AIDS Behav (2011) 15:1554–1560
DOI 10.1007/s10461-010-9857-y

ORIGINAL PAPER

Childhood Sexual Abuse and Health Risk Behaviors in Patients with HIV and a History of Injection Drug Use

Sarah M. Markowitz · Conall O'Cleirigh · Ellen S. Hendriksen · Jacqueline R. Bullis · Michael Stein · Steven A. Safren

Published online: 16 December 2010

Abstract Childhood sexual abuse (CSA) is related to poorer health outcomes, associated with increased risk for HIV acquisition, and prevalent among HIV risk groups. Links between CSA and health behavior are an important health concern. We examined the relationship between CSA and transmission risk behavior and medication adherence in 119 HIV-infected individuals with an injection drug use history. 47% reported CSA, with no gender difference. Individuals who experienced CSA were more likely to report sexual HIV transmission risk behavior in the past 6 months, more sexual partners, use of heroin in the past 30 days, and worse adherence to HIV medication than those who did not. These findings confirm that rates of CSA are high in this population, and suggest that a history of CSA may place people managing both HIV and opioid dependence at increased risk for HIV transmission, poor adherence to medication, and vulnerability to substance use relapse.

Keywords Childhood sexual abuse · HIV transmission risk · Injection drug use · Adherence

S. M. Markowitz
Psychology, Wells College, Aurora, NY, USA

C. O'Cleirigh · E. S. Hendriksen (✉) · J. R. Bullis · S. A. Safren
Behavioral Medicine Service, Massachusetts General Hospital, One Bowdoin Square, 7th Floor, Boston, MA 02114, USA
e-mail: ehendriksen@partners.org

C. O'Cleirigh · E. S. Hendriksen · S. A. Safren
Department of Psychiatry, Harvard Medical School, Boston, MA, USA

M. Stein
Department of General Medicine, Butler Hospital, Providence, RI, USA

M. Stein
Department of Medicine, Brown University, Providence, RI, USA

Introduction

National sample data indicate that approximately 15% of men and 30% of women experienced childhood sexual abuse (CSA) [1–3]. These rates appear to be consistent across racial groups when controlling for socio-demographic differences [4, 5], though they are higher among particular HIV risk groups. Among men who have sex with men (MSM) rates of CSA are closer to those among women, with estimates of 20–39% [6–10]. Female drug users may have even higher rates of CSA, with sample rates as high as 56% [11].

Rates of CSA are disproportionately high among individuals with HIV. Among a large sample of HIV infected men and women in the South, 38% of women and 30% of men had experienced CSA [12]. Among a sample of MSM at a gay pride festival, those who experienced CSA "regularly" were significantly more likely to be HIV-infected than those who had not experienced CSA [13]. Rates may be even higher among certain vulnerable groups; among a sample of homeless HIV-positive individuals, 39% of men and 52% of women experienced CSA [14]. Rates may differ by race; in a large multi-racial sample of women, HIV-positive African-American (63%) and Caucasian (54.3%) women were significantly more likely than HIV-positive Latina (38.1%) women to report experiencing CSA [15].

Individuals with a history of CSA have been shown to suffer disproportionately from a variety of psychological and

behavioral sequelae, both initially and over the lifespan. Long-term sequelae of CSA may include depression, anxiety, difficulties with self-esteem and interpersonal trust, sexual maladjustment, and higher rates of subsequent abuse [16, 17]. Two behaviors in particular, however, substance use, including injection drug use [11, 18] and sexual transmission risk behavior [6, 7, 9, 10, 19–21], have also been found to be associated with a history of CSA. These two behaviors place individuals with a history of CSA at higher risk for contracting [8, 9, 19] or transmitting HIV [22].

