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The Moderating Effect of Marijuana Use on the Relationship between Delinquent Behavior and HIV Risk among Adolescents in Foster Care

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Abstract

Adolescents in foster care experience mental health and substance use problems that place them at risk for HIV, yet the exact nature of the relationship remains unclear. This study examined the co-occurring influences of mental health problems and substance use on HIV risk and determined whether substance use moderated the effect of mental health problems on HIV risk behaviors among adolescents in foster care. Regression analyses of cross-sectional data collected through structured interviews with 334 adolescents, aged 15–18 years, determined which mental health problems and substances increased HIV risk behaviors. Adolescents with delinquency and anxiety/depression engaged in significantly more HIV risk behaviors than their counterparts, controlling for race, gender, and type of childhood abuse. Further, any marijuana use significantly moderated the effects of delinquent behaviors on HIV risk, differentially increasing HIV risk among those who engaged in delinquent behaviors.

Keywords

HIV risk; mental health; delinquency; substance use; adolescents; foster care; childhood abuse

Adolescents in foster care have histories of childhood abuse and are at increased risk for developing mental health problems (Landsverk & Garland, 1999; Trupin, Tarico, Benson, Jemelka, & McClellan, 1993) and using substances (Aarons et al., 2008; Thompson & Auslander, 2007; Traube, James, Zhang, & Landsverk, 2012). Studies also suggest that both mental health problems and substance use are associated with increased sexual risk-taking in this population (Auslander, et al., 2002; Carpenter, Clyman, Davidson, & Steiner, 2001; James, Montgomery, Leslie, & Zhang, 2009; Thompson & Auslander, 2011), making these adolescents more vulnerable to HIV infection.

Consistent findings across studies have indicated that there are higher rates of mental health problems among foster care adolescents than those youths not in foster care. Pilowsky and Wu (2006) found that adolescents involved in foster care were significantly more likely to report symptoms of conduct disorder, anxiety, and disruptive behavior disorders, as well as history of suicide ideation and attempts than the general population of adolescents. McMillen and colleagues (2005) found that 61% of their sample of older foster care adolescents reported having at least one psychiatric disorder during their lifetime. Similar rates have been reported in other studies of foster care adolescents, from over 50% (Mech, Ludy-Dobson, & Hulseman, 1994) to 72% (Trupin et al., 1993), compared with 49.5% of a nationally representative sample of U.S. adolescents (Merikangas et al., 2010).

Likewise, many studies have linked child maltreatment to substance use problems, and even after controlling for demographic and psychosocial variables, histories of abuse and neglect explained most of the variance in substance involvement (Aarons, et al., 2008). Findings from earlier studies indicated that 20% to 50% of adolescent samples reported use of alcohol or other substances while in foster care, with substantial numbers reporting problematic use and continued use after exiting care (Taussig, Clyman, & Landsverk, 2001). In a national survey on drug use by Substance Abuse and Mental Health Services Administration [SAMHSA] (2005) of adolescents ages 16–17 who had ever been in foster care, 56.7% had used alcohol and 48.1% had used marijuana or other illicit drugs in the past year. According to results of the Monitoring the Future Study with the general adolescent population of 10th graders, the rate in the past year of alcohol use was 48.5% and the rate for marijuana use was 28% (Johnston, O'Malley, Bachman, & Schulenberg, 2013). According to these two studies, adolescents involved with the foster care system appear to have higher rates of alcohol and marijuana use than the general adolescent population; however, because of differences across studies in the exact ages of respondents, and the inclusion of other illicit drugs in the SAMHSA study, it is difficult to make definitive conclusions.

The co-occurrence of mental health and behavioral problems and substance use and their relationship to increased HIV risk behaviors among adolescents who have histories of abuse can be broadly explained by stress and coping theory (Lazarus, 1966; Lazarus & Folkman, 1984). Many adolescents with histories of abuse experience emotional and behavioral problems such as anxiety, depression, and emotional dysregulation. The ability to emotionally self-regulate is compromised when healthy attachment bonds are disrupted, which is common among children who are abused and no longer live with their biological parents (Racusin, Maerlender, Sengupta, Isquith & Straus, 2005). In the absence of sufficient internal resources, adolescents may use unhealthy methods to cope with these problems (Spaccarelli, 1994), such as using substances to self-medicate or alleviate distressing symptoms (Kelder et al., 2001). These maladaptive coping responses may increase adolescents' risk for a range of risky behaviors, such as unprotected sex and other HIV risk behaviors. Studies of HIV-positive adults with histories of childhood sexual abuse indicated that maladaptive coping responses (i.e. substance use) to psychological distress caused by childhood trauma were associated with risky sexual behaviors (Meade et al., 2010; Sikkema, Hansen, Meade, Kochman & Fox, 2009).

Despite the recent increase in studies on the co-occurrence of mental health, substance use, and HIV risk behaviors, the exact relationships among these problems remain unclear. For example, does using substances exacerbate (moderate) the effect of emotional problems and increase HIV risk behaviors among adolescents who have histories of abuse? One recent study of high school urban adolescents tested the moderating effect of substance use on the relationship between psychological distress (symptoms of anxiety and depression) and sexual risk behavior, yet the results did not support the hypothesis (Elkington, Bauermeister, & Zimmerman, 2010). However, it is unclear whether this relationship will differ in adolescents with histories of abuse and with more severe mental health and behavioral problems than a school sample of high school adolescents. Understanding how mental health and behavioral problems and substance use interact is critical in a population that is at considerable risk for HIV and other negative life outcomes.

