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Drug Use and Sexually Transmitted Diseases among Female and Male Arrested Youths

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Abstract

Knowledge of the rates and correlates of juvenile offenders' sexually transmitted diseases (STD) has been limited to samples of incarcerated youths comprised mostly of males. Data collected on 442 female and 506 male youths processed at a centralized intake facility enabled us to study this important public health problem among a sample of juvenile offenders at the front end of the justice system. Female-male, multi-group latent class analyses identified two subgroups, High Risk and Lower Risk, of youths described by a latent construct of risk based on drug test results, STD test results, and a classification for the seriousness of arrest charge. The results found: (1) a similar classification distinguished High Risk and Lower Risk male and female youths, and (2) important gender group differences in sexual risk related factors (e.g., substance use during sexual encounters). Among the youths in this sample who tested positive for an STD, 66% of the girls and 57% of the boys were released back into the community after arrest. Overall, our findings raise serious public health and social welfare concerns, for both the youths and the community. Prevention and intervention implications of these findings are also discussed.

Keywords

Sexually transmitted disease; risky sexual behavior; substance use; juvenile offender

The juvenile delinquent population represents a segment of our society that is particularly at risk for developing future behavioral problems and health issues. In 2004, 2.2 million juvenile arrests were reported by law enforcement agencies (Snyder and Sickmund 2006). Although there has been a marked decrease in the overall rate of juvenile arrests, the proportions of drug arrests and arrests among girls have shown increasing trends (Snyder and Sickmund 2006). Since these subpopulations of juvenile offenders are at an elevated risk for sexually transmitted diseases (STDs) (Center for Disease Control [CDC] 2006), juvenile justice system (JJS) contact presents an important opportunity to identify and address health related needs that will inform prevention and treatment. As such, the purpose of this study is to report findings from a latent class analysis of risk behaviors among a sample of juvenile delinquents.

Research conducted on juvenile offenders consistently reveals significant relationships between drug use and crime (e.g., Welte et al. 2001; White et al. 1999; Harrison and Gfroerer 1992), important associations between drug use and STD risky behaviors (e.g.,

Teplin et al. 2005, 2003), and variation in the prevalence of STDs by subgroups of juvenile offenders, most notably drug users and females (Teplin et al. 2005, 2003). Therefore, the drug use-STD-juvenile offending nexus presents a highly significant public health problem, particularly as these behaviors involve personal harm and, in the case of STDs, the spread of disease to the wider community.

Risky Sexual Practices and STDs among Juvenile Offenders

Youths involved in the JJS tend to be younger at first sexual experience, report greater numbers of sexual partners, and use condoms less often than youths in the general population (Barthlow et al. 1995; Rickman et al. 1994). For example, Teplin et al. (2003) studied STD risky behaviors in a sample of 800 adolescents incarcerated in a juvenile detention center and reported 91% were sexually active, 35% reported having unprotected sex in the past month, 90% reported engaging in at least three risky sexual behaviors, and 65% reported engaging in 10 or more risky sexual behaviors. Undoubtedly, these risky sexual practices contribute to the likelihood that youths will contract an STD.

Studies that have estimated the prevalence rates of STDs among juvenile offenders reveal alarmingly high rates (Joesoef et al. 2006; Kahn et al. 2005; Morris et al. 1998). For instance, Kingree et al. (2000) estimate that 15% of male and 30% of female juvenile detainees are infected with an STD at any given time. More recently, the CDC (2006) reported a 6.3% median state STD positive rate for women aged 15 to 24 tested at family clinics, whereas the median percent positive rate for females tested in juvenile correctional facilities was 14.2%. Contributing to public health concerns regarding these alarming STD prevalence rates, a majority of juvenile offenders do not have regular sources of health care, access to HIV and STD testing and education, and/or the resources to obtain such services (Joesoef et al. 2006). Hence, large populations of youthful offenders are unlikely to receive STD education and treatment, and in turn, are more likely to be living with these infections.

Drug Use and Risky Sexual Behavior among Juvenile Offenders

Drug use among juvenile offenders remains a serious problem (Dembo, Wareham et al. 2007; McClelland et al. 2004; Potter and Jenson 2003). For instance, Belenko and Logan (2003) found that 35% of arrested adolescents had indications of alcohol involvement, 70% had drug involvement, and 75% either drug or alcohol involvement. Substance use has been associated with a variety of health and behavioral concerns, including STDs and sexual practices.

Studies that have examined the relationship between substance use and risky sexual behaviors involving both delinquent and non-delinquent youths suggest that substance users engage in risky sexual behaviors at a substantially higher rate than non-users (Malow et al., 2006; Hlaing et al. 2006; Bryan and Stallings 2002; Kingree and Phan 2001; Deas-Nesmith et al. 1999; Harwell et al. 1999). For juvenile offenders, marijuana use has been found to be associated with unprotected sex, as well as STDs (Kingree et al. 2000; Barthlow et al. 1995; Shafer et al. 1993). Alcohol use has also been linked to decreased condom use among female juvenile offenders, but not male delinquents (Bryan et al. 2007). Further, Teplin et al. (2005) reported significantly more detained youths with substance use disorders were found to be sexually active, reporting two or more partners in the past three months, unprotected sex, oral sex, and unprotected sex while drunk or high, than youths without a substance use disorder.