Researchers have examined these transmission risk behaviors among HIV-infected individuals. In terms of substance abuse, Bing and colleagues [23] found that in the last 12 months, 40% of a nationwide sample of HIV-infected individuals reported drug use other than marijuana, while 12% met criteria for drug dependence. For sexual risk-taking, a review of 53 studies from 2000 to 2005 indicated that 40% of HIV-infected MSM continued to engage in unprotected anal intercourse [24]. HIV-infected individuals with opioid dependence are particularly vulnerable for risk for HIV transmission and disease management difficulties. There may be a link between CSA and increased health risk behavior. We might expect individuals with a CSA history to have symptoms of PTSD, such as avoidance or hyperarousal, which may interfere with safer sex practices or lead to increased heroin or drug use. They may also have poorer self-efficacy, which may interfere with medication adherence as well. There is currently a gap in the literature regarding the relationship between CSA and health risk behavior in HIV-infected individuals with a history of injection drug use. The aim of this study was to examine the association of CSA with three specific current health risk behaviors, including (1) sexual risk-taking with an HIV-uninfected or HIV status unknown partner in the past 6 months, (2) heroin use in the last 30 days, and (3) medication adherence, defined as percentage of HIV medication taken on time in the past week. The sample consisted of HIV-infected adults with a history of injection drug use recruited for a study to treat depression. It is hypothesized that a history of CSA will be associated with increased health risk behaviors, namely current heroin use and/or unprotected sexual intercourse.

Methods

Participants

Participants were HIV-infected adults ($N = 119$, 71 men and 48 women) who were screened for enrollment in a randomized controlled trial of cognitive behavioral therapy for treatment of depression and HIV medication adherence. Inclusion criteria for the study included HIV-infection, a prescribed regimen of antiretroviral medication, a history of injection drug abuse or dependence, enrollment in a substance abuse treatment program, being age 18–65, and completion of a baseline diagnostic assessment. 158 individuals enrolled in the treatment study; the 119 individuals examined here had complete relevant screening data and had not yet been randomized. This study was reviewed and approved by the institutional review boards for Massachusetts General Hospital and Rhode Island Hospital.

Recruitment

Participants were recruited in person by study staff or clinic staff at methadone treatment centers, other substance abuse treatment centers, and HIV clinics. Participants were also recruited through advertisements at these clinics and through newspaper ads. Enrollment occurred between July, 2005 and October, 2008. The last follow up occurred in September of 2009.

Self-reported Measures

Reporting of Childhood Sexual Abuse

As part of the self-report battery, participants were asked two questions about CSA occurrences from Finkelhor's longer survey [25] about childhood sexual experiences: (1) When you were 12 years old or younger, did you have a sexual experience with a person who was at least 5 years older than you? and (2) When you were between the ages of 13 and 16, did you ever have a sexual experience with someone who was 10 years older or more?

Sexual Transmission Risk Behavior

Participants completed a questionnaire to assess sexual transmission risk behavior in the prior 6 months with both male and female partners. This consisted of standard questions for the frequency of unprotected vaginal sex and unprotected anal sex. Participants also reported the number of sexual partners as well as the HIV status of these partners as positive, negative, or unknown. Due to the HIV-positive serostatus of all participants, sexual transmission risk behavior was defined as having engaged in unprotected vaginal or anal sex with an HIV-negative or unknown status partner within the past 6 months.

Demographic Information

Participants completed a demographics questionnaire, which asked standard questions regarding participant age, race, ethnicity, level of education, employment status, relationship status, and sexual orientation.

Clinician-administered Psychological Measures

Heroin Use

A modified version of the Addiction Severity Index Lite [26] was used to assess what different substances, including alcohol, were used over the last 30 days and the total number of days of use for each substance. Heroin use was defined as the number of days of the past 30 the participant self-reported using heroin.

