ, Louden T, Doldren MA, Fortenberry RM. A meta-analysis of the relationship of child sexual abuse to HIV risk behavior among women. Child Abuse Negl. Jun; 2005 29(6):725–746. [PubMed: 15979712]
26. Cunningham RM, Stiffman AR, Dore P, Earls F. The association of physical and sexual abuse with HIV risk behaviors in adolescence and young adulthood: implications for public health. Child Abuse Negl. Mar; 1994 18(3):233–245. [PubMed: 8199905]
27. Kang SY, Deren S, Goldstein MF. Relationships between childhood abuse and neglect experience and HIV risk behaviors among methadone treatment drop-outs. Child Abuse Negl. Dec; 2002 26(12):1275–1289. [PubMed: 12464301]
28. Tyndall MW, Patrick D, Spittal P, Li K, O’Shaughnessy MV, Schechter MT. Risky sexual behaviours among injection drugs users with high HIV prevalence: implications for STD control. Sex. Transm. Infect. Apr; 2002 78(Suppl 1):i170–175. [PubMed: 12083439]
29. Arasteh K, Des Jarlais DC. At-risk drinking and injection and sexual risk behaviors of HIV-positive injection drug users entering drug treatment in New York City. Aids Patient Care STDS. Aug; 2009 23(8):657–661. [PubMed: 19591610]
30. Leigh BC, Ames SL, Stacy AW. Alcohol, drugs, and condom use among drug offenders: an event-based analysis. Drug Alcohol Depend. Jan 11; 2008 93(1-2):38–42. [PubMed: 17928167]

31. Matos TD, Robles RR, Sahai H, et al. HIV risk behaviors and alcohol intoxication among injection drug users in Puerto Rico. Drug Alcohol Depend. Dec 7; 2004 76(3):229–234. [PubMed: 15561474]
32. Mimiaga MJ, Reisner SL, Cranston K, et al. Sexual mixing patterns and partner characteristics of black MSM in Massachusetts at increased risk for HIV infection and transmission. J. Urban Health. Jul; 2009 86(4):602–623. [PubMed: 19466554]
33. Rees V, Saitz R, Horton NJ, Samet J. Association of alcohol consumption with HIV sex- and drug-risk behaviors among drug users. J. Subst. Abuse Treat. Oct; 2001 21(3):129–134. [PubMed: 11728786]
34. Stein M, Herman DS, Trisvan E, Pirraglia P, Engler P, Anderson BJ. Alcohol use and sexual risk behavior among human immunodeficiency virus-positive persons. Alcoholism: Clinical & Experimental Research. May; 2005 29(5):837–843.
35. Stein MD, Hanna L, Natarajan R, et al. Alcohol use patterns predict high-risk HIV behaviors among active injection drug users. J. Subst. Abuse Treat. Jun; 2000 18(4):359–363. [PubMed: 10812309]
36. Semple SJ, Amaro H, Strathdee SA, Zians J, Patterson TL. Ethnic differences in substance use, sexual risk behaviors, and psychosocial factors in a sample of heterosexual methamphetamine users. Subst. Use Misuse. 2009; 44(8):1101–1120. [PubMed: 19544148]
37. Elifson KW, Klein H, Sterk CE. Predictors of sexual risk-taking among new drug users. J. Sex Res. Nov; 2006 43(4):318–327. [PubMed: 17599253]
38. Rasch RF, Weisen CA, MacDonald B, Wechsberg WM, Perritt R, Dennis ML. Patterns of HIV risk and alcohol use among African-American crack abusers. Drug Alcohol Depend. Mar 1; 2000 58(3):259–266. [PubMed: 10759036]
39. Adimora AA, Fullilove RE. Men who have sex with men and women: pieces of the U.S. HIV epidemic puzzle. Sex. Transm. Dis. Oct; 2006 33(10):596–598. [PubMed: 17003676]
40. Tai B, Straus MM, Liu D, Sparenborg S, Jackson R, McCarty D. The first decade of the National Drug Abuse Treatment Clinical Trials Network: bridging the gap between research and practice to improve drug abuse treatment. J. Subst. Abuse Treat. Jun; 2010 38(Suppl 1):S4–13. [PubMed: 20307794]
41. Hanson GR, Leshner AI, Tai B. Putting drug abuse research to use in real-life settings. J. Subst. Abuse Treat. Sep; 2002 23(2):69–70. [PubMed: 12220602]
42. Brooks A, Meade CS, Potter JS, Lokhnygina Y, Calsyn DA, Greenfield SF. Gender Differences in the Rates and Correlates of HIV Risk Behaviors Among Drug Abusers. Subst. Use Misuse. 2010; 45(14):2444–2469. [PubMed: 20536356]
43. Espinoza L, Hall HI, Selik RM, Hu X. Characteristics of HIV infection among Hispanics, United States 2003-2006. Journal of Acquired Immune Deficiency Syndromes: JAIDS. Sep 1; 2008 49(1): 94–101.
44. Loue S. Preventing HIV, eliminating disparities among Hispanics in the United States. Journal of Immigrant & Minority Health. Oct; 2006 8(4):313–318. [PubMed: 16944327]
45. Darke S. Self-report among injecting drug users: a review. Drug Alcohol Depend. Aug 1; 1998 51(3):253–263. discussion 267-258. [PubMed: 9787998]
46. Darke S, Hall W, Heather N, Ward J, Wodak A. The reliability and validity of a scale to measure HIV risk-taking behaviour among intravenous drug users. AIDS. Feb; 1991 5(2):181–185. [PubMed: 2031690]
47. Petry NM. Reliability of drug users' self-reported HIV risk behaviors using a brief, 11-item scale. Subst. Use Misuse. Oct; 2001 36(12):1731–1747. [PubMed: 11758820]
48. McLellan AT, Kushner H, Metzger D, et al. The Fifth Edition of the Addiction Severity Index. J. Subst. Abuse Treat. 1992; 9(3):199–213. [PubMed: 1334156]
49. Korte JERC, Wakim PG, Perl HI. Addiction treatment trials: how gender, race/ethnicity, and age relate to ongoing participation and retention in clinical trials Substance Abuse and Rehabilitation. 2011; 2(1):205–218.
50. Wright PB, Stewart KE, Fischer EP, et al. HIV risk behaviors among rural stimulant users: variation by gender and race/ethnicity. AIDS Educ. Prev. Apr; 2007 19(2):137–150. [PubMed: 17411416]