Gender Differences across Offending, Drug Use, Risk Behaviors, and STD Prevalence

A large body of literature has been devoted to examining gender disparities among juvenile offenders. In general, there is consensus that female juvenile offenders tend to experience more severe psychosocial problems (Teplin et al. 2002; Broidy and Agnew 1997), higher levels of family adversity (Gavazzi et al. 2006), and more negative life events such as physical and sexual abuse (Dembo, Schmeidler et al. 2007; Acoca 1999; Acoca and Dedel 1998); whereas male juvenile offenders tend to demonstrate greater frequency, severity, and persistence in their offending (e.g., Snyder and Sickmund 2006; Zhang 2004; Farrington 1998; Huizinga et al. 1994; Moffitt 1993). Research on gender differences with regard to other forms of deviant behavior such as drug use and sexual practices is less consistent.

Research on gender differences in drug use among juvenile offenders is mixed, with no definite pattern of gender differences emerging. Some studies have revealed no significant gender differences in drug use behaviors among juvenile offenders (e.g., Teplin et al. 2003). Others have reported no gender differences for alcohol and marijuana use but significantly higher use of other illicit drugs such as cocaine and amphetamines among girls only (Neff and Waite 2007; Kim and Fendrich 2002). Yet other studies report higher levels of drug use among male juvenile offenders (see for example: McClelland et al. 2004; Zhang 2004).

Comparison of risky sexual behaviors among male and female detainees also reveals inconsistent patterns. Teplin et al. (2003) found that males were more likely to report being sexually active, having multiple partners, and having sex while drunk or high. However, female detainees reported higher levels of unprotected sex in the past month, sex with high risk partners, unprotected sex while drunk or high, and trading sex for money (Teplin et al. 2003). Canterbury et al. (1995) examined gender differences among incarcerated youths and found no significant differences in the number of sex partners or use of condoms but did report a significantly higher percentage of females possessed prior and current diagnoses of STDs than male youths. Morris et al. (1998) found that male detainees were more likely to report never using a condom, higher numbers of partners, and engaging in bisexual behaviors, than female detainees. On the other hand, Kingree et al. (2000) found that females were significantly more likely to have sex without a condom, than males.

Despite the unresolved relationships for risky sexual behaviors and drug use across gender, empirical research has consistently documented that female juvenile offenders have substantially higher prevalence rates of STD infection, than males. For example, Mertz et al. (2002) screened adolescents in 12 U.S. juvenile detention centers and found female prevalence rates of 15.6% for chlamydia and 5.2% for gonorrhea, and male rates of these diseases of 7.6% and 0.9%, respectively. Among juveniles in 14 detention centers, Kahn et al. (2005) found that 15.6% of females and 5.9% of males were positive for chlamydia, and 5.1% of females and 1.3% of males were positive for gonorrhea. Joesoef et al. (2006) estimate that chlamydia positive rates range from 13.0% to 24.7% in incarcerated adolescent female populations, and 4.8% to 8.1% in incarcerated adolescent male populations, and gonorrhea positive rates range from 4.5% to 7.3% for females and from 0.9% to 6.7% for males.

Although STD rates among juvenile offenders, as a whole, signify a major public health problem, the substantially higher rates of STD infection among female offenders is quite alarming—especially in view of the asymptomatic nature of these diseases (Burstein et al. 1998; Kahn et al. 2005). Undetected, and therefore, untreated STD infections can have serious, adverse, long-term health consequences. For females, these devastating consequences include pelvic inflammatory disease (PID), reproductive difficulties, and birth

defects (Chacko et al. 2004). Furthermore, untreated STDs may increase risk of HIV by 3 to 5 times (CDC 1998).

The Need for More Knowledge

Knowledge about the incidence and prevalence of STDs, and their associated risk behaviors, is still quite limited for the general juvenile justice population, especially for female offenders and those under community supervision. To date, the handful of studies that have been conducted are often based on self-report data and involve youths placed in secure detention centers or juvenile correctional facilities (Canterbury et al. 1995; Pack et al. 2000; Teplin et al. 2005; Kahn et al. 2005). Because of focusing on incarcerated youth, these studies fail to include sufficiently large samples of female juvenile offenders (in 2004, over 75% of detained juveniles were male [Stahl et al. 2007]). Accordingly, these studies fail to include two important subsamples of the juvenile offender population: 1) those who are returned to the community following arrest (in 2003, 20.4% of arrested youths were detained, while 79.6% were released back into the community [Stahl et al. 2007]) and 2) a sufficiently large and representative sample of female juvenile offenders.

