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Predicting HIV/STD Risk Level and Substance Use Disorders among Incarcerated Adolescents

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Abstract

Incarcerated adolescents are among the most vulnerable groups for STD infection, and substance abuse is prevalent in over half of this population. Substance abuse and HIV/STD-associated risk behaviors are closely linked among juvenile justice-involved youth, but it is unclear whether common antecedents explain these different problems. The current study examined predictors of HIV/STD risk level and substance use disorders, and investigated whether family variables added unique predictive variance for these problems among incarcerated youth. The sample included 154 substance-involved youth ages 13 to 17 recruited in detention facilities in Miami and Tampa, FL and was primarily male (82%) and African-American (58%). Using a comprehensive assessment strategy with data obtained from youth report, parent report, and laboratory confirmed STD testing, the results show that delinquency is a consistent predictor of both HIV/STD risk level and substance use disorders, and also that substance use directly predicts HIV/STD risk level among incarcerated adolescents. Consistent with previous research, family conflict is an important predictor of substance use disorders even after controlling for other factors. The results suggest the need for integrated family-based interventions addressing delinquency, substance abuse, and HIV/STD-associated risk factors with juvenile justice-involved adolescents.

Introduction

Juvenile justice-involved youth have extraordinarily high rates of substance abuse and HIV/STD-associated adverse health outcomes not only during adolescence (CASA 2004) but into adulthood (Keyes, Iacono & McGue 2007). An estimated 80% of juvenile justice-involved teens report substance use (CASA 2004). These adolescents are also at extremely high risk for acquiring HIV and STDs, with early age at first intercourse, infrequent use of condoms, permissive attitudes about sex, and low self-efficacy to practice safe sex (Rosengard et al. 2006; Teplin et al. 2005; Canterbury et al. 1995). Incarcerated adolescents represent the largest concentration of youths infected with or at high risk for HIV and STDs due to drug use and unsafe sexual behaviors (CDC 1996). Studies show that around 15 to 20% of detained youth test positive for an STD (Crosby et al. 2007; Kelly et al. 2000), and an alarming 95% of these adolescents have engaged in 3 or more HIV-associated risk behaviors (Teplin et al. 2003). When these teens move into adulthood, they carry significantly elevated risk for chronic drug addiction, HIV infection, mental illness, poor physical health, and a range of family problems (Golzari, Hunt & Anoshiravani 2006; Romero et al. 2007). Thus understanding and decreasing substance abuse and HIV-associated risk behaviors among juvenile justice-involved teens are urgent public health, policy, and research priorities (Butts et al. 2007; Center for Juvenile Justice Reform 2006).

Delinquency, substance use, and high risk sexual behaviors are often initiated in adolescence and co-occur at high rates (Guo et al. 2002; St. Lawrence et al. 2002; Mellins et al. 2005). The close associations among these problems have emerged repeatedly in studies across adolescent samples, but are especially pronounced in high-risk subgroups such as runaway and homeless youth, adolescents in drug treatment or suffering from mental disorders, and those in the juvenile justice system (Malow, Rosenberg & Devieux 2006). Many researchers assert that substance use in adolescence directly increases HIV/STD-associated risk behaviors due to impaired judgment, impulsivity, and unprotected sexual activity with multiple partners (Malow et al. 2006; Castrucci & Martin 2002; Devieux et al. 2002). In fact, there is strong evidence that the presence of substance abuse and conduct problems increases the likelihood of early and risky sexual behaviors (Lowry et al. 1994; Capaldi et al. 1996). One study showed that alcohol use increased youths' likelihood of engaging in sex by approximately 50% (Sikkema, Winett & Lombard 1995). Sequential analysis suggests that substance use and other problem behaviors precede and may influence the development of sexual risk behaviors (Elliott & Morse,

1988). Patterns of risky sexual behavior that emerge in adolescence are particularly likely to persist into adulthood if substance abuse continues (Bardone et al. 1998; Tapert et al. 2001). However, the evidence linking substance use to HIV/STD-associated risk behaviors is not unequivocal; one study using daily diary reports from teens failed to find an association between event-based substance use and condom use (Bailey, Gao & Clark 2006). DiClemente and Crosby (2003) suggest that substance use and HIV/STD-associated risk factors may be correlated due to common antecedents.