51. Essien EJ, Ross MW, Fernandez-Esquer ME, Williams ML. Reported condom use and condom use difficulties in street outreach samples of men of four racial and ethnic backgrounds. Int. J. STD AIDS. Nov; 2005 16(11):739–743. [PubMed: 16303069]
52. Adimora AA, Schoenbach VJ, Doherty IA. HIV and African Americans in the southern United States: sexual networks and social context. Sex. Transm. Dis. Jul; 2006 33(7 Suppl):S39–45. [PubMed: 16794554]
53. Adimora AA, Schoenbach VJ, Martinson FEA, et al. Heterosexually transmitted HIV infection among African Americans in North Carolina. Journal of Acquired Immune Deficiency Syndromes: JAIDS. Apr 15; 2006 41(5):616–623.
54. Doherty IA, Schoenbach VJ, Adimora AA. Sexual mixing patterns and heterosexual HIV transmission among African Americans in the southeastern United States. J. Acquir. Immune Defic. Syndr. Sep 1; 2009 52(1):114–120. [PubMed: 19506485]
55. Operario D, Smith CD, Arnold E, Kegeles S. Sexual Risk and Substance Use Behaviors Among African American Men Who Have Sex with Men and Women. AIDS Behav. Jul 2.2009
56. Parsons JT, Vicioso K, Kutnick A, Punzalan JC, Halkitis PN, Velasquez MM. Alcohol use and stigmatized sexual practices of HIV seropositive gay and bisexual men. Addict. Behav. Jul; 2004 29(5):1045–1051. [PubMed: 15219356]
57. Parsons JT, Vicioso KJ, Punzalan JC, Halkitis PN, Kutnick A, Velasquez MM. The impact of alcohol use on the sexual scripts of HIV-positive men who have sex with men. J. Sex Res. May; 2004 41(2):160–172. [PubMed: 15326541]
58. Fromme K, D'Amico EJ, Katz EC. Intoxicated sexual risk taking: an expectancy or cognitive impairment explanation? J. Stud. Alcohol. Jan; 1999 60(1):54–63. [PubMed: 10096309]
59. Kalichman SC, Weinhardt L, DiFonzo K, Austin J, Luke W. Sensation seeking and alcohol use as markers of sexual transmission risk behavior in HIV-positive men. nn. Behav. Med. 2002; 24(3): 229–235.
60. Maisto SA, Carey MP, Carey KB, Gordon CM, Schum JL. Effects of alcohol and expectancies on HIV-related risk perception and behavioral skills in heterosexual women. Experimental & Clinical Psychopharmacology. Nov; 2004 12(4):288–297. [PubMed: 15571446]
61. Hendershot CS, Stoner SA, George WH, Norris J. Alcohol use, expectancies, and sexual sensation seeking as correlates of HIV risk behavior in heterosexual young adults. Psychol Addict Behav. Sep; 2007 21(3):365–372. [PubMed: 17874887]
62. Gordon CM, Carey MP, Carey KB. Effects of a drinking event on behavioral skills and condom attitudes in men: implications for HIV risk from a controlled experiment. Health Psychol. Sep; 1997 16(5):490–495. [PubMed: 9302547]
63. Arasteh K, Des Jarlais DC, Perlis TE. Alcohol and HIV sexual risk behaviors among injection drug users. Drug Alcohol Depend. May 1; 2008 95(1-2):54–61. [PubMed: 18242009]
64. Essien EJ, Ogungbade GO, Ward D, Fernandez-Esquer ME, Smith CR, Holmes L Jr. Injecting drug use is associated with HIV risk perception among Mexican Americans in the Rio Grande Valley of South Texas, USA. Public Health. Apr; 2008 122(4):397–403. [PubMed: 17961614]
65. Cancel LI, Robles RR, Colon HM, Matos TD, Freeman DH. HIV/AIDS risk perception, HIV risk behaviors, and HIV seropositivity among injection drug users in Puerto Rico. P. R. Health Sci. J. Jun; 1994 13(2):153–158. [PubMed: 7938402]
66. Corby NH, Wolitski RJ, Thornton-Johnson S, Tanner WM. AIDS knowledge, perception of risk, and behaviors among female sex partners of injection drug users. AIDS Educ. Prev. 1991; 3(4): 353–366. [PubMed: 1777343]
67. Hall HI, Song R, Rhodes P, et al. Estimation of HIV incidence in the United States. JAMA. Aug 6; 2008 300(5):520–529. [PubMed: 18677024]
68. Holtgrave D, Hall HI, Rhodes PH, Wolitski R. Updated annual HIV transmission rates in the United States, 1977-2006. Journal of Acquired Immune Deficiency Syndromes: JAIDS. Feb 1; 2009 50(2):236–238.
69. CDC. Persons tested for HIV--United States, 2006. MMWR - Morbidity & Mortality Weekly Report. Aug 8; 2008 57(31):845–849. [PubMed: 18685551]
70. CDC. Late HIV testing - 34 states, 1996-2005. MMWR - Morbidity & Mortality Weekly Report. Jun 26; 2009 58(24):661–665. [PubMed: 19553901]