The current study addresses the above limitations by examining risky behaviors among a sample of delinquents processed at the “front-end” (i.e., initial entry stage) of the juvenile justice system in a southern U.S. city. As previously described, there is a certain degree of dependence (or nonindependence) between STD status, drug use, and juvenile offending that may vary across gender. Latent class analysis (LCA) allows for the estimation of an unobservable or latent construct that accounts for the observed associations between STD status, drug use, and offending. That is, the manifested relationships between STD, drug use, and offending can be thought of as describing two or more latent categories of risk behavior. In this study, LCA was used to examine the drug use-STD-juvenile offending nexus across gender relying upon conservative and more valid indicators obtained from biological assays and official records, rather than self-reports. The methodology and LCA results are described below, followed by a discussion of the policy and service delivery implications.

Methods

Procedure

A collaborative effort involving the Hillsborough County Juvenile Assessment Center (HJAC) (a centralized intake facility for arrested juveniles), the Florida Department of Health (DOH), Hillsborough County Health Department (HCHD), and the Florida Department of Juvenile Justice (DJJ) was established and implemented in Tampa, Florida. Based on collaboration between the lead author, HJAC personnel, DOH testing laboratory personnel, and HCHD administrators, a protocol was established involving three major steps: (1) HJAC assessors provided brief STD pre-counselling to newly arrested juveniles, (2) arrested juveniles who were over the age of 11 (under Florida law, youths 12 years of age or older are protected from disclosure to parents of STD test results and do not need parental consent to receive an STD test) and provided a urine sample for drug testing as part of the usual HJAC processing procedure were asked to consent to their urine specimens being split for chlamydia and gonorrhea testing, and (3) a coordinated effort was made to inform HCHD Disease Intervention Specialists of STD positive youths and locate and treat them. Participants in this study were newly arrested juveniles processed at the HJAC from June 16, 2006 through September 30, 2006 (for males) and from June 19, 2006 through December 31, 2006 (for females). Youths processed more than once during this period were tested only on their first admission. A total of 759 males and 634 females were recruited and assessed by HJAC assessment staff. Among these, 82.6% of the males and 82.6% of the females agreed to provide a urine specimen for drug testing. Of those providing a urine

specimen, 80.7% of the males and 84.4% of the females also consented to urine testing for chlamydia and gonorrhea. No significant differences were found in STD testing participation by gender, HJAC shift, race, age, or HJAC placement. Although the 506 male and 442 female youths involved in this study were not probability samples, comparison of these youths with all HJAC male and female intakes during the data collection period in regard to demographic and charge characteristics do not indicate any substantial difference between them.

Measures

Urine analyses drug use data

As per established procedures, voluntary urine specimens were collected during the HJAC assessment process. At the testing lab, the split urine specimens were tested for marijuana, cocaine, opiates, and amphetamines using the EMIT procedure. The cut-off levels for a positive for each drug were: marijuana (50 ng/ml of urine), cocaine (300 ng/ml of urine), opiates (300 ng/ml of urine) and amphetamines (1000 ng/ml of urine). Drug use test results were dichotomized as 0 = negative and 1 = positive.

STD testing data

A non-invasive, FDA-approved, urine-based nucleic acid test was used to test for presence of chlamydia and gonorrhea. The GenProbe APTIMA Combo 2 Assay involves a probe that is attached to the chlamydia and gonorrhea rRNA. GenProbe equipment detects this light-emitting probe, which is reported as a Relative Light Unit (RLU). The sensitivity of Gen-Probe's test has been shown to be superior to culture and direct specimen tests. The sensitivity and specificity of the GenProbe urine-based chlamydia test are 95.9% and 98.2%, respectively, and for gonorrhea they are 97.8% and 98.9%, respectively (Cook et al. 2005; Chacko et al. 2004). This test is currently in statewide use by the Florida Department of Health Bureau of Laboratories. An overall STD test result measure was created for chlamydia and/or gonorrhea, coded as 0 = negative and 1 = positive.

Post HJAC placement and charge level

In accordance with Florida State law, each arrested youth brought to the HJAC must have a Detention Risk Assessment Instrument (DRAI) completed on him/her (Dembo et al. 1994). The DRAI assigns points to the youth’s most serious current offense, other current offenses and pending charges, prior offense history, current legal status, and aggravating or mitigating circumstances. Youths assigned 0 to 6 points are released to the community without supervision, awaiting placement in a diversion program. Youths receiving 7 to 11 points are placed on non-secure home detention (home arrest). Youths receiving 12 or more points are placed in secure detention. The post HJAC placement variable we used in the analyses reflects this DRAI score based decision (i.e., diversion, non-secure home detention, secure detention).

Youths receiving a score of 7 or more on the DRAI are placed under the supervision of the DJJ; these youths are assigned a DJJ case manager who monitors their case until final court disposition. The current charge level variable used in our analyses differentiated diversion eligible youths (DRAI score 0 to 6 points; coded as 0) from youths whose scores place them under the supervision of DJJ (coded as 1).