Mental health problems may also be a common predictor of both substance use disorders and HIV/STD risk level, and are a core part of the risk and impairment profile of adolescent offenders (Vermeiren et al. 2006). In the general population, comorbidity between substance abuse disorders and other psychiatric disorders has been estimated at around 50% (Kessler 2004), yet in the adolescent offender population, comorbidity is more the norm than the exception (Lederman et al. 2004; Teplin et al. 2002). There is also emerging evidence linking mental health symptoms to HIV/STD-associated risk behaviors among juvenile justice-involved youth (Tolou-Shams et al. 2008), particularly negative affect (Lucenko et al. 2003).

The strong associations between substance use and HIV/STD-associated risk level seen in juvenile justice-involved samples may also be explained by examining other factors that may predict both types of behaviors. Family context may be a common predictor of substance abuse and HIV/STD risk level. Family factors are among the strongest predictors of substance initiation and problem use throughout adolescence, including ineffective parental discipline and family conflict (Dishion & Medici Skaggs 2000), parental permissiveness (Steinberg & Avenevoli, 1998), ineffective communication (Guilamo-Ramos et al. 2006), and low levels of family support and control (Brook et al. 2001). Family factors are also among the strongest protective influences against adolescent problems, and mediate individual and peer risk factors for drinking and drug use (Garnier & Stein 2002). Similarly, there is evidence that family factors are related to adolescents' HIV/STD-associated risk behaviors. Donenberg et al. (2006) posit that families influence adolescents' HIV risk in four ways: (a) instrumental characteristics (parental monitoring, control); (b) affective parenting behavior (warmth, support); (c) parental attitudes about sex; and (d) parent-teen communication. Positive and supportive family relationships, effective parenting practices, and communication with parents may reduce HIV/STD-associated risk (Dittus & Jaccard 2000; Perrino et al. 2000). DiClemente et al. (2007) call for a more contextual

and ecological approach to understanding HIV/STD-associated risk behaviors in adolescents that goes beyond recognized individual-level predictors and considers the potential influence of families in the development and amelioration of these behaviors. The current study will be among the first to examine the unique predictive role of family factors in HIV/STD risk level with incarcerated adolescents.

While substance abuse and HIV/STD-associated risk behaviors may be explained in part by similar factors, there also appear to be important differences in terms of demographic factors in predicting these problems. For instance, girls tend to have higher risk for HIV/STD infection related to route of transmission (DiClemente et al. 2004), whereas boys traditionally have higher rates of substance use (Johnston et al. 2008). In terms of race/ethnicity, African-American and Hispanic adolescents may be at higher risk for HIV/STDs than white non-Hispanic youths (Teplin et al. 2005), yet research consistently shows that white non-Hispanic youths use substance at higher rates than either African American or Hispanic youths (Hlaing, de la Rosa & Niyonsega 2007). The current research attempts to shed light on the possible shared and unique predictors of HIV/STD-associated risk and substance use disorders among an incarcerated sample of adolescents.

This study tested two critical research questions. First, are there direct relationships among delinquency, substance use and HIV/STD-associated risk behaviors among detained youth? Second, can common antecedents of HIV/STD risk level and substance use disorders (SUDs) be identified, particularly in the family environment? The hypotheses guiding the analyses were that:

1. Delinquency would predict SUDs, and substance use would predict HIV/STD risk level;
2. Predictors of HIV/STD risk level and substance use disorders would vary by gender and ethnicity such that female gender and minority ethnicity would predict HIV/STD risk level and male gender and white non-Hispanic ethnicity would predict SUDs;
3. Mental health problems would predict both problems after adjusting for demographics; and
4. Family factors would add unique predictive variance over demographics in predicting both HIV/STD risk level and substance use disorders.

Methods

Participants. The study recruited adolescents from two juvenile detention centers in Florida as part of a randomized controlled trial with drug involved juvenile offenders. Study participants were screened in detention

for the following inclusion criteria: (1) ages 13 to 17; (2) self-reported substance use in the 90 days before incarceration; and (3) at least one parent figure willing/able to participate in the study. Adolescents were excluded from the study based on the following criteria: (1) mental retardation/pervasive developmental disorders, psychotic symptoms, or acute suicidality requiring immediate mental health intervention; (2) high risk to receive immediate long-term residential placement as determined by Department of Juvenile Justice screening instrument (e.g., chronic violent offending, sexual offenses). Ninety one percent of youths and families who were eligible provided consent/assent for the study.

