

Antisocial Psychopathy and HIV Risk among Alcohol and Other Drug (AOD) Abusing Adolescent Offenders

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Abstract: While the consensus is that HIV prevalence has remained low among adolescent offenders, the prevalence of STDs and HIV transmission risk behaviors is alarming, particularly for those abusing alcohol and other drugs and those displaying antisocial or conduct disorder characteristics. In the current study, 269 male and 110 female inner city, culturally diverse alcohol and other drug (AOD) abusing adolescent offenders completed measures of (a) psychopathy, using the Millon Adolescent Clinical Inventory (MACI) (b) HIV transmission risk behavior, (c) prevention skills and attitudes and (d) social desirability. Results showed that those with high levels of psychopathy reported more AOD use, overall unprotected sex and more sexual activity when influenced by alcohol and/or marijuana. High psychopathy adolescent offenders also reported lower self-efficacy and sexual response-efficacy, less favorable safer sex and condom attitudes and less favorable intentions to engage in safer sex behaviors, when controlling for social desirability. Data suggest that adolescent offenders, who are either in court-ordered treatment or detention, should be assessed for psychopathy and provided with tailored risk reduction interventions, geared toward attitudinal and behavioral change. A discussion of integrating neurobiological measures to improve the next generation of tailored interventions for this risk group is offered in conclusion.

Key words: HIV, antisocial psychopathy, alcohol and other drug (AOD) abusing, Millon

INTRODUCTION

Progress in HIV behavioral prevention has been sufficient to establish effective interventions that can be identified by scientific panel and disseminated in a CDC compendium of effectiveness^[1,2]. The compendium's authors highlight vulnerable groups not yet effectively reached and encourage the prevention field to investigate population sub-groupings at particularly high risk. However, there are proximate and distal contextual barriers that may attenuate capacities to make use of current intervention designs^[3,4]. One such proximate barrier receiving focus is antisocial psychopathy and its symptoms, shown to be highly prevalent, but variable in manifestation, in the high-risk subgroup of AOD abusing adolescent offenders^[5-8].

Although there is no comprehensive randomized survey or surveillance, the consensus is that HIV

prevalence is low among juvenile offenders based on samples of detained adolescents and a 1994 National Institute of Justice/CDC study, all pointing to seropositivity at less than 1%^[9]. However, this population's sexual activities are many times greater than the average adolescent. Therefore the urgency of HIV-related AOD research is on behavioral risk and prevention, particularly given the frequent compounded risk of recidivism and relapse associated with being an offender^[10,11]. Public health concern is deepened by an almost 50% increase in the number of juvenile cases in the correctional system, as gauged from 1987 to 1996^[9]. These adolescents face the risk of joining the adult prison population, in which the prevalence of AIDS is nearly 6 times higher than for the general U.S. population^[12]. This future risk is a shared one, since the adult prison population is not static, but frequently moves in and out, so that in any given survey of U.S. populations, we can expect that

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between 10 and 20 % of those who are seropositive for HIV will be individuals released from the correctional system^[13].

Based on the 1994 National Institute of Justice/CDC Survey and the recent longitudinal Northwestern Juvenile Project, adolescent offenders can be expected to present the following HIV risk profile: 1) extremely disproportionate STD rates compared to average counterparts, such as gonorrhea incidence 42 times higher among confined male juveniles and 152 times higher among females^[13]; 2) pervasive HIV/AIDS risk behavior, with possibly 95% involved in 3 or more such behaviors and 65% in 10 or more^[14]; 3) early initiation to sex, in which over half of females as young as 10-13 may already be sexually active, rising to almost 95% for those 16 and older—the CDC has noted that juvenile offenders comprise the out-of-school adolescent grouping, in which reports of sexual intercourse are almost 25% more than among in-school adolescents^[13]; 4) prevalent multiple partner behavior and unprotected sex, with possibly over 30% of females (and over 60% of males) age 16 and older reporting more than one partner in the past 3 months and more than 50% of females (and over 35% of males) reporting unprotected vaginal sex in the past month; 5) AOD use hovering around 90% for alcohol or marijuana, with as many as 30% having had unprotected sex when drunk or high^[14].