STD/HIV risk behavior

During the HJAC intake process, youths were asked to complete a Risk Assessment Questionnaire, probing their engagement in eleven STD/HIV risk behaviors (see Table 1). Dichotomous measures for each of the eleven behaviors/experiences were created, where 0

= no and 1 = yes. An additive score summing the eleven dichotomous items was also created. Two features of these results are noteworthy: (1) relatively few male and female youths self-reported engaging in or experiencing many of the risk behaviors, and (2) females were significantly more likely to report sexual assaults and contracting an STD than male youths. Since the self-report STD/HIV risk behaviors were highly skewed due to the overwhelming number of youths not reporting such behaviors, we had to be judicious about including them in our study. Erring on the side of caution, a decision was made to avoid using the self-report indicators, which could reflect: (a) a reluctance to self-disclose (see, for example, Dembo et al. 1999) and/or (b) true low values for one or more of these items—both of which could affect the usefulness of the LCA estimations. However, four of the self-report risk items (items 2, 4, 8, and 9 in Table 1) demonstrated better response rates (greater than 2% for boys or girls) and were used as covariates in subsequent analyses to examine the validity of the latent class results (see Table 7).

Analysis Strategy

This study involved the use of a female-male, multi-group LCA using Mplus version 5.1 (Muthén and Muthén 2007). LCA is useful in a wide range of substantive areas involving cross-sectional and longitudinal data (Clogg 1995; Hagenaars and McCutcheon 2002). This statistical technique seeks to identify an underlying classification of entities (e.g., individuals) which are related to manifest indicators in probabilistic terms (Dayton 1998). In particular, the latent class model is useful when studying a heterogeneous population.

The issue of class enumeration, determining the appropriate number of classes (i.e., subgroups) for a study population, in mixture modeling remains unresolved; therefore, experts recommend using multiple criteria to aid in class enumeration (Nylund et al. 2007). The criteria used to assess the LCA results were: (1) the classification table based on class probabilities for the most likely latent class membership by latent class, (2) the entropy score, (3) the Akaike information criterion (*AIC*), (4) the Bayesian information criterion (*BIC*), (5) the sample size adjusted BIC (*saBIC*), and (6) the model fit to the univariate and bivariate frequency tables (Lubke and Neale 2006; Ramaswamy et al. 1993; Akaike 1987; Bozdogan 1987).[1] For the classification table, high diagonal values and low off-diagonal values indicate good classification quality (Muthén and Muthén 2001). The values of entropy range from 0 to 1, with scores close to 1 indicating clear classifications (Muthén and Muthén 2001:372). For *AIC*, *BIC*, and *saBIC*, lower scores, those closest to zero, indicate a better fit of the model. For the fit of the model to the univariate and bivariate frequency tables, smaller standardized residuals between the observed and estimated (expected) probabilities indicate a better fit. The substantive meaningfulness of the latent class results is also important in deciding on the number of classes.

The following categorical variables were used in the latent class analyses: overall STD results, urine analysis test results for marijuana and cocaine, and current charge level. Since very few youths were opiate or amphetamine positive (see Table 3), these drugs were excluded from the LCA models. The binary variables were chosen for analysis for two main reasons: (1) they represent key factors, noted earlier, related to HIV and general risk, and (2) they represent the most valid data available from the study, thus providing a conservative test.

[1]The Vuong-Lo-Mendell-Rubin likelihood ratio test, Lo-Mendell-Rubin adjusted likelihood ratio test, and the bootstrap likelihood ratio test statistics (Nylund et al. 2007; Lo et al. 2001) were not available for the “known class,” multi-group LCA we conducted (Muthén and Muthén 2007).

Results

Sample Characteristics

As Table 2 shows, the male and female youths were similar in age. In regard to race/ethnicity, a larger percent of white females are represented in the study than white males. A significantly larger percent of girls (72%) were arrested on less serious (misdemeanor, diversion eligible) charges than boys (58%); conversely, boys were more often arrested on serious felony charges. Nearly three in four girls, compared to just over half of the boys, were released to the community. On the other hand, more boys than girls were placed on non-secure home arrest or transported to a detention center from the HJAC.

Sexually Transmitted Diseases and Drug Use

Table 3 presents the STD and drug test results for the male and female youths. As can be seen, the gender groups have similar rates of drug positives for cocaine. On the other hand, boys had a significantly higher urine analysis positive rate for marijuana than girls. Consistent with findings from studies of incarcerated youths (e.g., Mertz et al. 2002; Kahn et al. 2005), girls had significantly higher STD positive rates than boys, overall (girls = 19.5%, boys = 10.7%). Finally, girls had significantly higher STD/HIV Risk summary measure scores ($M = 0.52$) than boys ($M = 0.34$).

Female and Male High Risk and Lower Risk STD/Drug Use Groups

Preliminary examination of the tetrachoric correlations among the binary variables for each gender group is presented in Table 4. These results highlight: (a) significant relationships between the STD results, the urine analysis test results for marijuana and cocaine, and current charge level, and (b) significant interrelationships among the urine analysis test results for marijuana and cocaine. In addition, *z*-score conversion comparisons of the correlations across gender indicated girls reported significantly higher associations between STD and cocaine use (Fisher's $z = 2.17$) and marijuana and cocaine use (Fisher's $z = 3.13$), whereas boys reported significantly higher associations between cocaine use and charge level (Fisher's $z = -2.20$) and marijuana use and charge level (Fisher's $z = -2.25$).