To address this problem, the following research questions were addressed among 334 adolescents with histories of abuse and living in foster care placements: 1) To what extent are mental health and behavioral problems and substance use associated with HIV risk behaviors of adolescents in foster care, and do these variables vary by age, gender, or race? and 2) Does substance use exacerbate or moderate the relationship between mental health and behavioral problems and HIV risk behaviors?

Method

Procedures

Data for this study were cross-sectional and collected between 1999 and 2003 during baseline assessments of an intervention study to increase independent living skills and prevent HIV among adolescents placed in foster care or other out-of-home placements due to histories of maltreatment. Adolescents were eligible for the study if they (1) were 15–18 years of age prior to starting the program and (2) were in out-of-home (foster) care. Adolescents were excluded from the study if they displayed (1) severe learning problems (i.e., unable to read or write) or (2) severe emotional problems whose symptoms would prohibit their participation in a group situation. Eligibility was assessed by social workers via a brief informal meeting with the adolescents prior to their participation in the study. Four adolescents were excluded from the study because they were seen as being incapable of participating in the group intervention without seriously disrupting the group process.

Before each adolescent was interviewed for the present study, informed consent was obtained from his/her legal guardian. At the completion of the interview, each adolescent was paid five dollars. After entering the study, structured interviews were conducted with the adolescents by trained MSW students. The Institutional Review Board at the study's university approved all procedures.

Subject Demographics

The sample consisted of 334 adolescents in foster care, aged 15 to 18 years ($M = 16.3$, $SD = .83$), with the majority of adolescents ages 15–16 years old (60.18%). Slightly more than half of the sample (54.19%, $n = 181$) were female. Of the sample, 69.16% ($n = 231$) self-

identified as adolescents of color (most of whom were African American), and 30.84% ($n = 103$) self-identified as White.

Variables

Ever Engaged in Sexual Risk Behavior—To determine the percentage of adolescents who ever engaged in sexual risk behaviors, if any one of 5 items were endorsed, the adolescent was considered sexually active. Items included vaginal sex, anal sex, oral sex, sex while using substances, and trading sex for drugs, money or place to stay (Yes/No). Those adolescents who responded “no” were not asked the questions about HIV risk behaviors in the last 2 months, and were coded “0” for the dependent variable “HIV risk behaviors” in the last 2 months.

HIV Risk Behaviors (last 2 months)—The dependent variable for this study was ‘HIV risk behaviors in the last 2 months’ and was measured by the frequency of the following behaviors without a condom: vaginal intercourse, anal intercourse, and oral sex (without a condom or barrier). In addition, three items assessed use of unclean needles: IV drug use, ear or body piercing; and tattoos. For the total HIV risk count score, individual risk items were coded, “1” if a behavior was endorsed and “0” if not, and then summed.

Mental Health and Behavioral Problems—The Youth Self-Report (YSR) (Achenbach, 1991) was utilized to assess mental health and behavioral problems. To allow for analyses of the roles that specific mental health and behavioral problems play in HIV risk behaviors, this study utilized the following eight YSR mental health subscales: *Withdrawn*, *Somatic Complaints*, *Anxious/Depressed*, *Social Problems*, *Thought Problems*, *Attention Problems*, *Delinquent Behavior*, and *Aggressive Behavior*. Select items of the YSR were also summed to describe the sample using the following subscales: *Internalizing*, *Externalizing*, and *Total Scale* scores. Higher scores for the YSR indicate higher levels of mental health and behavioral problems. For each subscale, a cut-off score was used to determine whether the adolescent scored in the normal range (i.e., t scores < 67) or above the borderline clinical cut-off point, which would include those in the borderline range (t scores between 67 and 70) and clinical range (i.e., t scores above 70).

The YSR is empirically derived, and although it is not a diagnostic tool but a screening tool, the scales correspond to well-established clinical symptoms, and demonstrate significant associations with DSM diagnostic categories (Achenbach, 1991; Weinstein, Noam, Grimes, Stone, & Schwab-Stone, 1990). For example, several of the YSR subscales have approximate counterparts in the DSM-III-R/DSM-IV (e.g., conduct disorder $\approx$ delinquent behavior; major depression $\approx$ anxious/depressed; psychotic disorders $\approx$ thought problems). Therefore, adolescents who scored above the borderline-clinical cut-off score were considered to have the mental health or behavioral problem. Criterion validity has been established by the ability of the YSR to discriminate between referred and non-referred adolescents on the basis of borderline-clinical scores (Achenbach, 1991).

Alcohol and Substance Use—Selected items from the alcohol and other drug use sections of the Diagnostic Interview Schedule for Children-Revised Version (DISC-R) were

used to measure substance use (Costello, Edelbrock, Dulcan, Kalas, & Klaric, 1984). For this study, alcohol use and 8 substances (“Yes/No”) were assessed in the last 6 months (i.e., *In the past 6 months, have you drunk any beer, wine, wine coolers, hard liquor, or any other alcoholic drinks?*). The substances included marijuana, amphetamines, barbiturates, tranquilizers, heroin, cocaine, hallucinogens, and inhalants. To further characterize the use of alcohol, frequency of use (number of occasions), binge drinking (“drinking or staying drunk for 2 or more days, Y/N”), and getting in trouble while drinking (Y/N) were assessed. For marijuana use, frequency of use (number of occasions) in the past 6 months was assessed.