71. Liddicoat RV, Losina E, Kang M, Freedberg KA, Walensky RP. Refusing HIV testing in an urgent care setting: results from the “Think HIV” program. Aids Patient Care STDS. Feb; 2006 20(2):84–92. [PubMed: 16475889]

72. Rountree MA, Chen L, Brown A, Pomeroy EC. HIV testing rates and testing locations, by race and ethnicity. Health Soc. Work. Nov; 2009 34(4):247–255. [PubMed: 19927473]

73. Broz D, Ouellet LJ. Racial and ethnic changes in heroin injection in the United States: implications for the HIV/AIDS epidemic. Drug Alcohol Depend. Apr 1; 2008 94(1-3):221–233. [PubMed: 18242879]

74. Castro FG, Barrera M Jr. Holleran Steiker LK. Issues and challenges in the design of culturally adapted evidence-based interventions. Annu. Apr 27.2010 6:213–239.

75. Wingood GM, DiClemente RJ. The ADAPT-ITT model: a novel method of adapting evidence-based HIV Interventions. Journal of Acquired Immune Deficiency Syndromes: JAIDS. Mar 1; 2008 47(Suppl 1):S40–46.

76. Resnicow K, Soler R, Braithwaite RL, Ahluwalia JS, Butler J. Cultural sensitivity in substance use prevention. J. Community Psychol. 2000; 28(3):271–290.