The American Academy of Pediatrics^[9] has noted that between 20% and 60% of adjudicated adolescents could be diagnosed as having a conduct disorder, according to a 1992 report. The range may be 2%-17% for personality disorders and 32%-78% for affective disorders. Most studies of the relationship between externalizing psychopathy and HIV risk, however, have been confined to adult populations and their AOD subgroups. Generally, higher levels of antisocial symptoms have been associated with increased HIV risk behavior and HIV seroprevalence rates^[15-18]. A subtype of psychopathic personality disorder^[5,6], Antisocial Personality Disorder (APD), has been linked among AOD abusers to condom nonuse, multiple sex partners, prostitution, sexually transmitted diseases, unfavorable HIV risk attitudes, injection drug use, early onset injection drug use, needle sharing and needle sharing partners^[17-25]. While Abbott *et al.*^[26] found no association between APD and HIV risk behaviors, the significance of the role of such externalizing psychopathologies has continued to be affirmed, particularly in comorbid samples of AOD abusers^[27-29].

As originally defined by Cleckley^[30,31] and elaborated by Hare^[32,33], psychopathy refers to a

personality syndrome that may be attributed to a core affective deficit. Support for extending this concept to adolescents with certain appropriate revisions in the defining criterion has been recently provided^[7,34-37]. As a related construct and subtype, APD has been characterized by impulsivity, low thresholds for erotic discharge, recklessness in the safety of self and others and aggressive reactivity to social norms^[38]. The unchecked result may be sexual promiscuity, sexual coercion and high stimulation-seeking behaviors that are clearly inconsistent with regular condom use. Approximately two-thirds of AOD abusers entering treatment present with a DSM-III or IV personality disorder diagnosis, with APD the most common^[15]. In a recent study by Bryan *et al.*^[39], lifetime conduct disorder (by meeting at least 3 DSM-III-R criteria) was found among 99% of a mandated treatment sample of AOD abusing male adolescent offenders.

The concern of the present study is to evaluate the relationship between APD symptoms and HIV risk behaviors among an adjudicated, AOD abusing sample of adolescent offenders, court-mandated into a treatment or detention setting. The Millon Adolescent Clinical Inventory (MACI) is utilized to delineate levels of psychopathy in relationship to an expanded examination of HIV risk behaviors and predictive variables consistent with the Information-Motivation-Behavioral skills (IMB) model, developed by Fisher and Fisher^[40]. Investigating meaningful subgroupings among this population may offer one strategy for addressing the complexity of risk and offering more tailored prevention interventions. Our recent preliminary work analyzing adolescent psychopathology subgroups with hierarchical agglomerative cluster analysis indicates the viability of this approach^[41].

MATERIALS AND METHODS

Sample: Participants were 269 male and 110 female inner city, culturally diverse adolescent offenders who were enrolled in two ongoing NIH-funded HIV prevention projects and court-mandated into either a juvenile detention or a treatment setting. The sample approximated consecutive admissions to both settings between 1998 and 2001. The modal subject was a low income, ethnic minority adolescent who abused alcohol, marijuana and/or non-injection “crack” cocaine and resided in the urban inner city. The mean age was 15.72 (SD = 1.33; range 13 to 18) and the average level of education was 8.74 years (SD = 1.35). Subjects were 31.6% African American, 9% Non-

Hispanic White, 31.5% Hispanic, 8.8% Haitian and 19.1% of other ethnic backgrounds. Ninety-one percent of participants reported that they lived with family members prior to being placed in a restricted environment.

Procedures: Measures included the psychopathy scale derived from the Millon Adolescent Clinical Inventory (MACI), an inventory measuring HIV transmission risk behaviors, skills and attitudes as detailed below and a measure of social desirability. Baseline assessments were administered one week after admission and with clearance from treatment staff that detoxification was adequately completed when appropriate. Interviewers were supervised by a clinical psychologist and used key events and calendar timelines to help participants accurately report their behavior over the recall period, following procedures by Jemmott *et al.*^[42] and established by our prior work to facilitate responsiveness during the interview process^[11].