The sample was 154 primarily male (82%) adolescents, 58% of whom were African-American, 19% White, Non-Hispanic, 22% Hispanic, and 1% other. Average age was 15. Over 96% came from single-parent homes with average family income of \$15,000. Participants averaged 3.9 lifetime arrests ($SD = 3.3$), with 2.3 in the last year. They were primarily marijuana users with 32% meeting DSM-IV diagnostic criteria for cannabis dependence and 29% meeting criteria for cannabis abuse (20% had an alcohol use disorder and 10% met criteria for other drug dependence or abuse). Other psychiatric diagnoses were also common: 43% had conduct disorder, 14% had generalized anxiety disorder, 20% had ADHD, and 9% had major depressive disorder.

Research Procedures

Participants were recruited from the population of juvenile detainees in the Miami-Dade County and Pinellas County juvenile detention centers. The Research Coordinator at each site met daily with detention intake workers to review files of all youths entering detention who would be detained for at least 48 hours (enough time to assess and begin intervention in the randomized trial before detention release). Those deemed to be at imminent risk for long-term placement according to the Florida Department of Juvenile Justice PACT Pre-Screen (Positive Achievement Change Tool; Fla. Dept. JJ, 2005) were not screened for the study because these youths would most likely be sent to a long-term residential facility directly following release from detention and would not be able to participate in the outpatient clinical phase of the randomized trial. The Research Coordinators then individually met with potentially eligible teens to screen them to determine substance involvement in the 90 days before their detention stay. Youths ineligible because of psychotic symptoms or suicide risk on the PACT Pre-Screen were provided immediate mental health intervention consistent with detention guidelines and practices. The Research Coordinator asked eligible and interested youths for their

permission to contact their parents regarding the study, and set up an interview in the parents' homes to obtain consent. Youths provided informed assent in detention only after parents consented.

Research Assessments. Assessments were administered to adolescents in the detention facilities and parents in their homes by trained assessors who were blind to study hypotheses. Assessments were conducted within 48 hours of the youths' entry into detention. Most measures asked about behaviors within the previous 90 days before adolescents were detained, however certain instruments (as indicated below) asked about the entire year since the previous assessment (e.g., psychiatric and substance use diagnoses). Adolescents were tested for STDs immediately upon detention release because Florida DJJ policies did not allow testing in facilities.

Measures. The following measures were collected based on a multi-method, multi-perspective measurement strategy that included the use of adolescent-report, parent-report, and biochemical data.

Parent Interview (CTRADA 1998) gathered information on demographic and background variables, such as the adolescent's age, gender, and ethnicity, and previous arrests.

Substance Use was measured using the **Timeline Follow-Back Method of Drug and Alcohol Use**. The TLFB has been adapted for adolescent samples (Bry & Krinsley 1992; Bry et al. 1986), obtaining retrospective reports of daily substance use for specific substances within the previous 90-day period using a calendar and memory prompts to stimulate recall. It yields consistently high test-retest correlations over periods up to 1 year (Carey 1997; Maisto et al 1992), and been shown to correlate with other self-reports as well as with collateral reports (Sobell & Sobell 1992). The **Personal Experiences Inventory** (PEI; Winters & Henly 1989) is a well-validated self-report measure designed to assess problems associated with adolescent substance use in the previous 90 day period rather than frequency of use. The Personal Involvement with Chemicals Scale measures global problem severity in terms of the adolescent's psychological involvement with substances. The **Adolescent Diagnostic Interview-Light** (Winters & Henly 1993), which has been validated with a range of clinical samples of substance using teens, was used to determine DSM-IV criteria for substance use disorders in the year prior to detainment.