77. Bernal G, Bonilla J, Bellido C. Ecological validity and cultural sensitivity for outcome research: issues for the cultural adaptation and development of psychosocial treatments with Hispanics. J. Abnorm. Child Psychol. Feb; 1995 23(1):67–82. [PubMed: 7759675]

78. Yuen, RK. The Effectiveness of Culturally Tailored Interventions: A Meta-Analytic Review; Unpublished doctoral dissertation; Chicago, IL, Loyola University. 2004;

79. CDC. Compendium of Evidence-Based HIV Prevention Interventions2009. 2009

Table 1

Description of Studies Included in Analysis

Study Title	Study Description	Eligibility Criteria	Sample Size (Sites)
• CTN-001 Buprenorphine/Naloxone vs. Clonidine for Inpatient Opiate Detoxification	• Compared the effectiveness of Buprenorphine/Naloxone versus Clonidine in a 13-day detoxification intervention. (Ling et al, 2005).	• Inpatients meeting DSM-IV opioid dependent criteria	112 (6)
• CTN-002 Buprenorphine/Naloxone vs. Clonidine for Outpatient Opiate Detoxification	• Replicated the design of CTN-001 in an outpatient sample (Ling, et al, 2005).	• Outpatients meeting DSM-IV opioid dependent criteria	195 (6)
• CTN-004 MET (Motivational Enhancement Treatment) to Improve Treatment Engagement and Outcome in Subjects Seeking Treatment for Substance Abuse	• Compared 3-sessions of counseling as usual with 3-sessions of Motivational Enhancement Therapy provided during the first month of treatment at outpatient substance abuse treatment programs for any substance (Ball et al, 2007).	• Outpatients meeting current criteria for substance abuse or dependence.	461 (5)
• CTN-005 Motivational Interviewing to Improve Treatment Engagement and Outcome in Outpatient Substance Users	• Compared standard intake procedures with standard intake procedures plus Motivational Interviewing in individuals seeking treatment at outpatient substance abuse treatment programs for any substance (Carroll et al., 2006).	• Outpatients who had used alcohol or any illicit drug in the past 28 days	422 (5)
• CTN-006 Motivational Incentives for Enhanced Recovery in Stimulant Users in Drug Free Clinics	• Compared usual care with usual care plus abstinence-based incentives in stimulant users seeking outpatient substance abuse treatment (Nancy M. Petry et al, 2005).	• Outpatients with self-reported stimulant use in the past 2 weeks or have a stimulant-positive urine sample	363 (8)
• CTN-007 Motivational Incentives for Enhanced Recovery in Stimulant Users in Methadone Maintenance Clinics	• Compared usual care with usual care plus low-cost prize-based incentives in stimulant users at methadone maintenance clinics (Peirce et al, 2006).	• Enrolled in methadone maintenance clinic between 30 days and 3 years and have a stimulant-positive urine sample.	337 (6)
• CTN-0021 Motivational Enhancement Treatment to Improve Treatment Engagement and Outcome for Spanish-Speaking Individuals Seeking Treatment for Substance Abuse	• Spanish-language version of CTN-004 comparing counseling as usual with Motivational Enhancement Therapy provided during the first month of treatment at outpatient substance abuse treatment programs for any substance (Carroll et al, 2009).	• Spanish-speaking outpatients meeting current criteria for substance abuse or dependence.	436 (5)