LCA models were estimated involving two latent classes, comparing the fit of two latent classes with the null model of one latent class for the data. Since four binary variables were involved in the analyses, up to two latent classes, with six degrees of freedom, could be identified in the data (L. Muthén, personal communication, May 20, 2008). There were a few cases with missing data ($n = 2$). For these few cases, we used the Mplus data imputation procedure (Rubin, 1987), in which each missing value is replaced by a set of plausible values drawn from their predictive distribution (Schafer and Olsen, 1998) to estimate the values of the missing data. The LCA fit statistics are shown in Table 5. As these results indicate, the two-class model is a significantly better fit to the data for the male and female youths, than a one-latent class model.

The LCA male and female risk model results are shown in Table 6. As Table 6a shows, four risk groups were identified in the data: (1) High Risk females ($n = 60$), (2) Lower Risk females ($n = 382$), (3) High Risk males ($n = 48$), and Lower Risk males ($n = 458$). Significant differences were found in the categorical latent variable means across the male and female groups and across the High risk and Lower Risk groups (see Table 6b).

The classification table based on class probabilities for most likely latent class membership by latent class indicates high main diagonal and modest off-diagonal values—with one relatively small exception: an off-diagonal classification of .221 for the High Risk females. Importantly, a high entropy value of 0.784 was obtained for the multi-group LCA results.

The univariate model fit results indicated, with a few nonsignificant exceptions, low or near zero standardized residuals between the observed and estimated (expected) probabilities. Further, in general, low, and all nonsignificant, standardized residuals were found for the bivariate model fit information involving 24 cell comparisons (not shown), indicating a respectable fit of the two-group, two-class model.

The LCA results in probability space (Table 6a) indicate, for each gender group, the two latent classes reflect different levels of STD-drug involvement-seriousness of arrest charge risk, such that: (1) male and female youths who are STD positive, marijuana positive, cocaine positive, and charged with serious, felony type offenses have a relatively high probability of placement in the High Risk latent class, and (2) male and female youths with negative results on these four indicators have a high probability of placement in the Lower Risk latent class. It is interesting to note that, for both males and females, all cocaine negative youths are placed in the Lower Risk class.

Comparisons of Demographic Factors, Charge Level, and STD/HIV Risk Behavior across Latent Risk Group Membership

The Mplus Auxiliary option (Muthén and Muthén 2007:454) of specifying variables for which the equality of means across latent classes is tested using posterior probability-based multiple imputation was used to compare, for each gender group, the equality of means for race, age, and self-reported engagement in certain STD/HIV risk behaviors. As Table 7 shows, comparisons across the High and Lower Risk male and female groups found no significant difference in regard to race. In regard to age, female High Risk youths (M = 15.74) were significantly older than Lower Risk females (M = 15.23) and Lower Risk males (M = 15.43); High Risk males (M = 15.91) were significantly older than Lower Risk males.

As noted earlier, we selected four of the STD/HIV risk behaviors (see Table 1) the youths reported most frequently engaging in (prevalence rates in parentheses) for further analysis: Have you had sex while using non-injecting drugs, such as alcohol? (8%); Have you had a sexually transmitted disease? (3%); Had intercourse with the opposite sex without using a condom? (22%); and Been sexually assaulted? (5%). As the results in Table 7 show, High Risk female youths were significantly more likely to report having sex while using non-injecting drugs, such as alcohol, than Lower Risk females, and High Risk males were significantly more likely to report this risk behavior, than Lower Risk females. Further, High Risk females, and Lower Risk females, were significantly more likely to report they had a sexually transmitted disease, than Lower Risk males. High Risk males were significantly more likely to report having intercourse with the opposite sex without using a condom, than Lower Risk females. Finally, and importantly, High and Lower Risk females were significantly more likely to report having been sexually assaulted, than High Risk and Lower Risk males.

Discussion

The results reported in this paper provide a strong case for significant relationships between drug use and STDs among this purposive sample of male and female juvenile arrestees. We are not aware of any selection bias (based on research staff presence during HJAC shifts over the data collection period) or threats to the validity of this study. The female-male, multi-group latent class analysis found a similar classification distinguishing High Risk and Lower Risk youths. For each gender group, youths classified as High Risk had higher STD positive rates, higher rates of urine analysis positive results for marijuana and cocaine, and higher rates of being charged with a serious offense compared to youths classified as Lower Risk. Since both the STD and drug use results were based on biological data (the first study we are aware of including biological measures of both these phenomena involving arrested

youths at the front end of the juvenile justice system), the compelling nature of these findings is amplified.