Delinquency was assessed using the **National Youth Survey Self-Report Delinquency Scale** (Elliot et al. 1983), measuring criminal behavior for the previous 90 day period using the Total Delinquency Scale. It is a well-validated instrument (Henggeler 1989) with similar juvenile justice-involved samples. In addition, we used

the Delinquency scale of both the **Child Behavior Checklist (CBCL)**, administered to parents, and the **Youth Self Report Form (YSR)** (Achenbach & Edelbrock 1983). Both have excellent reliability and validity (Kazdin 1990). Parents also reported the number of youths' arrests on the **Parent Interview**.

STD Incidence was determined using laboratory-confirmed biological specimens. Research assistants collected urine screens immediately upon the youths' release from detention. The Becton Dickinson ProbeTec assay was used for the detection of Chlamydia Trachomatis and Neisseria Gonorrhoeae. Both tests use amplified DNA technology to improve sensitivity and allow detection of these organisms from the urine. Sensitivity in male urine ranges from 93% -97% and in female urine sensitivity ranges from 80.5% to 84.9%. Specificity in male urine ranges from 95% -96% and in female urine from 96% -98%.

HIV/STD-Associated Risk Level was determined using the **POSIT HIV/STD Risk Screen**. The POSIT HIV/STD Risk Questionnaire was designed to be the first developmentally appropriate HIV/STD-risk screen for use in a wide range of settings (Rahdert & Czechowicz 1995) and validated with diverse samples across the country (Rahdert 1997). Additionally, a **Timeline Follow Back of Sexual Risk Behaviors** determined the extent of risky sexual activity for the 90 days prior to detainment. This method has been adapted to measure many high-risk behaviors among adolescents, including sexual activity (Malow et al. 1998). The TLFB method obtained retrospective reports of sexual activity by using a calendar and other memory prompts to stimulate recall. It gathered daily information on sexual experiences while intoxicated or high and use of condoms.

Mental Health Problems were measured using the **Diagnostic Interview Schedule for Children Predictive Scales (DISC-PS)**, which identify psychiatric disorders according to DSM-IV criteria. This measure asks about adolescents about their symptoms in the year prior to detainment. It has demonstrated excellent sensitivity and specificity as compared to the full Diagnostic Interview Schedule for Children (sensitivity=.86, specificity=.98; Lucas et al. 2001).

Family Functioning was measured using the **Family Environment Scale (FES)**, which has demonstrated adequate psychometric properties in numerous of studies (Grotevant & Carlson 1989; Moos & Moos 1986). The Conflict and Cohesion scales were administered to both the adolescent and parent. **Parenting Practices** were measured using the **Behavioral Affect Rating Scale** (BARS; Conger et al. 2002), assessing monitoring, warmth, and hostility between parents and teens. Both measures are well-validated with diverse

samples. Teens and parents reported on both measures.

Results

Analytic approach. Two dichotomous outcomes were analyzed by using a generalized linear model approach. Adolescents were categorized according to HIV/STD risk level (High or Low) and substance use disorders (Yes or No) respectively.

Adolescents with moderate to high risk as determined by POSIT norms as well as any adolescents testing positive for an STD (11% of sample) were grouped in the HIV/STD high risk outcome group for the regression analyses. The HIV/STD high risk group comprised 69% ($n = 103$) of the sample, with mean age of 15.53 years ($SD = 1.06$), 78% male, 20% white non-Hispanic, 53% African American, 26% Hispanic, and 1% other race/ethnicity. The HIV/STD low risk group had a mean age of 15.21, ($SD = 1.23$) and were 94% male, and 17% white non-Hispanic, 70% African American, and 13% Hispanic. There were no significant difference in average age between the two groups ($p=.13$). Regarding gender, the HIV/STD high risk group had a significantly lower proportion of males ($p=.02$). The two groups showed no significant difference on white non-Hispanic ($p=.63$) or Hispanic ($p=.07$) race/ethnicity distribution. However, the HIV/STD high risk group had a significantly lower proportion of African American adolescents ($p=.04$).