Measures: The Psychopathy Scale of the Millon Adolescent Clinical Inventory (MACI) consists of 20 items that assess some of the most common adolescent antisocial/conduct disorder/psychopathic traits and behaviors. The MACI is a 160-item self-report inventory that was developed and normalized for use in clinical, residential and correctional sites showing adequate reliability and validity across a wide variety of settings^[43-45]. The psychopathy content scale was developed and validated by Murrie and Cornell^[46]. They found that the scale correlated highly with both the interpersonal-affective (i.e., selfish, callous and remorseless) and antisocial lifestyle-social deviance factors of psychopathy measured by the widely used Psychopathy Checklist-Revised (PCL-R)^[47]. Most importantly, the scale adequately distinguished between high and low psychopathy groups and demonstrated acceptable sensitivity, specificity and positive predictive power^[46]. Those scoring high on the psychopathy content scale could be described as unruly, delinquent, impulsive and prone to substance abuse^[46]. High scores also suggest greater sensation seeking, problem solving difficulties and interpersonal deficits^[38], all of which are likely to increase HIV transmission risk. Sample items from this scale include: "Punishment never stopped me from doing whatever I wanted;" "I sometimes scare other kids to get them to do what I want;" and "I can charm people into giving me almost anything I want." A median split (median = 9) was conducted on the total score of the psychopathy content scale yielding two groups, one low and one high on psychopathy.

The Marlowe-Crowne Social Desirability Scale^[48] was used to assess biases in self-report due to social desirability (e.g. "I never hesitate to go out of my way to help someone in trouble," "When I don't know something I don't at all mind admitting it"). A short form of the instrument was used that includes 10 dichotomous response (yes/no) items^[49-51]. Higher scores on this scale indicate an attempt to appear socially attractive, morally virtuous and emotionally well composed.

Sex risk and drug risk variables were derived from sexual risk assessment measures adapted by Malow *et al.*^[11] and included retrospective recall of numbers of sex partners, unprotected sex acts and condom use during the previous 3-and 6-month periods, as well as marijuana, alcohol or cocaine use proximate to unprotected sex acts during the previous 3 months. HIV risk variables included Perceived Susceptibility (perceived risk for contracting HIV), AIDS-Related Anxiety (anxiety about becoming HIV infected), Sexual Self-Efficacy (confidence to adopt and maintain HIV preventive behaviors), Personal Attitudes Toward Condoms, Sexual Attitudes (importance placed upon peer, partner and parental approval of condom use) and Sexual Response Efficacy (belief that using condoms and being monogamous can prevent HIV/STD infection). The Sexual Attitudes scale has a 5-point Likert format with response options ranging from "extremely unimportant" to "extremely important" and yields a mean score with a possible range of 1 to 5. The remaining scales have 4-point formats with response options ranging from "strongly disagree" to "strongly agree," and total scores ranging from 1 to 4. These scale variables have been shown to mediate HIV risk and have demonstrated validity and reliability among similar samples^[52,53].

Based on focus groups and in-depth interviews, the research team has added items to the survey and modified the language to be culturally sensitive, reflecting the local terminology of the target population. In addition, we adapted a tabular format to facilitate administration and a calendar-based methodology (i.e., a Time-Line Follow-Back Procedure)^[54-55] to promote accurate recall. Items measuring substance use elicited the frequency of alcohol, marijuana, cocaine and poly-substances used during the three months prior to being in a restricted environment. This reporting period was chosen because recall has been shown to be reliable over 3 months^[56].

The Adolescent Drug Abuse Diagnosis Questionnaire (ADAD)^[57] is a structured interview

recommended by the Center for Substance Abuse Treatment consensus panel^[58] for comprehensively assessing demographic, social and psychological function among drug abusing adolescents. For the current study, sections of the questionnaire were used to gather relevant sociodemographic data, including age, level of education and ethnicity.

The Behavioral Intentions Scale is a 7-item measure that assesses intent to reduce HIV risk (e.g. "I will use a condom the next time I have sex"). It was derived by Klinkenberg (personal communication, March 1998) for use with men and women. A Cronbach's alpha of .94 for the behavioral intentions scale was calculated with a subgroup of the current sample (n = 86), indicating that the scale is internally consistent. The Behavioral Intentions scale has a 4-point Likert format with response options ranging from "strongly disagree" to "strongly agree," yielding a total score with a possible range of 7 to 28, with higher scores indicating a greater HIV risk reduction behavioral intent.