History of Abuse—In the current study, physical, emotional, and sexual abuse were used to characterize the sample and as control variables in the analysis to determine whether mental health and behavioral problems and use of substances were significant predictors of HIV above and beyond histories of abuse. Two subscales from the Childhood Trauma Questionnaire (CTQ) developed by Bernstein and Fink (1998) were used to assess the degree of physical and emotional abuse-related traumas experienced by the adolescents. Each subscale contained 5 items, using a 5-point Likert scale from “Never True” to “Very Often True.” The self-report subscales of the CTQ have been shown to be reliable and valid in previous research (Bernstein, Ahluvalia, Pogge, & Handelsman, 1997; Bernstein et al., 1994). Sexual abuse was assessed by 3 questions adapted from Russell (1986): 1) whether the adolescent was forced to touch someone else’s private parts against his or her wishes; 2) whether the adolescent’s private parts were touched against his or her wishes; and 3) whether the adolescent had experienced vaginal sex, anal sex, or oral sex against his or her wishes. If the adolescent responded “yes” to any of the three questions, then they were coded “1” for experiencing sexual abuse, and those who responded “no” to all three questions were coded “0” for not experiencing sexual abuse. Interviewers were trained to clarify to the respondents that these acts were committed against the adolescent’s wishes or forced.

Demographics—The demographic variables that were assessed for sample descriptive purposes and as control variables included age, race, and gender. Race and gender were dummy-coded (White = 0, Adolescents of Color = 1; Female = 0, Male = 1) for correlations and multivariate analyses.

Data Analysis

Simple correlations, t-tests, and a general linear model procedure (GLM) were performed to examine the association of mental health and substance use with HIV risk behaviors, controlling for demographic and histories of abuse. Variables that significantly correlated to HIV risk behaviors at the bivariate level were used in multivariate models to examine the relative influence of the predictor and moderating variables on HIV-risk behaviors.

Results

Frequencies of Mental Health and Behavioral Problems, Abuse, Substance Use, and HIV Risk Behaviors

Table 1 displays the frequencies of the adolescents above the borderline-clinical levels for each of the mental health problem types. Based on total YSR scores, results indicated that 34.73% ($n = 116$) of the adolescents reported mental health and behavioral problems above the borderline-clinical cut-off levels. Internalizing mental health problems were endorsed by 25.15% ($n = 84$), and Externalizing mental health problems were endorsed by 28.44% ($n = 95$). Delinquency was the most commonly endorsed mental health and behavioral problem, followed by Attention, and then Thought problems.

Although all of the adolescents in the study had histories of childhood maltreatment, the CTQ was used to assess the severity and frequency of physical and emotional forms of abuse. Results indicated that 84.43% of the sample had experienced *any* physical abuse, and the mean for the sample (11.80, $SD = 6.14$) was classified as moderate-severe according to the CTQ manual. Of the sample, 82.63% had experienced any emotional abuse, with the mean (12.30, $SD = 6.10$) classified as moderate. Sexual abuse was endorsed by 37.43% of the adolescents.

Table 2 shows the results of the frequencies of alcohol and substance use (Y/N) by the adolescents, indicating that the two substances most commonly used by the adolescents (in last six months) were alcohol (39.22%, $n = 131$) and marijuana (35.33%, $n = 118$). However, among adolescents who used alcohol, 14.5% reported that they engaged in binge drinking where they were drunk for 2 or more days, and 16% “got into trouble” for drinking or something they did while drinking. Because of the small numbers of adolescents who used the other substances that were assessed (5%), only alcohol and marijuana use were utilized in further analyses for the current study.

Lifetime frequencies of HIV risk behaviors were relatively high, with nearly three quarters of the sample (74%) reporting that they had *ever* engaged in any one of the sexual risk behaviors assessed. The dependent variable of interest for the present study was a count of HIV risk behaviors in the *last two months*, and results indicated a mean level of 0.67, $SD = 0.84$, with a range of 0–4. Of the items assessed, vaginal sex without a condom was the most frequently endorsed HIV risk behavior (19%), followed by oral sex without a condom (6%). The other risk behaviors were endorsed at 2% or less.

Demographic Differences in HIV Risk Behaviors, Mental Health, and Substance Use

To determine if there were any differences in HIV risk behaviors scores according to gender and race, independent samples t-tests were performed. Results indicated that females engaged in significantly more risky HIV-related behaviors than males ($t = 2.18$, $df = 321.45$, $p < .05$). Additionally, White adolescents engaged in significantly more HIV risk behaviors than adolescents of color, ($t = 2.88$, $df = 151.46$, $p < .01$). Age was not significantly associated with HIV risk behavior; however, the sample consisted of mostly 15- and 16-year-old adolescents. A two-way interaction was tested between race and gender to predict HIV risk behaviors. Results indicated that White females reported significantly more HIV

risk behaviors than White males or adolescents of color (both males and females), $F(3, 330) = 6.17, p < .05$). The adjusted least square means of HIV risk behaviors by race and gender from higher to lower risk were as follows: White Females (1.12), White Males (.60), Females of Color (.59), and Males of Color (.56).

Analyses were conducted to determine if there were any differences in mental health and behavioral problems by gender, race, or age. Using the Youth Self-Report cut-off scores, an examination of specific mental health problem subscales revealed that more females scored above the borderline-clinical range for Delinquency ($\chi^2 = 3.91, df = 1, p < .05$), Aggression ($\chi^2 = 7.57, df = 1, p < .01$), and Social Problems ($\chi^2 = 10.44, df = 1, p < .01$) than their males counterparts. There were also significant race differences in 6 of the 8 mental health subscales, with more White adolescents scoring above the borderline-clinical range for all problems except for Withdrawn and Social Problems. There were no significant differences in any of the mental health and behavioral problems by age.