Assessment of Adherence to Antiretroviral Medications

Medication Event Monitoring System (MEMS)

An electronic pill-cap MEMS was used to record the date and time of each discrete event associated with the opening and closing of a pill bottle. Medication adherence scores were calculated by dividing the number of doses taken by the number of prescribed doses for the preceding 7 days. MEMS adherence data was reviewed with participants to account for doses that participants may have taken without opening the pill cap. This procedure yields a measure of percent on-time adherence over the past 7 days and is consistent with recent studies comparing multiple measures of adherence with HIV outcomes and recommending the use of composite adherence scores [27–30].

Laboratory Measures

CD4+

During the baseline evaluation, participants had blood drawn for an immune assessment if they did not have a CD4+ lymphocyte test conducted within the past month and documented during clinic chart extraction.

Statistical Analysis

Two of the four dependent variable distributions were skewed. Within the number of sexual partners and number of days of heroin use distributions three and four extreme outliers, respectively, were identified (beyond 3 standard deviations above the mean) and winsorized [31], that is they were adjusted to fall within 2.5 standard deviations of the mean and to maintain their rank in the new distribution. The medication adherence variable was normally distributed and no adjustments were made to its distribution.

All logistic and linear regression models were adjusted for age, years of education, gender, and race. Age and education were entered in the models as continuous variables and gender (male/female) and race (African American/other) as dichotomous variables. Logistic regression models were calculated for the dichotomous dependent variable sexual transmission risk. Separate linear regression models were calculated for each of the continuous dependent variables (number of sexual partners, number of days of heroin use in past 30 days, percentage of missed doses in the past week). Logistic and linear regression models were calculated separately for the three independent variables sexual abuse at age 12 or younger, sexual abuse between the ages of 13 and 16, and sexual abuse reported during both age ranges (see Table 3).

Results

Demographics

The demographic characteristics of the study sample are presented in Table 1. The sample was 59.7% male and participants were, on average, 47 years of age (SD = 7.28). 47% of the sample identified as Caucasian, 32.8% as Black/African American, and 29.4% identified as Hispanic or Latino. Over two fifths (41.2%) of the sample did not complete high school and most participants were on disability (68.1%) or unemployed (22.7%).

Rates of Childhood Sexual Abuse

Fifty-six (47.1%) of the participants who completed the baseline assessment of CSA reported a history of sexual abuse during childhood. Slightly less than a third (29.4%) of the sample reported sexual abuse at age 12 or younger, and 41.2% reported sexual abuse between the ages of 13 and 16. Nearly one quarter (23.5%) of the sample reported experiencing sexual abuse during both age ranges.

Sexual abuse at or before age 12 was reported by 27.1% of women and 31% of men, whereas sexual abuse between the ages of 13 and 16 was reported by 41.7% of women and 40.8% of men. Sexual abuse during both age ranges was reported by 22.9% of women and 23.9% of men. There were no significant differences in the history of CSA between women and men (see Table 2). After controlling for gender, Caucasian participants had a significantly lower likelihood of a self-reported CSA history (OR = 0.48, $p = 0.048$, 95% CI = 0.23–0.99).

Health Risk Behavior

There was no sex difference in heroin use in the past 30 days, such that women reported an average of 1.38 days of heroin use, and men reported 1.33 days of heroin use. There was no sex difference in sexual transmission risk behavior, such that 25% of women and 35.9% of men reported engaging in sexual transmission risk behavior

Table 1 Participant background and demographic characteristics

Characteristic	Mean (SD) or Number (%) $N = 119$
Age (years)	47.01 (7.28)
Race	
Caucasian	56 (47.0%)
Black/African American	39 (32.8%)
Other	24 (20.2%)
Ethnicity	
Hispanic/Latino	35 (29.4%)
Education	
Less than high school grad	49 (41.2%)
High school grad	33 (27.7%)
Some college	25 (21.0%)
College degree and above	12 (10.1%)
Employment status	
Fulltime	6 (5%)
Parttime	10 (8.4%)
Disability	81 (68.1%)
Unemployed	27 (22.7%)
Relationship status	
Currently single	73 (61.9%)
Currently in a relationship	45 (38.1%)
Sexual orientation	
Gay/bisexual	14 (12.3%)
Heterosexual	100 (87.7%)
CD4 count (cells/mm^3)	431.34 (259.18)
Viral load (mean plasma HIV RNA: copies/ml)	4,058.22 (15,775.91)