Knowledge about HIV Transmission was assessed using an 18-item true/false questionnaire adapted from St. Lawrence *et al.*^[59]. Sample items include: "A person can get HIV from having sex one time" and "Condoms make intercourse completely safe." Participants received one point for each correctly answered item.

Statistical analysis: Means, standard deviations, frequencies and other descriptive statistics were derived to characterize the sample. Analyses of covariance (ANCOVAs) were used to test for group differences between the low and high psychopathy groups on sexual risk behavior; frequency of substance use, HIV related attitudes and beliefs and condom use skills.

Social desirability response bias: We conducted t-tests and chi squares to determine if the high and low psychopathy groups differed on social desirability, demographic variables and site of recruitment. Those in the high psychopathy group reported less social desirability (M=4.42, SD=1.92) than those in the low psychopathy group (M=6.12, SD=1.94; $t(1,377) = 8.56, p < .001$). Because of this difference, all analyses controlled for socially desirability response bias as assessed by the Marlowe-Crowne scale in order to avoid the shared measurement error introduced by the validity scales included in the MACI. This procedure helped to ensure validity of responses represented in the analyses^[60].

Gender and recruitment site: Although there were no significant differences between the groups for gender ($\chi^2 = 2.64, p = .10$), we chose to include gender of the

participant as a covariate in the analysis because of concern that psychopathy scales in general may tend to be biased toward identifying males and because gender has been noted as significantly associated with HIV risk behavior among adolescents^[61-64]. The high and low psychopathy groups also differed by site of recruitment ($\chi^2 = 14.56, p < .001$) with 63% of those in the high psychopathy group recruited from the inpatient substance abuse treatment program and 57% of subjects in the low psychopathology group recruited from the juvenile detention center. Therefore, we also included site of participant recruitment as a covariate in all analyses.

Ethnicity and other demographics: Several ethnic differences were found between the low and high psychopathology groups. Sixty-two percent of all African American subjects were in the low psychopathology group ($\chi^2 = 13.24, p < .001$), 32% of all non-Hispanic white subjects were in the low psychopathology group ($\chi^2 = 3.86, p < .05$) and 41% of all Hispanic subjects were in the low psychopathology group ($\chi^2 = 3.26, p < .05$). We did not include ethnicity variables as covariates due to the high correlations between ethnicity and site of recruitment. There were no significant group differences on living situation, age or level of education.

RESULTS

There was a direct association between psychopathy and AOD use and HIV transmission risk, with significant differences between high and low psychopathy groups across a variety of measures. Means, standard deviations and ANCOVA results for substance use, HIV related attitudes and beliefs, sexual risk behaviors and condom use skills are presented in Table 1.

Those who were high on psychopathy reported more marijuana, $F(4,355) = 11.81, p < .001$, alcohol, $F(4,355) = 8.36, p < .001$ and cocaine use, $F(4,355) = 2.48, p < .05$, a greater total percentage of unprotected sex acts, $F(4,355) = 2.72, p < .05$, a greater percentage of unprotected sex acts when high on alcohol, $F(4,355) = 3.25, p < .05$ and a greater percentage of unprotected sex acts when high on marijuana, $F(4,355) = 4.56, p < .01$ than those in the low psychopathy group. In addition, the high psychopathy group demonstrated less favorable condom attitudes, $F(4,355) = 5.94, p < .001$ and less favorable intentions to engage in safer sex behaviors, $F(4,355) = 3.24, p < .05$. No significant group differences were found for total number of partners, percent unprotected vaginal sex acts, percent unprotected sex acts when high on cocaine, condom use skills, or anxiety about becoming HIV infected.