Chi-square analyses were performed to examine gender, race, or age differences in substance use variables. There were also no significant differences in alcohol or marijuana use by gender or by age. However, findings revealed that White adolescents were more likely to use marijuana ($\chi^2 = 6.92, df = 1, p < .01$) than adolescents of color. There were no significant racial differences found in alcohol use.

Relationships between Mental Health and Behavioral Problems, Substance Use, Childhood Abuse, and HIV Risk Behaviors

To determine the associations between mental health and behavioral problems, substance use, childhood abuse, and HIV risk behaviors, simple correlations were computed (Table 3) using dummy-coded variables for categorical variables. Adolescents with more anxiety/depression ($p < .01$), attention problems ($p < .05$), and delinquency ($p < .001$) reported significantly more HIV risk behaviors than their counterparts. Likewise, adolescents who used alcohol ($p < .001$) and marijuana ($p < .001$) engaged in more HIV risk behaviors. Of the childhood abuse variables, adolescents who had experienced more severe emotional abuse ($p < .05$) and any sexual abuse ($p < .001$) engaged in significantly more HIV risk behaviors.

Multiple regression analyses were conducted to identify the significant predictors of HIV risk among adolescents in foster care and to determine if substance use significantly moderated the relationship between mental health and behavioral problems and HIV risk behaviors. As shown in Table 4, variables that were significant at the bivariate level were entered in the initial model, including controlling for the race X gender interaction (as discussed previously) and emotional and sexual abuse. The final reduced model included those variables that remained significant. Findings indicated that adolescents who reported higher levels of delinquent behaviors and more anxiety/depression engaged in significantly more HIV risk behaviors than their counterparts, controlling for the race X gender interaction. Furthermore, the association between delinquent behavior and HIV risk behaviors was influenced by using marijuana (i.e., significant moderating effect).

Table 5 compares the least square means for HIV risk behaviors of the four groups of adolescents in order of high to low risk: (1) those who were delinquent and used marijuana;

(2) those who used marijuana but not delinquent; (3) those who were delinquent but did not use marijuana; and (4) those who neither used marijuana nor were delinquent. Adolescents who used marijuana and reported delinquent behaviors in the clinical range engaged in significantly more HIV risk behaviors than the other three groups of adolescents. Additionally, adolescents who used marijuana but were not delinquent engaged in significantly more HIV risk behaviors than adolescents who were neither delinquent nor users of marijuana. There were no other significant differences found between the other groups.

Discussion

The results of this study indicate that there is a differential influence of mental health and behavioral problems, specifically delinquency, on HIV risk behaviors depending on the adolescent's marijuana use. Those who engaged in delinquent behaviors above the borderline-clinical cut-off level and who used marijuana in the past six months engaged in the most HIV risk behaviors. Previous research has reported that adolescents with histories of abuse report higher levels of mental health problems than the general adolescent population (SAMHSA, 2005). Moreover, previous research has demonstrated the associations among mental health problems, substance use, and HIV risk behaviors (Coleman-Cowger, Green, & Clark, 2011; Devieux et al., 2002; Teplin et al., 2005; Tolou-Shams, Brown, Houck, & Lescano, 2008). The present study provides further evidence for these relationships among youth in foster care as well as the differential influence that *any marijuana use* has on increasing HIV risk among those with delinquent behavioral problems.

The findings of this study also are consistent with research on juvenile delinquents. Specifically, research has found that juvenile delinquents engage in more HIV risk behaviors if they report a substance use disorder (Teplin et al., 2005). In the present study, delinquency was identified as the strongest predictor of HIV risk, and just over one-fifth of the sample met the diagnostic criteria for this behavioral disorder, endorsing behaviors such as stealing at home or other places, running away from home, lying and cheating, skipping school, and setting fires. In fact, there is a growing literature that suggests a strong link between histories of child maltreatment and delinquency, indicating that adolescents who experience abuse are at high risk for violent and delinquent behavior (Bender, 2010; Jonson-Reid, 2004; Jonson-Reid & Barth, 2000; Widom, Schuck, & White, 2006). Several intervening factors have been identified that may explain the maltreatment-delinquency trajectory that include the presence of other mental health problems, substance use, running away from home, school difficulties, and association with deviant peers (Bender, 2010), all of which are characteristic of adolescents in the child welfare system, and also place adolescents at increased risk for HIV.

Marijuana and alcohol were the substances used most by adolescents in the present study, and both were associated with HIV risk behaviors at the bivariate level. However, when entered into the multivariate model, only marijuana use remained a significant predictor of HIV risk behaviors, controlling for alcohol use and the other variables. This finding is consistent with previous literature that found that students who used marijuana were more

likely to report engaging in HIV-related sexual behaviors that their counterparts who used alcohol only (Lowry et al., 1994). This suggests that youths who use marijuana may engage in different or more risk taking than those who use alcohol, particularly when co-occurring with delinquent behavioral disorders.

Another interesting finding of this study is that White females engage in significantly more HIV risk behaviors than their counterparts, even when controlling for delinquent behaviors, marijuana use, and anxiety/depression. This may partially be explained by the disproportionately higher numbers of African American adolescents who are in the child welfare system (Wulczyn & Lery, 2007). It is possible that White adolescents are less likely than African American adolescents to be reported and substantiated by child protective services unless their situations are more serious. This finding suggests that prevention efforts for these adolescents should be tailored to address their mental health needs and childhood abuse histories. Additionally, more research is warranted in this population to explore other factors that influence HIV risk such as partner characteristics and prevalence of HIV in the community.