Adolescents meeting criteria for any alcohol or drug abuse or dependence disorder on the ADI-Light were grouped in Substance Use Disorder (SUD) group for the regression analyses. The SUD group (Yes/No to any SUD) comprised 62% ($n = 95$) of the sample and were 15.35 ($SD = 1.09$) average years of age, 79% male, and 30% white non-Hispanic, 47% African American, 22% Hispanic, and 1% other race/ethnicity. The group with no SUDs had a mean age of 15.51 ($SD = 1.18$), were 90% male, and 3% white non-Hispanic, 75% African American, and 22% Hispanic. There was no significant difference on average age between the two groups ($p=0.40$). The SUD group had a slightly lower proportion of males compared to those with no SUDs ($p=.08$). Regarding race/ethnicity distribution, the SUD group had a significantly higher proportion of white non-Hispanic adolescents ($p<.001$), a lower proportion of African American adolescents ($p<.001$) and virtually no difference in terms of Hispanic race/ethnicity ($p=.99$).

Logistic regression analysis was used to test the significance of the risk factors in predicting the two outcomes: HIV/STD risk level and SUDs. For each outcome, the analyses proceeded in a series of three steps.

First, all of the demographic variables (age, gender, and ethnicity) were entered into the logistic regression to control for any differences in outcome that might be attributable to participant characteristics. Next, each potential risk predictor was entered into the model, one at a time (17 total variables to predict HIV/STD risk level and 18 variables to predict SUDs). Variables examined as potential predictors of both HIV/STD risk level and SUD included total number of arrests (Parent Interview), total delinquency (NYS), parent- and youth-reported delinquency (CBCL and YSR), parent- and youth-reported cohesion and conflict (FES), parent- and youth-reported monitoring, warmth, and hostility (BARS), and number of psychiatric diagnoses (DISC-PS). Additionally, days used alcohol or drugs in the previous 90 (TLFB) and psychological involvement with substances (PEI) were added to the models predicting HIV/STD risk level. Number of sexual encounters while drunk/high and proportion of protected sexual acts (TLFB of Sexual Risk Behaviors) and total HIV/STD risk score (POSIT) were added to the models predicting SUDs. In this way, it was possible to measure the total variance associated with each predictor after controlling for demographic variables. At the final step, all of the predictors that were at least marginally significant ($p < .10$) earlier, when entered into the model univariately, were entered simultaneously into the model. This final multivariate predictor model provided estimates of the unique variance associated with each factor after adjusting for the variance accounted for by all factors. The stepwise model selection method was used and we only report the final model.

Predicting HIV/STD High Risk Level.

Demographic predictors. From the demographic only model, we found that age, gender, and race/ethnicity were all significant predictors of HIV/STD risk level. Older adolescents were at higher risk ($B = 0.342$, $p < .05$) as were females ($B = -1.736$, $p < .01$). With regard to race/ethnicity, Hispanic adolescents had higher HIV/STD risk level than African Americans ($B = 1.144$, $p < .05$), but neither group differed significantly from non-Hispanic white adolescents ($p > .05$).

HIV/STD risk level predictors. When the 17 separate predictors for HIV/STD risk level were added to the model univariately (after controlling for demographic variables), five predictors were found to be significant. Three of the predictors were delinquency variables (total delinquency from the NYS and delinquency scale scores from both the CBCL and the YSR). The other two significant predictors were two different measures of substance use (number of days used alcohol or drugs in the past 90 from the TLFB and psychological

involvement with substances from the PEI). We present two multivariate models in Tables 1 and 2 below. Table 1 contains all of the predictors that were significant after controlling for demographic variables when entered into the model univariately. Table 2 lists only significant predictors after a step-wise model selection procedure (total delinquency from the NYS and delinquency scale scores from the CBCL). In both models, the demographics were retained.

Insert Tables 1 and 2 Here

Predicting Substance Use Disorders.

Demographic predictors. Among the demographic variables entered into the model initially, only race/ethnicity was a significant predictor. White non-Hispanic adolescents had a significantly higher SUD rate than did African American or Hispanic adolescents ($B = 2.622, p < .001$; $B = 2.094, p < .012$). Although the rate for Hispanic adolescents was somewhat higher than for African Americans, the difference was not significant ($p > .19$). Age and gender did not significantly predict SUDs.