Table 2

Protocol differences in participant characteristics

Variable		001 n=110	002 n=193	004 n=324	005 n=408	006 n=315	007 n=278	021 n=435	Test statistic, χ^2 (df) [+]
Ethnicity									1962.9(12) [*]
Non-Hispanic White	n (%)	66 (60.0%)	84 (43.5%)	142 (43.8%)	350 (85.8%)	116 (36.8%)	80 (28.8%)	0 (0%)	
Non-Hispanic Black	n (%)	24 (21.8%)	64 (33.2%)	138 (42.6%)	42 (10.3%)	199 (63.2%)	198 (71.2%)	0 (0%)	
Hispanic	n (%)	20 (18.2%)	45 (23.3%)	44 (13.6%)	16 (3.9%)	0 (0%)	0 (0%)	435 (100%)	
Age	Range	19.7-61.3	18.9-65.0	18.1-64.8	18.1-73.2	18.8-62.6	20.6-63.5	18.2-62.6	245.6(6) [*]
	Mean±SD	36.4±9.7	38.3±10.2	37.7±9.4	33.5±10.2	37.6±8.1	42.9±8.1	32.7±9.0	
Education (years)	Range	8-20	7-20	7-27	6-19	4-18	6-20	0-20	371.8(6) [*]
	Mean±SD	13.0±1.8	12.6±2.2	12.9±2.3	12.2±1.9	11.9±2.0	12.1 ±1.9	9.5±3.22	
Female	n (%)	44 (40.0%)	57 (29.5%)	94 (29.0%)	171 (41.9%)	185 (58.7%)	132 (47.5%)	47 (10.8%)	225.1(6) [*]
Employment									100.3(12) [*]
Full-time	n (%)	66 (60.0%)	102 (52.8%)	199 (61.4%)	238 (58.3%)	155 (49.2%)	97 (34.9%)	285 (65.5%)	
Part-time	n (%)	26 (23.6%)	35 (18.1%)	41 (12.7%)	58 (14.2%)	40 (12.7%)	50 (18.0%)	43 (9.9%)	
Other	n (%)	18 (16.4%)	56 (29.0%)	84 (25.9%)	112 (27.5%)	120 (38.1%)	131 (47.1%)	107 (24.6%)	
Living with Sexual Partner	n (%)	61 (55.5%)	74 (38.3%)	133 (41.0%)	159 (39.0%)	125 (39.7%)	85 (30.6%)	204 (46.9%)	29.7(6) [*]
Primary Drug	n (%)								1763.5 (18) [*]
Heroin/Other Opiates	n (%)	63 (57.3%)	107 (55.4%)	34 (10.5%)	44 (10.8%)	4 (1.3%)	16(5.8%)	20 (4.6%)	
Stimulant	n (%)	0 (0%)	0 (0%)	160 (49.4%)	116 (28.4%)	166 (52.7%)	0 (0%)	130 (29.9%)	
Both Opiates & Stimulants	n (%)	47 (42.7%)	85 (44.0%)	48 (14.8%)	39 (9.6%)	62(19.7%)	262 (94.2%)	19 (4.4%)	
Other	n (%)	0 (0%)	1 (0.5%)	82 (25.3%)	209 (51.2%)	83(26.3%)	0 (0%)	266 (61.1%)	
Alcohol Use Composite	Range	0-0.85	0-0.71	0-0.92	0-0.96	0-0.92	0-0.88	0-0.85	291.7(6) [*]
	Mean±SD	0.05±0.12	0.06±0.11	0.30±0.27	0.24±0.26	0.19±0.25	0.09±0.17	0.20±0.21	
Drug Use Composite	Range	0.06-0.54	0.08-0.54	0-0.46	0-0. 51	0-0.48	0.04-0.60	0-0.54	846.7(6) [*]
	Mean±SD	0.34±0.08	0.32±0.07	0.17±0.12	0.12±0.12	0.17±0.11	0.30±0.12	0. 08±0.11	
Psychiatric Composite	Range	0-0.73	0-0.77	0-0.82	0-1.0	0-1.0	0-0.91	0-0.82	63.4(6) [*]

Variable		001 n=110	002 n=193	004 n=324	005 n=408	006 n=315	007 n=278	021 n=435	Test statistic, χ^2 (df)[+]
	Mean±SD	0.25±0.24	0.19±0.21	0.24±0.23	0.28±0.24	0.28±0.26	0.23±0.23	0.17±0.23	
Family/Social Composite	Range	0-0.97	0-0.88	0-0.93	0-0.96	0-0.94	0-0.84	0-0.86	36.0(6) *
	Mean±SD	0.31±0.25	0.25±0.18	0.33±0.23	0.28±0.21	0.31±0.23	0.24±0.18	0.26±0.18	
Legal Composite	Range	0-0.91	0-0.77	0-1.00	0-0.87	0-0.88	0-0.80	0-0.60	78.2(6) *
	Mean±SD	0.19±0.24	0.13±0.18	0.11±0.18	0.19±0.22	0.12±0.19	0.10±0.18	0.15±0.18	
Years at Present Address	Range	0-45.0	0-51.0	0-47.0	0-48.0	0-45.0	0-48.0	0-28.0	71.5(6) *
	Mean±SD	4.3±8.0	6.6±10.2	4.6±8.0	3.3±6.3	3.8±7.0	6.1±9.5	2.7±4.2	
Trauma									198.6(18) *
No Abuse	n (%)	73 (67.0%)	145 (76.3%)	182 (56.5%)	211 (51.7%)	180 (57.1%)	215 (77.3%)	377 (86.9%)	
Sexual Abuse Only	n (%)	5 (4.6%)	3 (1.6%)	19 (5.9%)	21 (5.1%)	17 (5.4%)	19 (6.8%)	7 (1.6%)	
Physical Abuse Only	n (%)	11 (10.1%)	29 (15.3%)	64 (19.9%)	82 (20.1%)	54 (17.1%)	22 (7.9%)	33 (7.6%)	
Sex And Physical Abuse	n (%)	20 (18.3%)	13 (6.8%)	57 (17.7%)	94 (23.0%)	64 (20.3%)	22 (7.9%)	17 (3.9%)	
Sexually Active	n (%) Yes	70 (63.6%)	116 (60.1%)	193 (59.6%)	268 (65.7%)	202 (64.1%)	144 (51.8%)	268 (61.6%)	15.7(6) **
Any IDU	n (%) Yes	79 (71.8%)	112 (58.0%)	31 (9.6%)	41 (10.0%)	17 (5.4%)	120 (43.2%)	12 (2.8%)	623.1(6) *

[+] Chi-square test for categorical variables and Kruskal-Wallis test for age, education, and ASI composite scale were used.