Results of this study indicate that both internalizing (i.e., anxiety/depression) and externalizing mental health problems (i.e., delinquency) increase HIV risk among adolescents in foster care. The current study assessed abuse-related traumatic events that the adolescents had experienced (using the Childhood Trauma Questionnaire), and it is very likely that the high levels of internalizing and externalizing problems among the adolescents are a result of untreated complex trauma histories due to abuse, separation from their families, and home instability. Consistent with a stress and coping framework, adolescents in foster care who lack internal resources may resort to using substances, such as marijuana, to cope with their mental health and behavioral problems related to trauma. HIV prevention with foster care adolescents may need to integrate healthy coping skills training with trauma-focused treatment (focusing on reducing anxiety, depression, and delinquent behaviors) to reduce HIV risk behaviors for adolescents within the child welfare system.

In addition to a lack of internal resources, the influence of social norms, particularly peer networks (Kandel, 1980; 1986), should not be overlooked as an explanation for the co-occurrence of delinquency, substance use, and HIV risk behaviors among adolescents in foster care, and the fact that marijuana use increases HIV risk in the presence of delinquency. There is significant empirical evidence that supports the co-occurrence of deviant or delinquent behaviors, substance use, and risky sexual behaviors for both male and female adolescents, as described by Jessor and colleagues as the problem behavior syndrome (Jessor & Jessor, 1977; Donovan & Jessor, 1985). Although it is unclear whether youths in foster care are more frequent or problematic users of marijuana compared with the general adolescent population, they do in fact have a higher rate of mental health and behavioral disorders, and a unique set of peer-related risk factors that increase their exposure to deviant peers. Youths in foster care often live in congregate care settings such as group foster home placements, group homes, and residential care facilities with deviant peers or other adolescents who have multiple mental health and behavioral problems. Deviant peers can exert a negative influence on adolescents through peer pressure, modeling, and facilitation, whereby peers reinforce and encourage deviant activities (Patterson, Dishion, & Yoerger,

2000). In addition, it is very common for youths in foster care to experience multiple home placements and subsequent changes in school placements, both of which can lead to a lack of healthy friendship networks and limited positive parental role models (Aarons, et al., 2008). It is likely that there is an interplay between a lack of internal resources and deviant peer networks that negatively influence youths in the child welfare system and increase their risk to HIV.

The present study found that 19% of the youths engaged in vaginal sex without a condom in the last 2 months. A comparison of rates with the general adolescent population or other samples of foster care youths on a specific sexual risk behavior is difficult because of the lack of consistency in methodology across studies, such as differences in time frames, target samples, and measures. However, research suggests that youths in foster care experience higher rates of early pregnancy in comparison to other adolescents (Courtney & Dworsky, 2006; James, et al., 2009; Svoboda, Shaw, & Bright, 2012), suggesting that they are also at risk for HIV due to their engagement in unprotected sexual behaviors.

There are several limitations to this study that should be noted. The design of the study was cross-sectional and did not allow for testing of causal relationships between mental health and behavioral problems, substance use, and HIV risk behaviors. However, the study design was sufficient to identify the significant mental health, substance use, and demographic factors associated with engaging in HIV risk behaviors among adolescents in foster care. Second, because the data were from baseline assessments from an HIV prevention study and substance use was not a primary outcome of interest, the study did not include measures of severity, dependency, or problematic marijuana use. Additionally, this study used an index of HIV risk behaviors and did not examine each risk behavior separately. This limited the interpretation of our findings. Another limitation of the current study is the reliance on self-report data collection methods for accurately assessing sexual risk behaviors. There are many factors that may influence self-report data, such as length of the assessment interval and gender-specific response bias (Schroder, Carey, & Vanable, 2003). There is some evidence that the 2-month time frame used in the current study may be reliable (Jaccard, McDonald, Wan, Dittus, & Quinlan, 2002), however, more systematic research is needed, particularly among different populations. Likewise, studies have found higher self-reports of sexual behaviors among men versus women (Catania, Gibson, Chitwood, & Coates, 1990). Yet, this gender-bias may differ according to the population; female adolescents in foster care may not be influenced by the same social norms as the general population. In the absence of an external criterion available to validate the self-report data, the reliability and validity of the adolescents' reports need to be carefully considered. Last, the sample in the current study was not random, but rather a convenience sample of adolescents in foster care from a Midwestern mid-sized metropolitan area. Yet, the sample is comparable to other child welfare populations in that they have a high frequency of mental health and behavioral problems and an over-representation of African Americans adolescents.

In conclusion, this study examined the relationships among mental health and behavioral problems, co-occurring substance use, and HIV risk behaviors among adolescents in foster care. The strengths of this study include a focus on an understudied population, a relatively large sample size, and the use of well-established instruments. Despite the fact that the data

from this study were collected a decade ago, this population is at high risk for poor sexual health outcomes and remains understudied. Previous research with adults, particularly women, has consistently demonstrated a relationship between histories of childhood abuse (reported retrospectively) and sexual risk behaviors (Clark & Koenig, 2004). Yet few studies have examined *current* HIV risk behaviors among adolescents with histories of abuse and high rates of mental health disorders and the moderating role of substance use. Knowledge gained from this study of adolescents can be utilized to tailor HIV prevention programs for adolescents with histories of maltreatment that address serious mental health and behavioral problems such as delinquency, anxiety/depression, and their co-occurring marijuana use.