SUD predictors. At the next step, each of the 18 risk factors was added to the logistic model. Four of the variables were significantly associated with SUDs. Two of the four predictors were measures of adolescent delinquent behavior (total delinquency from the NYS and the delinquency scale scores from the YSR) and one was a measure of psychiatric comorbidity (number of psychiatric disorders). Adolescent-reported family conflict from the FES was also a significant predictor. We presented two multivariate models in Tables 3 and 4 below. Table 3 contains all of the predictors that were at least marginally significant ($p < .10$) when entered into the model univariately, and Table 4 presents only significant predictors after a step-wise model selection procedure (total delinquency adolescent-reported family conflict). In both models, the demographics were retained.

Insert Tables 3 and 4 Here

Discussion

These findings uncover new and clinically important findings regarding the unique and shared predictors of substance use disorders and HIV/STD risk level among incarcerated adolescents. First, as hypothesized, delinquency was a predictor of substance use disorders. While the role of delinquency in predicting substance abuse has been well established (Dierker et al. 2007; Becker & Grilo 2006), the strength of delinquency in predicting HIV/STD risk level is somewhat unexpected. In fact, self-reported delinquency was

the only consistent predictor of both HIV/STD risk level and SUDs in this study. It remained a significant predictor of both outcomes after accounting for the variance of all other variables in the final multivariate model. There are few published studies that have linked specific indicators of delinquency directly to high-risk sexual behaviors. One study examining arrest history with a community-based sample (Tolou-Shams et al. 2007), a second study of multiple admissions in a detained sample (Harwell et al. 1999), and a third study of psychopathy with a juvenile justice-involved sample (Malow et al. 2007), linked these indicators of delinquency to high-risk sexual behaviors (earlier initiation of sex, unprotected sex acts, sex while drunk or high, STDs, less favorable attitudes towards condoms and safer sex practices, and less favorable intentions to practice safer sex). These findings suggest that interventions to reduce HIV/STD risk and substance abuse must be comprehensive enough to address the delinquent behaviors that are so closely linked to substance abuse and HIV/STD-associated risk behaviors among juvenile justice-involved adolescents.

Substance abuse also predicted HIV/STD risk level after adjusting for demographic variables (frequency of use and psychological involvement with substances), although in the final multivariate model, delinquency was the only variable that contributed unique variance to HIV/STD risk level. The direct link between substance abuse and HIV/STD-associated risk behaviors shown in this study is supported by an impressive body of evidence with community, clinical, and juvenile justice samples. Both marijuana (Kingree, Braithwaite, & Woodring 2000) and alcohol use (Malow et al. 2006) have been linked to a range of high-risk sexual behaviors among youths, including unprotected sex and multiple sex partners.

The results also shed light on the subgroups most vulnerable for each outcome. As hypothesized based on previous research, HIV/STD risk level was predicted by female gender. Research has consistently shown that female adolescents are more susceptible to HIV and STD infection than males even at lower levels of other problem behaviors and known HIV/STD-associated risk behaviors (Halpern et al. 2004; DiClemente & Crosby 2003; Canterbury et al. 1995). Older age was also a significant predictor, consistent with findings from other high-risk samples (Fisher et al. 2008). In terms of ethnicity, Hispanic ethnicity was a predictor of HIV/STD risk level in comparison to African American ethnicity, consistent with results of research with a similar sample in the same geographic region (Devieux et al. 2005). Contrary to hypotheses, however, neither minority group had significantly elevated risk compared to white, non-Hispanic youth. This contradicts research showing that white

non-Hispanics and African Americans had higher HIV/STD risk relative to Hispanic teens in Florida (Hlaing, de la Rosa & Niyonsenga 2007), and that African American youths were at highest risk for HIV and STDs using nationally representative data (Halpern et al. 2004). There is a large body of research documenting health disparities in terms of higher rates of STDs among African American youths even at lower levels of other well established risk factors (DiClemente & Crosby 2003). Demographic variables were not strongly predictive of SUDs; only ethnicity (white, non-Hispanic ethnicity) was significantly related to SUD status, yet this was in the expected direction and consistent with previous research (Hlaing, de la Rosa & Niyonsenga 2007).