Table 2 Participants' sexual abuse history

Sexual abuse history	Women (%)	Men (%)
Sexual abuse at age 12 or younger	13 (27.1)	22 (31.0)
Sexual abuse between the ages of 13 and 16 years old	20 (41.7)	29 (40.8)
Abuse at either age range	22 (45.8)	34 (47.9)
Abuse during both age ranges	11 (22.9)	17 (23.9)

The number and percentage of participants reporting sexual abuse up to the age of 12 years old, between the age of 13 and 16 years old, and during either and both time frames reported separately for men and women

during the past 6 months. Women reported significantly fewer sexual partners (M = 0.64; SD = 0.93) than men (M = 1.35; SD = 2.30) during the past 6 months ($t = 2.19$, $p = 0.031$). Women also had worse adherence to HIV medication (M = 72.35%; SD = 26.73) than men (M = 82.51%; SD = 22.80) during the monitoring period ($t = 2.07$, $p < 0.041$).

Relationships between CSA and Risk Behaviors

Table 3 presents the results of the linear and logistic bivariate regression analyses used to identify the relationships between CSA and sexual transmission risk behaviors, substance use, and antiretroviral medication adherence. Self-report of CSA both before age 12 and between ages 13 and 16 was predictive of more frequent heroin use during the past 30 days ($\beta = 0.22$; $p = 0.03$), more sexual partners in the past six months ($\beta = 0.25$; $p = 0.008$), and poorer medication adherence ($\beta = -0.20$; $p = 0.04$). Participants who experienced CSA during both age ranges were also more likely to report engaging in sexual transmission risk behavior during the past 6 months (OR = 3.96, 95% CI = 1.02–12.13, $p = 0.04$) than those who did not experience CSA during both age ranges.

Self-report of CSA between ages 13 and 16 was predictive of self-reported heroin use during the past 30 days

Table 3 Association between CSA and health behaviors

	Wald	*OR*	*p*	*95% CI*	
CSA during both age ranges					
Sexual transmission risk behavior	**3.96**	**3.52**	**0.04**	**1.02–12.13**	
	Beta coefficient	*t*	*p*	*df*	
Number of sexual partners	**0.25**	**2.70**	**0.008**	**102**	
Heroin use in past 30 days	**0.22**	**2.19**	**0.03**	**105**	
Medication adherence	**−0.20**	**−2.08**	**0.04**	**103**	
	Wald	*OR*	*p*	*95% CI*	
CSA at age 12 or younger					
Sexual transmission risk behavior	2.23	2.46	0.14	0.75–8.04	
	Beta coefficient	*t*	*p*	*df*	
Number of sexual partners	**0.21**	**2.19**	**0.03**	**102**	
Heroin use in past 30 days	0.16	1.52	0.13	105	
Medication adherence	−0.13	−1.15	0.25	103	
	Wald	*OR*	*p*	*95% CI*	
CSA at age 13–16 years					
Sexual transmission risk behavior	2.75	2.4	0.09	0.85–6.76	
	Beta coefficient	*t*	*p*	*df*	
Number of sexual partners	0.16	1.64	0.11	102	
Heroin use in past 30 days	**0.22**	**2.19**	**0.03**	**105**	
Medication adherence	−0.11	−1.13	0.26	103	

Linear and logistic regression models (adjusted for age, gender, years of education, and race) identifying the association between CSA and HIV sexual transmission risk, substance use and antiretroviral medication adherence

The bold values indicate relationships that were significant at $p < 0.05$

($\beta = 0.22$; $p = 0.03$) and CSA at age 12 or younger was associated with more sexual partners during the past 6 months ($\beta = 0.21$; $p = 0.03$). The other relationships examined with CSA during either age range did not reach significance.