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References

- Aarons GA, Monn AR, Hazen AL, Connelly CD, Leslie LK, Landsverk JA, Hough R, Brown SA. Substance involvement among youths in child welfare: The role of common and unique risk factors. *American Journal of Orthopsychiatry*. 2008; 78:340–349. [PubMed: 19123753]
- Achenbach, TM. Manual for the Youth Self-Report and 1991 Profile. Burlington, VT: University of Vermont, Department of Psychiatry; 1991.
- Auslander WF, McMillen JC, Elze D, Thompson R, Jonson-Reid M, Stiffman A. Mental health problems and sexual abuse among adolescents in foster care: Relationship to HIV risk behaviors and intentions. *AIDS and Behavior*. 2002; 6(4):351–359.
- Bender K. Why do some maltreated youth become juvenile offenders? A call for further investigation and adaption of youth services. *Children and Youth Services Review*. 2010; 32:466–473.
- Bernstein DP, Ahluvalia T, Pogge D, Handelsman L. Validity of the Childhood Trauma Questionnaire in an adolescent psychiatric population. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1997; 36:340–348. [PubMed: 9055514]
- Bernstein, DP.; Fink, L. *Childhood Trauma Questionnaire: A retrospective self-report*. San Antonio, Texas: Pearson; 1998.
- Bernstein DP, Fink L, Handelsman L, Foote J, Lovejoy M, Wenzel K, Sapareto E, Ruggiero J. Initial reliability and validity of a new retrospective measure of child abuse and neglect. *American Journal of Psychiatry*. 1994; 151:1132–1136. [PubMed: 8037246]
- Carpenter SC, Clyman RB, Davidson AJ, Steiner JF. The association of foster care or kinship care with adolescent sexual behavior and first pregnancy. *Pediatrics*. 2001; 108(3):e46.10.1542/peds.108.3.e46 [PubMed: 11533364]
- Catania JA, Gibson DR, Chitwood DD, Coates TJ. Methodological problems in AIDS behavioral research: Influences on measurement error and participation bias in studies of sexual behavior. *Psychological Bulletin*. 1990; 108:339–362. [PubMed: 2270232]
- Clark, H.; Koenig, LJ. Sexual abuse of girls and HIV infection among women: Are they related?. In: Koenig, LJ.; Doll, LS.; O'Leary, A.; Pequegnat, W., editors. *From child sexual abuse to adult sexual risk: Trauma, revictimization, and intervention*. Washington, DC: American Psychological Association; 2004. p. 69-92.
- Coleman-Cowger VH, Green BA, Clark TT. The impact of mental health issues, substance use, and exposure to victimizations on pregnancy rates among a sample of youth with past-year foster care

- placement. *Children and Youth Services Review*. 2011; 33:2207–2212.10.1016/j.childyouth.2011.07.007
- Costello, AJ.; Edelbrock, CS.; Dulcan, MK.; Kalas, R.; Klaric, SH. Report on the NIMH Diagnostic Interview Schedule for Children (DISC). Washington, DC: National Institute of Mental Health; 1984.
- Courtney ME, Dworsky A. Early outcomes for young adults transitioning from out-of-home care in the USA. *Child and Family Social Work*. 2006; 11:206–219.
- Deiveux J, Malow R, Stein JA, Jennings TE, Lucenko BA, Averhart C, Kalichman S. Impulsivity and HIV risk among adjudicated alcohol- and other drug-abusing adolescent offenders. *AIDS Education and Prevention*. 2002; 14(5 Suppl B):24–35. [PubMed: 12413190]
- Donovan JE, Jessor R. Structure of problem behavior in adolescence and youth adulthood. *Journal of Consulting and Clinical Psychology*. 1985; 53(6):890–904. [PubMed: 4086689]
- Elkington KS, Bauermeister JA, Zimmerman MA. Psychological distress, substance use, and HIV/STI risk behaviors among youth. *Journal of Youth and Adolescence*. 2010; 39(5):514–527. [PubMed: 20229264]
- Jaccard J, McDonald R, Wan CK, Dittus PJ, Quinlan S. The accuracy of self-reports of condom use and sexual behavior. *Journal of Applied Social Psychology*. 2002:1863–1905.
- James S, Montgomery SB, Leslie LK, Zhang J. Sexual risk behaviors among youth in the child welfare system. *Children & Youth Services Review*. 2009; 31:990–1000. [PubMed: 23606780]
- Jessor, R.; Jessor, SL. Problem behavior and psychosocial development. New York: Academic Press; 1977.
- Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. Monitoring the Future national results on drug use: 2012 Overview, Key Findings on Adolescent Drug use. Ann Arbor: Institute for Social Research. The University of Michigan; 2013.
- Jonson-Reid M. Child welfare services and delinquency: The need to know more. *Child Welfare*. 2004; 133:157–173. [PubMed: 15068217]
- Jonson-Reid M, Barth R. From placement to prison: The path to adolescent incarceration from child welfare supervised foster or group care. *Children and Youth Services Review*. 2000; 22:493–516.
- Kandel DB. Drug and drinking behavior among youth. *Annual Review of Sociology*. 1980; 6:235–85.
- Kandel, DB. Processes of peer influence n adolescence. In: Silberstein, R., editor. *Development as action in context: Problem behavior and normal youth development*. New York: Springer-Verlag; 1986. p. 203-228.
- Kelder SH, Murray NG, Orpinas P, Prokhorov A, McReynolds L, Zhang Q, Roberts R. Depression and substance use in minority middle-school students. *American Journal of Public Health*. 2001; 91(5): 761–766. [PubMed: 11344884]
- Landsverk, J.; Garland, AF. Foster care and pathways to mental health services. In: Curtis, PA.; Dale, G.; Kendall, JC., editors. *The foster care crisis: Translating research into policy and practice*. Lincoln, NE: University of Nebraska Press; 1999. p. 193-210.
- Lazarus, R. *Psychological stress and the coping process*. New York, United States: McGraw Hill; 1966.
- Lazarus, RS.; Folkman, S. *Stress, appraisal, and coping*. New York, United States: Springer Publishing Company; 1984.
- Lowry R, Holtzman D, Truman BI, Kann L, Collins JL, Kolbe LJ. Substance use and HIV-related sexual behaviors among US high school students: Are they related? *American Journal of Public Health*. 1994; 84(7):1116–1120. [PubMed: 8017535]
- McMillen JC, Zima BT, Scott LD, Auslander WF, Munson MR, Ollie MT, Spitznagel EL. Prevalence of psychiatric disorders among older youths in the foster care system. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2005; 44(1):88–95. [PubMed: 15608548]
- Meade CS, Drabkin AS, Hansen NB, Wilson PA, Kochman A, Sikkema KJ. Reductions in alcohol and cocaine use following a group coping intervention for HIV-positive adults with childhood sexual abuse histories. *Addiction*. 2010; 105:1942–1951.10.1111/j.1360-0443.2010.03075.x [PubMed: 20840176]