Mental health problems were also investigated as common antecedents of both HIV/STD risk level and SUDs. Mental health problems predicted SUDs after adjusting for demographic variables, yet in the final multivariate model did not contribute unique variance to SUDs. Mental health problems have been strongly linked to SUDs in a host of other research studies with community, clinical, and criminal justice samples with adults and adolescents (Cocozza & Skowrya 2000; Leshner 1997). The limited predictive relationship between mental health problems and HIV/STD risk level can be reconciled with previous research findings that show substance abuse to be a stronger determinant of sexual risk taking than mental health problems. Teplin et al. (2005) showed that juvenile detainees with mental disorders did not show elevated HIV/STD-associated risk in comparison to those with no SUDs or mental disorders only; in fact, the group with SUDs and comorbid mental health problems was not significantly different from the SUD-only group in terms of sexual risk taking. Similarly, Deas-Nesmith et al. (1999) demonstrated that the “knowledge-behavior gap” (the dissonance between what is known about HIV/AIDS and the extent of sexual risk taking) was largest in youths with SUDs, whereas adolescents with psychiatric disorders were not significantly different from community controls.

The study examined several aspects of family relationships as potential predictors of HIV/STD risk level and SUDs, including overall family environment variables of cohesion and conflict, as well as specific parent-adolescent relationship dimensions of hostility and warmth, and parental monitoring. Consistent with previous research, the findings support the important role of the family environment in adolescents’ substance abuse, specifically family conflict as perceived by the adolescent. Adolescents’ reports of family conflict contributed unique predictive variance to SUDs after controlling for demographics and all other factors. Similarly, family conflict (Dishion & Medici-Skaggs, 2000) and low levels of family support (van der Vorst et

al, 2006) are reliable predictors of adolescent delinquency and substance abuse across clinical, community, and juvenile justice samples. While these family variables were not significant predictors of HIV/STD risk level, it is possible that other family factors not measured in this study but linked to HIV/STD-associated risk behaviors in large-scale school samples, particularly parent-adolescent communication (Dilorio et al. 2003; DiClemente & Crosby 2003), maternal education level (Dye & Upchurch 2006), and parents' self-efficacy and risk behaviors (Wilder & Watt 2002) might have a more direct impact on sexual risk taking. Additionally, the strong link between delinquency and both outcomes may have obscured the associations between family factors and SUDs and HIV/STD-associated risk behaviors. One hypothesis that might be tested using structural equation modeling with a larger longitudinal dataset is that family relationship and environment factors are primary influencers of early problem behaviors and delinquency, which serve as proximal predictors of substance use and HIV/STD-associated risk behaviors in adolescence. There is some support for this hypothesis at least in terms of delinquency and substance use (Loeber & Farrington 2000; Mason et al. 2007), but further investigation including HIV/STD-associated risk behaviors is needed.

Certain limitations in the current study need to be acknowledged. First, the study relied on teens' self-reports of substance use. The case could be made that since these adolescents were involved with the courts, they might have been less than candid about their drug and antisocial activities. At the same time, self reports remain a standard and accepted way of collecting treatment outcome data, particularly the Time Line Follow Back (TLFB; Fals-Stewart et al. 2000). In addition, the conditions designed to maximize response accuracy were incorporated into the study's methodology. Data were collected by trained research staff independent and separate from detention personnel and teens were made aware that their responses constituted privileged information and would not be shared with parents or juvenile justice authorities.

A second limitation concerns generalizability. Our sample was incarcerated, low-income and urban composed of primarily males from ethnic minorities. Thus, it is not known whether the results would generalize to adolescents in the community with other demographic characteristics. The sample was also recruited for a randomized clinical trial in which youths and parents were willing to participate in ongoing research and assessment, thus it is possible that adolescents with no motivation for treatment would show different risk profiles. These results need to be replicated with other populations, and with larger samples.

The study has several strengths that give confidence to the validity of the findings. The study used standardized assessments tapping different symptom and prosocial domains of functioning with different respondents, and supported STD/HIV risk profiles with biological confirmation of STD infection. Because neither self report nor biological measures can wholly substitute for the other, we combined them to assess HIV/STD risk level in a reliable and valid way (Fishbein & Pequegnat 2000). While this type of correlational research does not lend itself to making causal relationships about the risk factors for either HIV/STD or substance use disorders (Leigh & Stall 1993), these findings shed new light on unique and common antecedents for these problems among juvenile justice-involved adolescents.