* p<0.001

** p=0.015

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Table 3

Racial/Ethnic differences in participant characteristics

Variable		Non-Hispanic White n=838 (41%)	Non-Hispanic Black n=665 (32%)	Hispanic n=560 (27%)	Total N=2063	Test statistic, χ^2 (df)*	p-value
Age	Range	18.1-73.2	18.4-65.0	25.4-39.3	18.1-73.2	340.4 (2)	<0.001
	Mean±SD	34.3±9.8	42.1±7.7	33.1±9.1	36.5±9.8		
Education (years)	Range	6-27	4-20	0-20	0-27	314.2 (2)	<0.001
	Mean±SD	12.7±2.1	12.0±1.9	10.0±3.2	11.8±2.6		
Female	n (%)	379 (45.2%)	279 (42.0%)	72 (12.9%)	730 (35.4%)	172.4 (2)	<0.001
Employment						55.3 (4)	<0.001
Full-time	n (%)	463 (55.3%)	324 (48.7%)	355 (63.4%)	1142 (55.4%)		
Part-time	n (%)	151 (18.0%)	76 (11.4%)	66 (11.8%)	293 (14.2%)		
Other	n (%)	224 (26.7%)	265 (39.8%)	139 (24.8%)	628 (30.4%)		
Living with Sexual Partner	n (%)	322 (38.4%)	267 (40.2%)	252 (45.0%)	841 (40.8%)	6.2 (2)	0.046
Primary Drug	n (%)					270.8 (6)	<0.001
Heroin/Other Opiates	n (%)	162 (19.3%)	59 (8.9%)	67 (12.0%)	288 (14.0%)		
Stimulant	n (%)	196 (23.4%)	224 (33.7%)	152 (27.1%)	572 (27.7%)		
Both Opiates & Stimulants	n (%)	226 (27.0%)	277 (41.7%)	59 (10.5%)	562 (27.2%)		
Other	n (%)	254 (30.3%)	105 (15.8%)	282 (50.4%)	641 (31.1%)		
Alcohol Use Composite	Range	0-0.96	0-0.92	0-0.92	0-0.96	16.9(2)	<0.001
	Mean±SD	0.19±0.25	0.18±0.23	0.19±0.21	0.19±0.23		
Drug Use Composite	Range	0-0.56	0-0.60	0-0.54	0-0. 60	192.8(2)	<0.001
	Mean±SD	0.20±0.14	0.22±0.13	0.12±0.13	0.18±0.14		
Psychiatric Composite	Range	0-1.0	0-1.0	0-0.82	0-1.0	73.4(2)	<0.001
	Mean±SD	0.28±0.24	0.20±0.23	0.19±0.23	0.23±0.24		
Family/Social Composite	Range	0-0.97	0-0.89	0-0.91	0-0.97	23.1(3)	<0.001
	Mean±SD	0.31±0.22	0.26±0.20	0.27±0.19	0.28±0.21		
Legal Composite	Range	0-0.88	0-1.0	0-0.84	0-1.0	38.7(2)	<0.001
	Mean±SD	0.16±0.21	0.11±0.19	0.15±0.18	0.14±0.20		
Years at Present Address	Range	0-47.0	0-51.0	0-32.9	0-51.0	16.9(2)	<0.001
	Mean±SD	3.5±6.17	5.9±9.86	3.2±5.2	4.2±7.45		

Variable		Non-Hispanic White n=838 (41%)	Non-Hispanic Black n=665 (32%)	Hispanic n=560 (27%)	Total N=2063	Test statistic, χ^2 (df)*	p-value
Trauma						145.7(6)	<0.001
No Abuse	n (%)	449 (53.6%)	478 (72.1%)	456 (82.0%)	1383 (67.3%)		
Sexual Abuse Only	n (%)	46 (5.5%)	36 (5.4%)	9 (1.6%)	91 (4.4%)		
Physical Abuse Only	n (%)	163 (19.5%)	73 (11.0%)	59 (10.6%)	295 (14.3%)		
Sex And Physical Abuse	n (%)	179 (21.4%)	76 (11.5%)	32 (5.8%)	287 (14.0%)		

*Chi-square test for categorical variables and Kruskal-Wallis test for age, education, and ASI composite scales were used.