- Mech E, Ludy-Dobson C, Hulseman F. Life skills knowledge: A survey of foster adolescents in three placement settings. Special Issue: Preparing foster care youth for adulthood. *Children and Youth Services Review*. 1994; 16(3–4):181–200.
- Merikangas KR, He J, Burstein M, Swanson SA, Avenevoli S, Cui L, Benjet C, Georgiades K, Swendsen J. Lifetime prevalence of mental disorders in U.S. Adolescents: Results from the National Comorbidity Survey Replication-Adolescent Supplement (NCS-A). *Journal of the American Academy of Child & Adolescent Psychiatry*. 2010; 49:980–989. [PubMed: 20855043]
- Patterson GR, Dishion TJ, Yoerger K. Adolescent growth in new forms of problem behavior: Macro- and micro-peer dynamics. *Prevention Science*. 2000; 1:3–13. [PubMed: 11507792]
- Pilowsky DJ, Wu L. Psychiatric symptoms and substance use disorders in a nationally representative sample of American adolescents involved with foster care. *Journal of Adolescent Health*. 2006; 38(4):351–358.10.1016/j.jadohealth.2005.06.014 [PubMed: 16549295]
- Racusin R, Maerlender AC, Sengupta A, Isquith PK, Straus MB. Psychosocial treatment of children in foster care: A review. *Community Mental Health Journal*. 2005; 41(2):199–221. [PubMed: 15974499]
- Russell, DEH. *The secret trauma: Incest in the lives of girls and women*. New York: Basic Books; 1986.
- Schroder KE, Carey MP, Venable PA. Methodological challenges in research on sexual risk behavior: Accuracy of Self-Reports. *Annals of Behavioral Medicine*. 2003; 26(2):104–123. [PubMed: 14534028]
- Sikkema KJ, Hansen NB, Meade CS, Kochman A, Fox AM. Psychosocial predictors of sexual HIV transmission risk behavior among HIV-positive adults with a sexual abuse history in childhood. *Archives of Sexual Behavior*. 2009; 38:121–134. [PubMed: 17999171]
- Spaccarelli S. Stress, appraisal, and coping in childhood sexual abuse: A theoretical and empirical review. *Psychological Bulletin*. 1994; 116(2):340–362. [PubMed: 7972595]
- Substance Abuse and Mental Health Services Administration. Substance use and need for treatment among youths who have been in foster care. The NSDUH Report. 2005. Retrieved from <http://www.samhsa.gov/data/2k5/fosterCare/fosterCare.htm>
- Svoboda DV, Shaw TV, Barth RP, Bright CL. Pregnancy and parenting among youth n foster care: A Review. *Children and Youth Services Review*. 2012; 34:867–875.
- Taussig HN, Clyman RB, Landsverk J. *Pediatrics*. 2001; 108(1):e10.10.1542/peds.108.1.e10 [PubMed: 11433089]
- Teplin LA, Elkington KS, McClelland GM, Abram KM, Mericle AA, Washburn JJ. Major mental disorders, substance use disorders, comorbidity, and HIV-AIDS related risk behaviors in juvenile detainees. *Psychiatric Services*. 2005; 56(7):823–828. [PubMed: 16020814]
- Thompson RG, Auslander WF. Risk factors for alcohol and marijuana use among adolescents in foster care. *Journal of Substance Abuse Treatment*. 2007; 32(1):61–69. [PubMed: 17175399]
- Thompson RG, Auslander WF. Substance use and mental health problems as predictors of HIV sexual risk behaviors among adolescents in foster care. *Health & Social Work*. 2011; 36(1):33–43. [PubMed: 21446607]
- Tolou-Shams M, Brown L, Houck C, Lescano CM. The association between depressive symptoms, substance use, and HIV risk among youth with an arrest history. *Journal of Studies on Alcohol and Drugs*. 2008; 69:58–64. [PubMed: 18080065]
- Traube DE, James S, Zhang J, Landsverk J. A national study of risk and protective factors for substance use among youth in the child welfare system. *Addictive Behaviors*. 2012; 37(5):641–650. [PubMed: 22321315]
- Trupin EW, Tarico VS, Benson PL, Jemelka R, McClellan J. Children on child protective service caseloads: Prevalence and nature of serious emotional disturbance. *Child Abuse and Neglect*. 1993; 17:345–355. [PubMed: 8330221]
- Weinstein SR, Noam GG, Grimes K, Stone K, Schwab-Stone M. Convergence of DSM-III diagnoses and self-reported symptoms in child and adolescent inpatients. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1990; 29:627–634. [PubMed: 2387799]

- Widom CS, Schuck AM, White HR. An examination of pathways from childhood victimization to violence: The role of early aggression and problematic alcohol use. *Violence and Victims*. 2006; 21:675–690. [PubMed: 17220013]
- Wulczyn, F.; Lery, B. Racial disparity in foster care admission. Chicago, IL: Chapin Hall Center for Children at the University of Chicago; 2007 Sep.