Indirect Effects

Heroin use was assessed as a cross-sectional mediator of the relationship between CSA and number of sexual partners using a series of adjusted linear regression equations according to the logic of mediation [32, 33]. The indirect effects were not examined for transmission risk behavior or medication adherence as heroin use was not significantly related to these outcomes in the adjusted models. However, heroin use was significantly related to number of sexual partners ($\beta = 0.23$, $t = 2.39$, $p = 0.02$). When CSA and heroin use were both included in the adjusted linear regression model predicting number of sexual partners CSA maintained a significant relationship with number of sexual partners ($\beta = 0.30$, $t = 2.99$, $p = 0.004$) but the previously significant relationship between heroin use and number of sexual partners was no longer significant ($\beta = 0.03$, $t = 0.339$, $p = 0.73$). Thus, heroin use failed to meet the final condition for the test of mediation.

Discussion

This study examined the relationships between sexual abuse during childhood and current health risk behavior, including sexual transmission risk behavior, heroin use, and medication adherence, in a sample of HIV-infected adults with a history of injection drug use. This is the first study of which we are aware to establish a relationship between sexual abuse histories and current heroin use and unprotected sex with an HIV-serodiscordant partner in HIV-infected individuals. Results indicate that history of CSA is indeed associated with current health risk behaviors; specifically, CSA across both age categories (before 13 and between 13 and 16) was significantly associated with current heroin use, higher number of sexual partners, and current (past 6 months) unprotected sex with HIV-negative or HIV-status unknown partner(s), and poorer medication adherence. CSA before age 12 was significantly related only to number of sexual partners and CSA between ages 13 and 16 was associated with current heroin use. It is important to keep in mind that all of the increased risk behaviors of individuals with CSA history reported here are in comparison to other individuals who are HIV-positive and have a history of injection drug use, a highly vulnerable population.

One notable finding of the study was the high percentage of participants who reported experiencing CSA. Regardless of gender, CSA was reported by approximately one-third of the sample before age 13 and by approximately 40% of the sample between ages 13 and 16. Compared to a general population estimate of 16% for men and 27% for women [34], the population from which this sample was drawn—HIV-infected individuals enrolling in a depression treatment study with a history of IV drug use—bears a disproportionately high burden of CSA. These four factors—HIV, mental illness, substance abuse, and CSA—have seldom been examined together as a cluster of experiences that increase sexual risk taking and other health risk behaviors. Meade and colleagues [35] linked childhood abuse both directly and indirectly to HIV risk through substance abuse and re-victimization in a sample with severe mental illness. More research is needed, however, on the effects of this combination of factors and possible treatment approaches.

CSA history is associated with increased sexual transmission risk in this sample, which is in line with other studies, including increased sexual transmission risk among a large sample of initially HIV-uninfected MSM [10], increased injection drug use among a sample of HIV-infected men [36], and evidence that injection drug users with a history of CSA had a younger age of first injection [18]. CSA history may represent a particular risk factor for HIV acquisition through sexual risk behavior. The experience of CSA may disturb sexual development, particularly if it occurs at more than one developmental stage. CSA may then interfere with individuals' ability to keep themselves and their partners safe from HIV, possibly because they have difficulties negotiating for condom use, or because they may be more likely to use substances before and during sex to avoid unpleasant associations or memories. In this sample, however, heroin use did not mediate the relationship between CSA and either sexual transmission risk behavior or number of sexual partners. Individuals with a CSA history may also experience hyperarousal and avoidance (symptoms of PTSD not explicitly measured here) in sexual situations, which would contribute to sexual transmission risk.