Although limited in scope, a comparison of the latent classifications with self-reported indicators of sexually risky behavior not included in the LCA analyses suggested that the latent classifications do indeed reflect differences in risk (see Table 7). In our sample, overall tests of mean differences across the four classes revealed that female High Risk and Lower Risk youths were more likely than Lower Risk males to report having a sexually transmitted disease. High Risk and Lower Risk females were also more likely to report having been sexually assaulted ($p = 0.08$), than their male counterparts. Pair wise mean comparisons of the four latent classes also indicated some significant differences, with the High Risk and female classes being generally more likely to report risky sexual practices.

We believe the concept of relative deviance at least partially explains the male-female differences we identified (Dembo and Shern 1982; Kaufman 1978) across the gender-based latent construct of risk. According to this view, persons who are more deviant from the norms of their social and cultural setting tend to exhibit more serious behavior problems. Our findings are consistent with those of several studies that have revealed higher psychological deficits and troubled backgrounds among female, compared to male, juvenile offenders (Belenko et al. 2004; Dembo et al. 1993; Dembo et al. 1998; Dembo et al. 1995). Other studies have found that female juvenile offenders have higher rates of victimization from physical and sexual abuse (Acoca and Dedel 1998; Chesney-Lind 2001), and substance-involved adolescent females suffer from post-traumatic stress disorder at much higher rates than substance-involved males (Deykin and Buka, 1997). As Wilson and Herrnstein (1985) asserted, it is as if females have to reach a higher threshold before they become involved in the JJS.

Of particular concern, 7% of High Risk females, compared to 0.8% of High Risk males, self-reported ever having an STD. Together with the high STD prevalence rates we found, our data suggest the need for a public health policy change relating to juvenile offenders, particularly female offenders. The STD positive rates for chlamydia and gonorrhea for males (9.3%, 3.0%) and females (16.9%, 6.8%) are far higher than comparable rates for male (0.1%,0.2%) and female (1.3%, 0.3%) youths in the Hillsborough County general population receiving STD testing in 2005 (the latest available data) (Florida Department of Health 2006).

Given the literature reviewed earlier, we were not surprised that 24.3% of the youths who were placed in secure detention were STD positive. However, it is of concern that 11.9% of youths released to diversion programs and 12.6% of youths placed on non-secure home detention were infected, indicating a substantial risk for the spread of disease in the community. In particular, 66% of STD positive females, and 57% of STD positive males, were released back to the community. Universal, voluntary STD testing for newly arrested juveniles, with treatment follow-up for STD positive cases seems to be seriously needed - especially for youths released to the community.

Because of the elevated health risks to females having STDs, STD positive females require priority attention. Early detection and treatment of STDs is crucial to the prevention of related, chronic, long-term health consequences (Chacko et al. 2004). The high number of STD positive females found in our data coincides with the existing research that suggests female adolescent offenders are an extremely important risk group for STDs, and are in critical need of education, testing, and treatment (CDC 2006).

Given the increased HIV risk associated with STD infections, increasing detection and treatment can help to prevent future HIV infections as well (ASTHO 2005). Early detection

is vital in effectively addressing the STD and HIV/AIDS epidemics (Teplin et al. 2003). Additional analyses indicated a strong linear trend by age for STD positive results–with younger aged youths having far lower rates than older aged youths. Involving younger aged, arrested juveniles in prevention or early intervention services holds considerable promise of reducing the incidence and spread of these diseases.

A number of interventions have been developed to reduce HIV risk among juvenile offenders (McKernan McKay et al. 2004; Jemmott et al. 2000; St. Lawrence et al. 1999). They hold considerable promise of reducing this growing public health problem. Our results suggest that these interventions need to be sensitive to differences in risk levels as well as gender differences in risk related factors. We found High Risk male and female youths had higher prevalence rates for STDs and for marijuana and cocaine, than their Lower Risk counterparts; and High Risk males and females were more likely to be arrested on more serious charges, than Lower Risk males and females, respectively. Higher risk youths may require more intensive services. Further, as discussed earlier, our data suggest female youths are at higher risk than male youths. Service providers need to be sensitive and prepared to respond to these potential gender group differences, particularly the high reported rates of being sexually assaulted among girls. Juvenile justice agencies should make the introduction of effective risk level and gender sensitive interventions in their programs a priority.

It is important to replicate our study among front end, juvenile justice youths in other jurisdictions serving diverse cultural groups, to among other things, assess the generalizability of our results. This effort should include expanding the number of risk variables (i.e., substance use, delinquency, STD status, and sexual behaviour) used in the LCA analyses. By increasing the number of variables used in latent class analyses, future studies will be able to obtain a fuller understanding of subgroup heterogeneity that may exist among various samples. In addition, an increase in the number of variables will permit estimation of more latent class structures. Unfortunately, due to data limitations, we were unable to accomplish this in the current study.

At the same time, the findings from this study suggest the need for an urgent response to the high STD rates, as well as the drug use issues, presented by arrested juveniles. Strong public health and political commitments are needed to address these serious public health needs among this highly vulnerable population. A large number of youths processed by the JJS are from economically stressed families who lack the resources to access health care (Dembo and Schmeidler 2002). The front door of the juvenile justice system represents an important, procedurally efficient, and effective opportunity to improve these youths' health in a way that directly impacts the health of the general community.