Table 1

Frequency of Adolescents with Borderline-Clinical Mental Health Problems (N = 334)

	n	%
Internalizing Problems	84	25.15
Withdrawn	36	10.78
Somatic Complaints	34	10.18
Anxious/Depressed	32	9.58
Externalizing Problems	95	28.44
Delinquent Behavior	73	21.86
Aggressive Behavior	34	10.18
Other Mental Health Problems		
Social Problems	29	8.68
Thought Problems	47	14.07
Attention Problems	48	14.37
Total Problems	116	34.73

Table 2

Substance Use (Yes) and Frequency of Use in the Past Six Months (N=334)

Substance	n	%
Alcohol Use (Yes)	131	39.22
1–2 occasions	51	15.27
3–5 occasions	33	9.88
6–9 occasions	14	4.19
10–19 occasions	18	5.39
20–39 occasions	8	2.40
40 or more occasions	7	2.10
Marijuana Use (Yes)	118	35.33
1–2 occasions	34	10.18
3–5 occasions	23	6.89
6–9 occasions	9	2.69
10–19 occasions	19	5.69
20–39 occasions	15	4.49
40 or more occasions	18	5.39
Hallucinogens	17	5.09
Amphetamines	13	3.89
Barbiturates	7	2.10
Cocaine	7	2.10
Inhalants	5	1.50
Tranquilizers	5	1.50
Heroin	2	.60

Notes. Percentages for frequency of use for alcohol and marijuana were based on the entire sample of N=334. Frequency of use of other substances was not collected.

Table 3
Pearson Product-Moment Correlations among HIV Risk, Demographics, and Predictor Variables (N=334)

Variable	HIV	Age	Sex	Race	PA	EA	SA	Alcohol	Marijuana
HIV Risk	—	—	—	—	—	—	—	—	—
Age	-.02	—	—	—	—	—	—	—	—
Gender	-.12*	-.01	—	—	—	—	—	—	—
Race	-.18**	-.16**	.03	—	—	—	—	—	—
Physical Abuse (PA)	.05	.09	-.09	-.11	—	—	—	—	—
Emotional Abuse (EA)	.16**	.08	-.17**	-.16**	.70***	—	—	—	—
Sexual Abuse (SA)	.20***	.12*	-.38***	-.22***	.35***	.40***	—	—	—
Alcohol Use	.23***	-.04	.02	-.10	.02	.03	.08	—	—
Marijuana Use	.30***	.10	-.03	-.14**	.07	.10	.13*	.51***	—
Withdrawn	.04	.09	-.05	-.02	.09	.16**	.05	-.06	-.05
Somatic	.06	-.05	-.01	-.12*	.03	.12*	.07	-.07	.02
Anxious/Depressed	.18**	.03	-.07	-.16**	.19***	.26***	.19***	.03	.01
Social	.03	-.01	-.18**	-.05	.16**	.20***	.18**	.06	-.01
Thought	.08	.01	-.10	-.12*	.18**	.24***	.13*	.03	.06
Attention	.13*	-.04	-.09	-.17**	.23***	.25***	.19***	.09	.07
Delinquent	.31***	-.06	-.11*	-.18***	.16**	.23***	.17**	.21***	.25***
Aggression	.01	.00	-.15**	-.12*	.17**	.19***	.17**	.07	.04

Notes: Gender is coded as Female=0, Male =1; Race is coded as White=0, Youths of Color=1.

* p<.05

**

p<.01

*** p<.001.

Table 4

Results of Multiple Regression Models Predicting HIV Risk Behaviors (N=334)

Variable	Initial Model ($R^2=.22$)		Final Model ($R^2 = .20$)	
	<i>F</i>	<i>p-value</i>	<i>F</i>	<i>p-value</i>
Race	1.00	.32	1.64	.20
Gender	4.34	.04	5.93	.02
Race $\times$ Gender	5.84	.02	5.56	.02
Delinquent	12.31	.0005	14.11	.0002
Marijuana	8.64	.004	23.73	.0001
Delinquent $\times$ Marijuana	3.77	.05	4.36	.04
Anxious/Depressed	5.66	.02	6.02	.01
Anxious/Depressed $\times$ Marijuana	.45	.50		
Attention	.10	.76		
Attention $\times$ Marijuana	.00	.99		
Alcohol	.11	.74		
Delinquency $\times$ Alcohol	.31	.58		
Anxious/Depressed $\times$ Alcohol	.26	.61		
Attention $\times$ Alcohol	1.32	.25		
Emotional Abuse	.15	.69		
Sexual Abuse	1.00	.32		

Note: One of the 11 items of the delinquency subscale pertained to substance use. Additional analyses were conducted removing the item from the subscale and there were no differences in any of the results, indicating that the item did not have a meaningful impact in the subscale. Therefore we have kept the original subscale intact, as it is a widely published and standardized scale with corresponding T-scores used in this study.

Table 5

Post-hoc Comparisons of Least Square Means for HIV Risk Behaviors by Delinquent Behaviors (Borderline-Clinical Levels) and Marijuana Use (N=334)

Group	n	HIV Risk Behaviors (LS Means)
Marijuana and Delinquency	42	1.55
Marijuana Only	76	.93
Delinquency Only	31	.82
Neither	185	.64