In contrast to a kind of invariability (albeit negative) that might be expected from a high

Table 1: Means (Standard deviations), and ANCOVAS - Comparing Low and High Psychopathy Groups on Sex and Drug Risk Behaviors and HIV Relevant Attitudes and Skills

| Variable | Total Sample | High Psychopathy | Low Psychopathy | F | p |
|---|------------------|------------------|------------------|-------|------|
| <u>Drug Risk Variables</u> | | | | | |
| Marijuana use last 3 months | 28.34 (41.78) | 39.58 (49.93) | 16.18 (25.70) | 11.81 | .001 |
| Cocaine Use last 3 months | 4.16 (14.62) | 5.71 (17.35) | 2.49 (10.73) | 2.48 | .043 |
| Alcohol use last 3 months | 6.32 (12.48) | 9.08 (14.43) | 3.34 (9.08) | 8.36 | .001 |
| <u>Sex Risk Variables</u> | | | | | |
| Total percent unprotected sex acts last 3 months | 39.06 (40.29) | 43.32 (39.09) | 34.47 (41.16) | 2.72 | .029 |
| Total number of sex partners last 3 months | 1.88 (3.83) | 2.30 (5.01) | 1.43 (1.73) | 2.07 | .084 |
| Percent unprotected vaginal sex acts last 3 months | 27.39 (39.23) | 29.35 (39.22) | 25.26 (39.25) | 1.32 | .262 |
| Percent unprotected sex acts when high on alcohol | 12.35 (31.37) | 17.67 (35.58) | 6.59 (24.89) | 3.25 | .012 |
| Percent unprotected sex acts when high on cocaine | 5.92 (22.63) | 8.13 (26.13) | 3.53 (17.87) | 1.41 | .231 |
| Percent unprotected sex acts when high on marijuana | 18.45 (34.75) | 24.46 (37.55) | 11.94 (30.23) | 4.56 | .001 |
| <u>HIV Risk-Related Attitudes and Skills</u> | | | | | |
| Susceptibility | 2.32 (.63) | 2.41 (.61) | 2.21 (.64) | 3.91 | .004 |
| Sexual Attitudes | 4.29 (.63) | 4.20 (.66) | 4.39 (.58) | 5.36 | .001 |
| Sexual Response Efficacy | 2.69 (.47) | 2.64 (.46) | 2.74 (.48) | 3.45 | .009 |
| Sexual Self-Efficacy | 3.23 (.57) | 3.11 (.52) | 3.37 (.60) | 7.66 | .001 |
| Knowledge about HIV | 13.39 (2.89) | 13.79 (2.80) | 12.95 (2.93) | 8.63 | .001 |
| Condom Use Skills | 4.82 (2.19) | 4.78 (2.06) | 4.86 (2.32) | .75 | .558 |
| Condom Attitudes | 3.23 (.37) | 3.21 (.37) | 3.27 (.37) | 5.94 | .001 |
| Anxiety about HIV | 3.13 (.67) | 3.18 (.66) | 3.07 (.67) | 1.13 | .340 |
| Intentions to engage in Safer Sex Behaviors | 22.44 (5.32) | 21.90 (5.63) | 23.01 (4.91) | 3.24 | .012 |

psychopathy profile, remarkable paradox was observed on certain measures of vulnerability. Those in the high psychopathy group reported higher levels of susceptibility to HIV, $F(4,355) = 3.91, p < .01$, while indicating greater knowledge about HIV, $F(4,355) = 8.63, p < .001$ and placed less importance on the sex attitudes of others, $F(4,355) = 5.36, p < .001$, while reporting lower sexual response efficacy, $F(4,355) = 3.45, p < .01$ and less sexual self-efficacy, $F(4,355) = 7.66, p < .001$.

Gender effects were found for frequency of marijuana use, knowledge and condom attitudes, with males reporting more marijuana use, $F(1,355) = 11.76, p < .01$, greater knowledge about HIV, $F(1,355) = 7.13, p < .01$ and less favorable condom attitudes, $F(1,355) = 10.47, p < .01$.

Several differences were noted with respect to recruitment site, irrespective of psychopathy grouping. Those recruited from juvenile detention reported less alcohol use, $F(1,355) = 10.47, p < .01$, a lower percentage of unprotected sex acts, $F(1,355) = 4.77, p < .05$ and less knowledge about HIV, $F(1,355) = 15.93, p < .001$. In addition, they reported more favorable sexual attitudes, $F(1,355) = 5.63, p < .05$ and greater sexual response efficacy, $F(1,355) = 4.95, p < .03$.