Variation in negative sequelae was based on age of CSA. Individuals who experienced CSA between age 13 and 16 were more likely to currently use heroin than those who did not experience CSA at that age. It has been shown that periods of substance abuse negatively impact HIV medication adherence compared to periods of sobriety [37]. Individuals who sustained abuse across both age ranges were more likely to be currently using heroin, had a history of more sexual partners, were more likely to have engaged in sexual transmission risk behavior in the past 6 months, and had poorer adherence to their HIV medication regimen. Abuse across both age categories may indicate prolonged abuse over many years, and/or revictimization by more

than one perpetrator. In either case, this represents more severe abuse and likely drives the particularly negative sequelae in this group [38]. The poor medication adherence found in those who were abused over both age ranges is particularly troubling, as it places these individuals at risk for poorer health outcomes, medication resistance, and increased risk for transmitting the virus. This result could be due to the effects of repeated abuse on self-esteem and self-efficacy, impeding the development of adaptive coping responses and making it more difficult for survivors of repeated CSA events to care for themselves effectively.

This study has the strength of examining a unique and understudied sample. This is the first study of which we are aware to consider rates of CSA, and the relationship of CSA with transmission risk behavior and adherence, in individuals with HIV in and a history of injection drug use seeking depression treatment. This is an important area of research, as these individuals are at high risk for a variety of poor mental and physical health outcomes, as well as possible transmission of HIV to non-infected individuals. The study has the strength of relying on the MEMS electronic pill cap for adherence data, rather than on self-report alone. In addition to these strengths, the study is limited by the method of determining the presence of CSA by two questions as part of the self-report battery. It is possible that a more refined instrument could have yielded more information about the nature of the CSA, when it occurred, and its aftermath, which may have implications for the relationships with adherence and transmission risk behavior. While the nature of this sample afforded a unique opportunity to learn more about depression treatment seeking HIV-infected individuals with a history of injection drug use, it may limit the generalizability of the study. Finally, given the number of separate regression analyses that were run, this sample may be considered underpowered, and these findings preliminary.

There are several clinical implications from this research. A large proportion of the sample had a history of CSA. These individuals were being screened for a study of depression, not trauma, so it is important for clinicians to assess for trauma regardless of the referral question, particularly among individuals with depression, HIV, and/or a history of opioid dependence. There was no difference in the rate of CSA among women compared with men, so clinicians should make sure to assess CSA in both men and women. In addition to being aware of the high rates of CSA in this sample, it is also important to note that a history of CSA was associated with increased transmission risk behavior, including heroin use in the past 30 days, increased sexual transmission risk behavior and more sexual partners in the past 6 months. History of CSA was also associated with poorer adherence to HIV medications. It is therefore extremely important that clinicians integrate harm reduction counseling to reduce transmission risk behavior (e.g., problem solving to avoid needle sharing, negotiating condom use) and improve medication adherence (e.g., problem solving and reminder strategies to take medication) into trauma treatment, as these are possible sequelae of CSA. CSA can have life-long repercussions; it is paramount that researchers and clinicians alike consider this important life event in their assessment of HIV-infected and other vulnerable populations.

Future areas of research should include additional testing of these hypotheses with a larger sample and additional measures of CSA, as well as work on possible pathways from CSA to reduced adherence and increased transmission risk. As the experience of CSA over two age ranges was related to poorer medication adherence, it is important to consider the possible pathway from repeated CSA to lower self-efficacy and/or impaired adaptive coping responses to poor adherence. Other pathways that should be the focus of future research are between CSA and heroin and sexual risk behavior. It is possible that the emotional cues for heroin use are the same as those for risky sexual behavior, and that CSA creates a vulnerability to those pathways in some individuals. As we learn more about this particularly vulnerable population of HIV-infected patients with a history of injection drug use, we can determine which pathways are most important and how clinical interventions can be most effective to both prevent poor outcomes for these individuals and reduce the public health threat of HIV transmission.

Acknowledgments This project was funded by Grant number DA018603-03 from the National Institute of Drug Abuse.