The clinical implications of these findings are clear: interventions for youths in the juvenile justice system must comprehensively target HIV/STD-associated risk factors, substance abuse, and delinquency. In the substance abuse and delinquency fields, family-based interventions have shown impressive results in significantly reducing drug use, criminal behavior, and mental health problems (Liddle et al. 2001, in press; Henggeler et al. 1999), and decreasing recidivism not only in the short-term but over many years (Schaeffer & Borduin 2005). While this study did not demonstrate direct effects of family factors on HIV/STD-associated risk behaviors, the strong links between delinquency, substance abuse, and risky sexual behaviors indicate the need for interventions that are potent and intensive enough to change the environmental and individual antecedents of these interrelated problems. This approach is consistent with recommendations from intervention experts such as Loeber and Farrington (2000) who call for integrated treatments that address the full constellation of problems among delinquent youths. However, effective interventions that systematically and concurrently target the interrelated problem areas of substance abuse, delinquency, and HIV/STD risk with adolescents in the juvenile justice system are nonexistent. Rigorous study of HIV prevention for juvenile offenders lags far behind research with other samples (DiClemente et al. 2007). Even with lower risk adolescent samples, existing evidence-based HIV prevention approaches are generally delivered in a group format with little attention to contextual or systems factors (Malow et al. 2007). In clinical practice, intervention programs typically target “individual” problem areas separately, perpetuating well-documented problems of service fragmentation in juvenile justice, addictions, and health systems (IOM 2006). Given the empirically established interdependence of shared risk factors for HIV-associated sexual behaviors, substance abuse, and delinquency (Donenberg et al. 2006;

McClelland et al. 2002), the need for effective and efficient service delivery systems that can deliver comprehensive interventions targeting all of these problems with juvenile offenders is an urgent public health and research priority (DiClemente et al. 2007; Teplin et al. 2005).

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Table 1. Predictors of HIV/STD High Risk Level Group Entered Univariately with Demographic Variables Controlled

	Beta	Std.Error	t.value	p.value
Total Delinquency (NYS)	0.011	0.005	2.352	0.020
Parent Reported Delinquency (CBCL)	0.098	0.042	2.327	0.021
Adolescent Reported Delinquency (YSR)	0.151	0.059	2.571	0.011
Days Used Alcohol or Drugs (TLFB)	0.010	0.005	2.108	0.037
Involvement w/Substances (PEI)	0.036	0.016	2.315	0.022

Table 2. Final Predictors of HIV/STD High Risk Level Group: Step-Wise Model Selection Procedure

	Beta	Std.Error	t.value	p.value
Intercept	-3.841	3.036	-1.265	0.208
Age	0.412	0.182	2.260	0.025
Gender	-1.619	0.666	-2.433	0.016
White Non-Hispanic Ethnicity	-0.150	0.534	-0.280	0.780
Hispanic Ethnicity	1.145	0.533	2.147	0.033
Total Delinquency (NYS)	0.011	0.005	2.166	0.032
Parent Reported Delinquency (CBCL)	0.085	0.040	2.119	0.036

Table 3. Predictors of Substance Use Disorders Entered Univariately with Demographic Variables Controlled

	Beta	Std.Error	t.value	p.value
Number Lifetime Arrests	0.167	0.089	1.886	0.061
Total Delinquency (NYS)	0.009	0.004	2.446	0.016
Adolescent Reported Delinquency (YSR)	0.117	0.054	2.168	0.032
Adolescent Reported Conflict (FES)	0.181	0.077	2.355	0.020
Number of Psychiatric Diagnoses (DISC)	0.305	0.104	2.916	0.004
Having Sex when Drunk or High	0.125	0.070	1.789	0.076

Table 4. Final Predictors of Substance Use Disorders: Step-Wise Model Selection Procedure

	Beta	Std.Error	t.value	p.value
Intercept	1.711	2.791	0.613	0.541
Age	-0.091	0.168	-0.541	0.589
Gender	-0.512	0.575	-0.891	0.374
White non-Hispanic Ethnicity	2.293	0.783	2.928	0.004
Hispanic Ethnicity	0.467	0.444	1.053	0.294
Total Delinquency (NYS)	0.008	0.004	2.237	0.027
Adolescent Reported Conflict (FES)	0.152	0.078	1.935	0.055