DISCUSSION

This study examined how HIV risk in a heterogeneous group of male and female adolescent offenders, both in treatment and incarcerated, is associated with externalizing, antisocial psychopathy. Despite a high prevalence of such traits among adolescent offenders and a number of studies documenting a strong association between antisocial features and HIV risk behavior in adults, little data has been reported on the nature of these relationships among adolescents. This study offers evidence of such relationships for a variety of HIV risk factors and behaviors in this sample of adolescent offenders. Specifically, our results showed that those with high levels of psychopathy, as measured by the MACI, reported greater levels of drug and alcohol use, overall unprotected sex and more sex when high on alcohol and/or marijuana during the past three months.

As expected, adolescent offenders in the high psychopathy group exhibited the characteristic lack of concern for the safety and needs of others found among adults diagnosed with APD. They also demonstrated less favorable sex and condom attitudes, including significantly lower intentions toward safer sex behaviors. Thus, these adolescents present a resistance to attitude and behavior change in the realm of HIV prevention, including apparent unconcern with consequences and social norms. The trait of overall impulsivity is also in evidence, given the expression of less perceived control over sexual behavior compared to peers. Impulsivity was associated with higher HIV

risk in a previous study of ours conducted with a subgroup of these adolescents^[11].

Despite greater levels of knowledge regarding modes of HIV transmission and methods of self-protection, as well as stronger perceptions of susceptibility for contracting HIV, high psychopathy substance abusers reported more risky behaviors and less favorable HIV risk-related attitudes and intentions than their low psychopathy counterparts. Such findings are consistent with the literature on adult outcomes, which describes psychopathic and antisocial adults as more likely to engage in sexually impulsive behavior^[15-18,38].

Yet, these adolescents are not APD-diagnosed adults. Antisocial behavior among adolescents likely involves a cognitive-affective compensatory strategy that may have both learned and predisposing components that should be distinguished by HIV intervention designs. Certainly, data from this study suggest that AOD abusing adolescent offenders should be assessed for levels of psychopathy. Further, those with high levels should perhaps be provided with more structured and targeted HIV and general STD risk reduction interventions. And like other risk groups, these adolescents demonstrate the classic risk behavior paradox of not acting upon what they know, suggesting that interventions be more oriented toward attitude and behavioral change than building knowledge of HIV transmission modes. But to the degree that antisocial impulsivity is a strategy of affective and cognitive coherence where none may otherwise exist, particularly along sexual and relational dimensions, this poses a challenge to HIV preventionists to supply a sufficiently appealing alternative narrative for these adolescents to follow. Sensing that there is more to know about the underlying dimensions of such behavior in adolescents, Bryan *et al.*^[65] have sought to differentiate the personality constructs of antisocial behavior in relationship to HIV risk. Though unsuccessful, their results point to sex as something distinctive from other problem behaviors for this subgroup—and the presence of still undefined factors. One hypothesis offered is that these factors may lie in the affective domain, specifically depression and may link with similar negative affect in family members.

One study limitation is the use of self-reports, which may have been unintentionally or intentionally biased because of the sensitivity of sexual behavior and substance use issues addressed in the assessments^[60]. However, several strategies were utilized to increase accurate recall and to motivate honest responding, in addition to controlling for social desirability bias in the analysis. Also, because of the nature of the sample, findings can only be generalized to substance abusing

adolescents in a court-ordered treatment or detention setting. However, attention to adjudicated adolescents seems a necessary first step for the prevention community in learning to deal with psychopathy in relationship to both HIV risk and the juvenile justice system. Our findings extend the adult literature to high psychopathy adolescents involved with this system and related AOD treatment programs, an association which has been little explored to date.