References

1. Briere J, Elliott DM. Prevalence and psychological sequelae of self-reported childhood physical and sexual abuse in a general population sample of men and women. Child Abuse Negl. 2003;27(10):1205–22.
2. Finkelhor D, Hotaling G, Lewis IA, Smith C. Sexual abuse in a national survey of adult men and women: prevalence, characteristics, and risk factors. Child Abuse Negl. 1990;14(1):19–28.
3. Vogeltanz ND, Wilsnack SC, Harris TR, Wilsnack RW, Wonderlich SA, Kristjanson AF. Prevalence and risk factors for childhood sexual abuse in women: national survey findings. Child Abuse Negl. 1999;23(6):579–92.
4. Romero GJ, Wyatt GE, Loeb TB, Carmona JV, Solis BM. The prevalence and circumstances of child sexual abuse among Latina women. Hisp J Behav Sci. 1999;21(3):351–65.
5. Wyatt GE, Loeb TB, Solis B, Carmona JV. The prevalence and circumstances of child sexual abuse: changes across a decade. Child Abuse Negl. 1999;23(1):45–60.
6. Paul JP, Catania J, Pollack L, Stall R. Understanding childhood sexual abuse as a predictor of sexual risk-taking among men who have sex with men: The Urban Men's Health Study. Child Abuse Negl. 2001;25(4):557–84.