Table 4

Racial/Ethnic differences in HIV risk behaviors in the past 30 days

Variable		Non-Hispanic White n=838 (41%)	Non-Hispanic Black N=665 (32%)	Hispanic n=560 (27%)	Total N=2063	χ^2(df)*	p-value
Sexually active	nResponding	838	665	560	2063	2.4(2)	0.31
	n (%) Yes	513 (61.2%)	393 (59.1%)	355 (63.4%)	1261 (61.1%)		
Multiple partners	n Responding+	513	393	355	1261	14.8(2)	<0.001
	n (%) Yes	86 (16.8%)	80 (20.4%)	36 (10.1%)	202 (16.0%)		
Any unprotected sex - regular partner	n Responding+	513	393	355	1261	6.1(4)	0.195
No regular partner	n (%)	47 (9.2%)	31 (7.9%)	23 (6.5%)	101 (8.0%)		
Unprotected sex	n (%) Yes	379 (73.9%)	276 (70.2%)	270 (76.1%)	925 (73.4%)		
Any unprotected sex - casual partner	n Responding+	508	378	354	1240	13.6(4)	0.009
No casual partner	n (%)	400 (78.7%)	298 (78.8%)	292 (82.5%)	990 (79.8%)		
Unprotected sex	n (%) Yes	57 (11.2%)	28 (7.4%)	39 (11.0%)	124 (10.0%)		
Any unprotected sex when trading sex	n Responding+	508	378	354	1240	10.3(4)	0.036
No trading sex	n (%)	472 (92.9%)	340 (90.0%)	330 (93.2%)	1142 (92.1%)		
Unprotected sex	n (%) Yes	23 (4.5%)	18 (4.8%)	19 (5.4%)	60 (4.8%)		
Any unprotected anal intercourse	n Responding+	508	390	354	1252	3.9(4)	0.418
No anal intercourse	n (%)	465 (91.5%)	368 (94.4%)	323 (91.2%)	1156 (92.3%)		
Unprotected sex	n (%) Yes	33 (6.5%)	15 (3.9%)	22 (6.2%)	70 (5.6%)		
Sex risk composite	n Responding+	503	375	354	1232	1.6(2)	0.447
	Min, Max	1,17	1,19	1,18	1,19		
	Mean±SD	5.9±2.8	5.7±2.7	5.9±3.1	5.9±2.8		
Any IDU	n Responding+	838	665	560	2063	56.2(2)	<0.001
	N (%) Yes	232 (27.7%)	111 (16.7%)	69 (12.3%)	412 (20.0%)		
Daily IDU	n Responding+	232	111	69	412	17.8(2)	<0.001
	n (%) Yes	163 (70.3%)	55 (49.6%)	52(75.4%)	270 (65.5%)		

Variable		Non-Hispanic White n=838 (41%)	Non-Hispanic Black N=665 (32%)	Hispanic n=560 (27%)	Total N=2063	χ^2(df)*	p-value
Receptive needle sharing	n Responding+	200	102	69	371	3.9(2)	0.144
	n (%) Yes	42 (21.0%)	13 (12.8%)	16 (23.2%)	71 (19.1%)		
Distributive needle sharing	n Responding+	224	110	67	401	10.2(2)	0.006
	n (%) Yes	52 (23.2%)	18 (16.4%)	25 (37.3%)	95 (23.7%)		
Inconsistent needle cleaning before use	n Responding+	206	106	69	381	3.2(2)	0.200
	N (%) Yes	112 (54.4%)	60 (56.6%)	46 (66.7%)	218 (57.2%)		
Drug risk composite	n Responding+	191	102	67	360	16.1(2)	<0.001
	Min, Max	1,26	1,19	1,21	1,26		
	Mean±SD	8.9±5.2	7.0±4.3	9.7±4.4	8.5±4.9		

+Total sample with data for that item (i.e. excludes missing data or not applicable).