In concluding their report on results from the Northwestern Juvenile Project, Teplin *et al.*^[14] call for future research that would address how the *set* of psychosocial problems facing adolescent offenders may shape HIV/AIDS risk behavior and how structural factors may condition outcomes. The risk profile presented in our introductory section is only the apex of a pyramid of risks stacked against these adolescents, the base of which is little understood or investigated, whether in its psychosocial or structural aspects. Between 25%-31% can be expected to have a history of child abuse or neglect and 17%-53% may have developmental disorders and learning disabilities^[9]. Mortality due to violent death is more than 75 times greater than for the rest of us^[9]. Dental problems have been detected at a 90% prevalence rate and very dated reports have recorded medical problems in close to 50% of those entering juvenile correctional settings^[9]. As expected, these adolescents typically come from *syndromic* neighborhoods and if measured with Cohen *et al.*'s^[66] "broken windows" index, would no doubt score high. When combined with other typical measures of human capital for this group, it makes for a structural picture that is grim, but one that has never been adequately delineated in HIV prevention research.

Yet the structural barriers are not only social ecological, they are also biological. In their review of randomized controlled trials of adolescent HIV interventions, Pedlow and Carey^[67] concluded that "many adolescent HIV risk reduction interventions have been effective but are associated with small effect sizes^[67]." A major critique was the absence of cognitive developmental factors in the guiding theories, the intervention and the analysis. Several years since this review, little has changed. The reason may be that we and others in the prevention community have not understood the full implication of such a critique. Because, in order to integrate the cognitive developmental factors into adolescent prevention, it means integrating the emerging science of brain and gene plasticity. The neuroscientist Nancy Andreasen, a pioneer of neuroimaging applied to mental disorders, has emphasized the fundamental importance of integrating the principle of plasticity into our models of mental health, which means learning to integrate the neurochemical messages as well as the social messages that adolescents, particularly troubled ones, may be

contending with in trying to utilize prevention interventions^[68]. This in turn means integrating new modes of assessment—neuroimaging and genetic markers—into our methods of observation and intervention.

The weight of the evidence on the influence of neurochemical messaging or neurotransmitter systems such as the serotonin and dopamine systems, increasingly shows the importance of their consideration in the prevention of co-morbid conduct and substance misuse disorders among adolescents^[69,70]. Recent advances in the fields of genetics, molecular biology, behavioral neuropharmacology and brain imaging have dramatically changed our understanding of the addictive process and why relapse occurs even in the face of catastrophic consequences. Addiction is now recognized as a chronic brain disease that involves complex interactions between repeated exposure to drugs, biological (i.e., genetic and developmental) and environmental (i.e., drug availability, social and economic variables) factors. Its treatment, therefore, requires, in general, not only a long-term intervention but also a multipronged approach that addresses the psychiatric, medical, legal and social consequences of addiction. Also, because addiction usually starts in adolescence or early adulthood and is frequently co morbid with mental illness, we need to expand our treatment interventions in this age group both for substance abuse and psychiatric disorders. [delete asterisk and make the following e a paragraph]

* Repeated findings indicate a relationship between serotonergic dysregulation and antisocial behavior, including aggression, in children and adolescents^[71-75]. Most recently, the New York Academy of Sciences focused their December 2006 issue on the role of neurobiology on resilience and prevention interventions for children and adolescents. In particular, Cicchetti and Blender^[74] concentrated on how to adopt multiple levels of analysis in psychosocial and behavioral prevention interventions that would reflect the neurobiological mechanisms of plasticity and advances in molecular genetics and the study of neurotransmitters. In addition to utilizing neurobiological data as indicators of barriers to amelioration, they suggest that it is also important to include such assessment points to monitor "the extent to which neural plasticity may be promoted" by a given intervention^[74]. The logic of incorporating genetic markers in psychosocial studies related to substance abuse prevention has been recently elucidated by Hutchison *et al.*^[75]. [delete asterisk make a paragraph]

* The contention of our study is that more attention will be needed to what is still not known about the most distinguishing factors of risk for these

subgroups. Our study joins with a very few others in the field in demonstrating in yet a more expanded way that antisocial psychopathy and its symptoms may represent a severe barrier to HIV prevention efforts with adolescent offenders, particularly those with AOD abuse problems. Little is known beyond this, although there is accumulating evidence that these adolescents nonetheless remain malleable and can be responsive to the proper intervention^[3,4]. The burden is on the public health community to identify and target high psychopathy adolescents in order to effectively create and disseminate tailored HIV risk reduction interventions that address their specific antisocial tendencies. However, this will require a return to biology in order to maintain the credibility of our multi-factorial models and our prevention interventions.

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