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Table 1

Juvenile Assessment Center Intake STD/HIV Risk Questions

		% Males Reporting(*n* = 500 or 501)	% Females Reporting(*n* = 440 or 441)	Fisher's Exact Test
1.	Have you injected drugs?	1.2%	<1%	ns
2.	Have you had sex while using non-injecting drugs, including alcohol?	7.6%	8.6%	ns
3.	Have you traded sex for drugs or money?	<1%	<1%	ns
4.	Have you had a sexually transmitted disease?	<1%	5.0%	***
5.	Are you a child of a woman with HIV/AIDS?	<1%	<1%	ns
6.	Are you a hemophiliac?	<1%	<1%	ns
7.	Have you had a blood transfusion?	1.6%	<1%	ns
8.	Have you had intercourse with the opposite sex without using a condom?	20.6%	24.1%	ns
9.	Have you been sexually assaulted?	<1%	10.0%	***
10.	Have you had sexual intercourse with a man who has had sex with a man?	<1%	<1%	ns
11.	Have you had sexual intercourse with a person at risk for HIV/AIDS?	1.0%	<1%	ns

Two tailed *p*-values

* $p < .05$

** $p < .01$

*** $p < .001$.

Table 2

Sociodemographic Characteristics, Charge Level, Drug Use, and Post HJAC Placement by Gender

Race/Ethnicity:	**Male**	**Female**
White	34.7%	43.2%
African-American	54.0%	49.5%
Hispanic White	10.5%	7.2%
Hispanic Black	0.6%	--
Other	0.2%	--
	100.0%	100.0%
	(*n* = 504)	(*n* = 442)
	χ^2 (4, N = 946) = 11.60, *p* < .05	
Age:	Male	Female
12	2.4%	3.8%
13	9.3%	9.7%
14	12.8%	15.8%
15	19.0%	20.6%
16	24.9%	24.0%
17	27.9%	21.9%
18	3.8%	4.1%
	100.0%	100.0%
	(*n* = 506)	(*n* = 442)
	χ^2(6, N = 948) = 6.96, *p* = n.s.	
Charge Level:	Male	Female
Diversion	58.6%	71.9%
Dept. Juvenile Justice Case	41.4%	28.1%
	100.0%	100.0%
	(*n* = 505)	(*n* = 442)
	χ^2(1, N = 947) = 18.38, *p* < .001	
Post HJAC Placement:	Male	Female
Diversion	55.2%	72.2%
Non-Secure Home Detention	18.0%	10.0%
Secure Detention	26.7%	17.9%
	100.0%	100.0%
	(*n* = 505)	(*n* = 442)
	χ^2(1, N = 947) = 29.63, *p* < .001	

Table 3

Sexually Transmitted Disease, Drug Test Results, and HIV/STD Risk Behaviors by Gender

	Male	Female
Urine Analysis Drug Test Results		
Marijuana:		
Negative	57.0%	73.5%
Positive	43.0%	26.5%
	100.0%	100.0%
	(n = 505)	(n = 441)
	$\chi^2(1, N = 946) = 27.86, p < .001$	
Cocaine:		
Negative	94.1%	95.9%
Positive	5.9%	4.1%
	100.0%	100.0%
	(n=505)	(n=441)
	$\chi^2(1, N = 946) = 1.69, p$ = n.s	
Amphetamines:		
Negative	98.2%	98.2%
Positive	1.8%	1.8%
	100.0%	100.0%
	(n=505)	(n=441)
	$\chi^2(1, N = 946) = 0.01$, p = n.s	
Opiates:		
Negative	99.4%	99.5%
Positive	0.6%	0.5%
	100.0%	100.0%
	(n = 505)	(n = 441)
	$\chi^2(1, N = 946) = 0.09, p$ = n.s.	
Sexually Transmitted Diseases		
Negative	89.3%	80.8%
Positive Chlamydia	7.7%	12.4%
Positive Gonorrhea	1.4%	2.5%
Positive Chlamydia and Gonorrhea	1.6%	4.3%
	100.0%	100.0%
	(n = 506)	(n = 442)
	$\chi^2(3, N = 948) = 15.00, p < .01$	
STD/HIV Risk Summary Measure (s.d.)	0.34 (0.64)	0.52 (0.86)
	(n = 506)	(n = 442)
	$F (1, 946) = 12.97, p < .001$	

Table 4

Tetrachoric Correlations between STD Positive, Drug Test Positive, and Charge Level (males above diagonal, females below diagonal)

Variable	Tetrachoric Correlations			
	1.	2.	3.	4.
1. STD	--	.143	.156	.337***
2. Cocaine	.278*	--	.516***	.277**
3. Marijuana	.202*	.650***	--	.148*
4. Serious Charge	.227**	.140	.002	--

Note. Due to low prevalence rates, urine analysis results for amphetamines (1.8%) and opiates (0.5%) have been excluded from this table. Descriptive information on these variables, for the male and female youths, can be found in Tables 2 and 3. Two tailed p-values

* $p < .05$

** $p < .01$

*** $p < .001$.

Table 5

Fit Statistics for Multiple Group (Female, Male) Risk Group Latent Class Analysis

	Pearson Chi-Square	*df*	Akaike (AIC)	Bayesian (BIC)	Sample-Size Adjusted BIC
1 class	115.54	22	4895.14	4938.83	4910.24
2 classes	21.72	13	4838.37	4925.74	4868.58

Note. AIC = Akaike information criterion; BIC = Bayesian information criterion. Two-tailed p-values: 1 class, $p = 0.000$; 2 classes, $p = 0.060$.