7. Jinich S, Paul JP, Stall R, et al. Childhood sexual abuse and HIV risk-taking behavior among gay and bisexual men. AIDS Behav. 1998;2(1):41–51.
8. Doll LS, Joy D, Bartholow BN, et al. Self-reported childhood and adolescent sexual abuse among adult homosexual bisexual men. Child Abuse Negl. 1992;16(6):855–64.
9. Arreola SG, Neilands TB, Díaz R. Childhood sexual abuse and the sociocultural context of sexual risk among adult Latino gay and bisexual men. Am J Public Health. 2009;99(Suppl 2):S432–8.
10. Mimiaga MJ, Noonan E, Donnell D, et al. Childhood sexual abuse is highly associated with HIV risk-taking behavior and infection among MSM in the EXPLORE Study. J Acquir Immune Defic Syndr. 2009;51(3):340–8.
11. Plotzker RE, Metzger DS, Holmes WC. Childhood sexual and physical abuse histories, PTSD, depression, and HIV risk outcomes in women injection drug users: a potential mediating pathway. Am J Addict. 2007;16(6):431–8.
12. Whetten K, Leserman J, Lowe K, et al. Prevalence of childhood sexual abuse and physical trauma in an HIV-positive sample from the deep south. Am J Public Health. 2006;96(6):1028–30.
13. Brennan DJ, Hellerstedt WL, Ross MW, Welles SL. History of childhood sexual abuse and HIV risk behaviors in homosexual and bisexual men. Am J Public Health. 2007;97(6):1107–12.
14. Henny KD, Kidder DP, Stall R, Wolitski RJ. Physical and sexual abuse among homeless and unstably housed adults living with HIV: prevalence and associated risks. AIDS Behav. 2007;11(7):842–53.
15. Paxton KC, Myers HF, Hall NM, Javanbakht M. Ethnicity, serostatus, and psychosocial differences in sexual risk behavior among HIV-seropositive and HIV-seronegative women. AIDS Behav. 2004;8(4):405–15.
16. Browne A, Finkelhor D. Impact of child sexual abuse: a review of the research. Psychol Bull. 1986;99(1):66–77.
17. Zierler S, Feingold L, Laufer D, Velentgas P, Kantrowitz-Gordon I, Mayer K. Adult survivors of childhood sexual abuse and subsequent risk of HIV infection. Am J Public Health. 1991;81(5):572–5.
18. Ompad DC, Ikeda RM, Shah N, et al. Childhood sexual abuse and age at initiation of injection drug use. Am J Public Health. 2005;95(4):703–9.
19. Lenderking WR, Wold C, Mayer KH, Goldstein R, Losina E, Seage GR 3rd. Childhood sexual abuse among homosexual men. Prevalence and association with unsafe sex. J Gen Intern Med. 1997;12(4):250–3.
20. Miller M. A model to explain the relationship between sexual abuse and HIV risk among women. AIDS Care. 1999;11(1):3–20.
21. Holmes WC, Foa EB, Sammel MD. Men's pathways to risky sexual behavior: role of co-occurring childhood sexual abuse, posttraumatic stress disorder, and depression histories. J Urban Health. 2005;82(1 Suppl 1):i89–99.
22. O'Leary A, Wolitski RJ, Remien RH, et al. Psychosocial correlates of transmission risk behavior among HIV-seropositive gay and bisexual men. AIDS. 2005;19(Suppl 1):S67–75.
23. Bing EG, Burnam MA, Longshore D, et al. Psychiatric disorders and drug use among human immunodeficiency virus-infected adults in the United States. Arch Gen Psychiatry. 2001;58(8):721–8.
24. van Kesteren NM, Hospers HJ, Kok G. Sexual risk behavior among HIV-positive men who have sex with men: a literature review. Patient Educ Couns. 2007;65(1):5–20.
25. Finkelhor D. Sexually victimized children. New York: The Free Press; 1979.
26. McLellan AT, Kushner H, Metzger D, et al. The fifth edition of the addiction severity index. J Subst Abuse Treat. 1992;9(3):199–213.
27. Gonzalez JS, Safren SA, Cagliero E, et al. Depression, self-care, and medication adherence in type 2 diabetes: relationships across the full range of symptom severity. Diabetes Care. 2007;30(9):2222–7.
28. Llabre MM, Weaver KE, Durán RE, Antoni MH, McPherson-Baker S, Schneiderman N. A measurement model of medication adherence to highly active antiretroviral therapy and its relation to viral load in HIV-positive adults. AIDS Patient Care STDS. 2006;20(10):701–11.
29. Liu H, Golin CE, Miller LG, et al. A comparison study of multiple measures of adherence to HIV protease inhibitors. Ann Intern Med. 2001;134(10):968–77.
30. Liu H, Miller LG, Hays RD, et al. Repeated measures longitudinal analyses of HIV virologic response as a function of percent adherence, dose timing, genotypic sensitivity, and other factors. J Acquir Immune Defic Syndr. 2006;41(3):315–22.
31. Sheskin DJ. Handbook of parametric and nonparametric statistical procedures. 3rd ed. Boca Raton, FL: Chapman & Hall; 2004.
32. Baron RM, Kenny AA. The moderator-mediator distinction in social psychological research: Conceptual, strategic, and statistical considerations. J Pers Soc Psychol. 1986;51(6):1173–82.
33. MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. Psychol Method. 2002;7(1):83–104.
34. Finkelhor D, Hotaling G, Lewis IA, Smith C. Sexual abuse in a national survey of adult men and women: prevalence, characteristics, and risk factors. Child Abuse Negl. 1990;14(1):19–28.
35. Meade CS, Kershaw TS, Hansen NB, Sikkema KJ. Long-term correlates of childhood abuse among adults with severe mental illness: adult victimization, substance abuse, and HIV sexual risk behavior. AIDS Behav. 2009;13(2):207–16.
36. Holmes WC. Association between a history of childhood sexual abuse and subsequent, adolescent psychoactive substance use disorder in a sample of HIV seropositive men. J Adolesc Health. 1997;20(6):414–9.
37. Lucas GM, Gebo KA, Chaisson RE, Moore RD. Longitudinal assessment of the effects of drug and alcohol abuse on HIV-1 treatment outcomes in an urban clinic. AIDS. 2002;16(5):767–74.
38. Kendall-Tackett KA, Williams LM, Finkelhor D. Impact of sexual abuse on children: a review and synthesis of recent empirical studies. Psychol Bull. 1993;113(1):164–80.