*Chi-square test for categorical variables and Kruskal-Wallis test for HRBS sex risk composite and drug risk composite were used

Table 5

Sex risk behavior analyses

Variable	High vs moderate/low risk: OR (95%CI)*	High/moderate vs low risk: OR (95%CI)**	χ^2 (df)	p-value
Race/Ethnicity (reference = Non-Hispanic White)			9.8 (4)	0.044
Non-Hispanic Black	1.00 (0.69-1.45)	0.62 (0.45-0.85)[a]	9.8 (2)	0.0074
Hispanic	0.99 (0.67-1.48)	0.81 (0.58-1.13)	1.85 (2)	0.40
Alcohol use composite[+]				
Non-Hispanic White	0.97 (0.88-1.06)	1.09 (1.01-1.19)[a]	7.29 (2)	0.026
Non-Hispanic Black	1.15 (1.05-1.27)[a]	1.08 (0.99-1.18)	6.46 (2)	0.040
Hispanic	1.02 (0.90-1.15)	0.96 (0.87-1.06)	1.60 (2)	0.45
Psychiatric composite[++]				
Non-Hispanic White	1.05 (0.96-1.14)	1.12 (1.03-1.22)[a]	7.20 (2)	0.027
Non-Hispanic Black	1.13 (1.02-1.25)	1.00 (0.91-1.10)	5.92 (2)	0.052
Hispanic	1.13 (1.02-1.25)	1.03 (0.93-1.13)	4.88 (2)	0.087
Family/social composite	1.01 (0.96-1.06)		0.08 (1)	0.77
Stimulant use (reference = no use)	1.52 (1.11-2.08)[a]	0.82 (0.63-1.06)	12.9 (2)	0.0016
Drug use composite	1.29 (1.16-1.43)[a]	1.03 (0.94-1.13)	24.0 (2)	<0.0001
Abuse history (reference = no abuse)				
sex abuse only	3.26 (1.82-5.83)[a]	1.29 (0.70-2.28)	17.70 (2)	0.0001
physical abuse only	1.39 (1.02-1.90)		4.26 (1)	0.039
sex and physical abuse	1.52 (1.05-2.21)		4.79 (1)	0.029
Legal status composite	1.08 (1.02-1.15)		6.62 (1)	0.010
Housing stability (years at present address)	0.99 (0.98-1.01)		0.66 (1)	0.42

*For ASI composite scores, odds ratio indicates the magnitude of change in odds per 0.1 unit increase in the corresponding composite score. For housing stability, this is the change per 1-year increase in years at present address.

**Separate odds ratios for high/moderate vs low risk sex behavior are presented only if the proportional odds assumption was not met; otherwise, odds ratios are the same in both the model of high vs moderate/low risk behavior and the model of high/moderate vs low risk behavior.

[a]Denotes statistically significant results when proportional odds assumption was not met.

[+]Alcohol use composite*race/ethnicity interaction p=0.0031

[++]Psychiatric composite*race/ethnicity interaction p=0.012

Table 6

Drug risk behavior analyses

Variable	Linear regression coefficient* (SD)	t	p-value
Ethnicity (reference = Hispanic)**			
Non-Hispanic White	−0.86 (0.71)	−1.21	0.23
Non-Hispanic Black	−1.99 (0.84)	−2.38	0.018
Alcohol use composite			
	0.019 (0.15)	0.12	0.90
Psychiatric composite+			
Non-Hispanic White	0.16 (0.15)	1.06	0.29
Non-Hispanic Black	−0.41 (0.21)	−1.92	0.056
Hispanic	−0.39 (0.25)	−1.56	0.12
Family/social composite	0.054 (0.12)	0.44	0.66
Stimulant use	−0.45 (0.59)	−0.77	0.44
Drug use composite++			
Non-Hispanic White	1.12 (0.33)	3.43	0.0007
Non-Hispanic Black	−0.091 (0.42)	−0.21	0.83
Hispanic	1.70 (0.61)	2.79	0.0055
Abuse history			
sex abuse only	−1.77 (1.34)	−1.32	0.19
physical abuse only	0.38 (0.81)	0.47	0.64
sex and physical abuse	0.16 (0.82)	0.20	0.84
Legal status composite	0.18 (0.12)	1.46	0.15
Housing stability (years at present address)	0.0073 (0.031)	0.23	0.81

*For ASI composite scores, linear regression coefficient is the magnitude of change in drug risk behavior score per 0.1 unit increase in the corresponding composite score. For housing stability, this is the change per 1-year increase in years at present address.

**Overall test for ethnicity: F(2,351) = 2.90, p-value = 0.0565

+Psychiatric composite*ethnicity interaction p=0.040

++Drug use composite*ethnicity interaction p=0.023