Table 6

Features of Multiple Group (Female, Male) Latent Class Analyses (Results in Probability Space)

	Females (*n* = 442)			Males (*n* = 506)		
a. Class Characteristics	***Estimate***	***SE***	***Critical Ratio***	***Estimate***	***SE***	***Critical Ratio***
High Risk Class (n = 60)				*High Risk Class (n = 48)*		
STD Results:						
Negative	0.648	0.138	4.70***	0.736	0.066	11.18***
Positive	0.352	0.138	2.56*	0.264	0.066	4.00***
Urine Analysis Cocaine Results:						
Negative	0.801	0.093	8.66***	0.722	0.106	6.82***
Positive	0.199	0.093	2.15*	0.278	0.106	2.63**
Urine Analysis Marijuana Results:						
Negative	0.204	0.137	1.48	0.198	0.109	1.81
Positive	0.796	0.137	5.80***	0.802	0.109	7.34***
Current Charge:						
Diversion	0.654	0.122	5.35***	0.315	0.074	4.28***
Department of Juvenile Justice:	0.346	0.122	2.83**	0.685	0.074	9.30***
Lower Risk Class (n = 382)				*Lower Risk Class (n = 458)*		
STD Results:						
Negative	0.846	0.027	31.52***	0.936	0.028	33.41***
Positive	0.154	0.027	5.73***	0.064	0.028	2.29*
Urine Analysis Cocaine Results:						
Negative	1.000	0.000	--	1.000	0.000	--
Positive	0.000	0.000	--	0.000	0.000	--
Urine Analysis Marijuana Results:						
Negative	0.872	0.087	9.99***	0.671	0.038	17.84***
Positive	0.128	0.087	1.47	0.329	0.038	8.73***
Current Charge:						
Diversion	0.736	0.033	22.58***	0.660	0.044	15.06***

	Females (n = 442)			Males (n = 506)		
a. Class Characteristics	***Estimate***	***SE***	***Critical Ratio***	***Estimate***	***SE***	***Critical Ratio***
Department of Juvenile Justice	0.264	0.033	8.08***	0.340	0.044	7.76***
b. Comparison of Latent Variable Means	*Estimate*	*SE*	*Critical Ratio*			
Female and Male Groups	−0.135	0.065	−2.08*			
High Risk and Lower Risk Groups	−1.325	0.470	−2.82**			
Entropy	0.784					

Average Latent Class Probabilities for Most Likely Latent Class Membership (row) by Latent Class (column)

Latent Class>	*1.*	*2.*	*3.*	*4.*
1. High Risk Females	0.779	0.221	0.000	0.000
2. Lower Risk Females	0.116	0.884	0.000	0.000
3. High Risk Males	0.000	0.000	0.923	0.077
4. Lower Risk Males	0.000	0.000	0.139	0.861

Two tailed p-values

* $p < .05$

** $p < .01$

*** $p < .001$.

Table 7

Equality Tests of Means/Proportions across Classes Using Posterior Probability Based Multiple Imputations with 1 Degree of Freedom

	Females		Males			
Latent Class Number	**1**	**2**	**3**	**4**		
Latent Class	**High Risk (*n* = 60)**	**Lower Risk (*n* = 382)**	**High Risk (*n* = 48)**	**Lower Risk (*n* = 458)**	**Overall Test of Significance**	**Significant Class Comparisons**
Comparison Variables:						
Race (African American)	0.426	0.513	0.549	0.534	1.98	None
Age	15.74	15.23	15.91	15.43	25.00***	1 vs. 2**
						1 vs. 4***
						3 vs. 4**
STD/HIV Risk Behavior:						
Had sex while using non-injecting drugs, such as alcohol (yes)	0.173	0.064	0.114	0.066	7.99*	1 vs. 2*
						2 vs. 3*
Had a sexually transmitted disease (yes)	0.067	0.046	0.008	0.005	3.92	1 vs. 4*
						2 vs. 4***
Had intercourse with the opposite sex without using a condom (yes)	0.341	0.215	0.258	0.192	4.95	2 vs. 3*
Been sexually assaulted (yes)	0.124	0.094	0.019	0.005	6.74	1 vs. 3*
						1 vs. 4***
						2 vs. 3**
						2 vs. 4***

Chi-Square two tailed *p*-values

* $p < .05$

** $p < .01$

*** $p < .001$.