

# Effects of Trauma Intervention on HIV Sexual Risk Behaviors among Women with Co-Occurring Disorders in Substance Abuse Treatment

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*Women in substance abuse treatment often have co-occurring mental health disorders and a history of trauma; they are also at high risk for HIV infection and other sexually transmitted diseases via unprotected sex. A quasi-experimental study evaluated the effectiveness of trauma-enhanced*

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*substance abuse treatment combined with HIV/AIDS prevention (N = 122) on reducing sexual risk behaviors compared to treatment with services-as-usual (N = 110). Participants in the services-as-usual condition were 2.8 times more likely to engage in unprotected sex at the 6-month follow-up and 4.5 times more likely to do so at the 12-month follow-up than those in the intervention program. © 2007 Wiley Periodicals, Inc.*

Drug abuse, mental health disorders, and a history of trauma are all associated with sexual risk behaviors (Alegría et al., 1994; Cournos & McKinnon, 1997; Kalichman, Kelly, Johnson, & Bulto, 1994; Koenig & Clark, 2004; Leigh & Stall, 1993; Wingood & DiClemente, 1998; Wu, El-Bassel, Witte, Gilbert, & Chang, 2003). The co-occurrence of drug abuse, mental health disorders, and history of abuse is associated with HIV risk behaviors and HIV infection (Stall et al., 2003).

The use of drugs increases risky sexual behaviors (Centers for Disease Control and Prevention [CDC], 2002a; Leigh & Stall, 1993; Wingood & DiClemente, 1998). Women with severe drug dependency are more likely to engage in unsafe sex with multiple partners, have sex for money or drugs, and have unprotected sex with an injection drug user (Heise, Ellsberg, & Gottemoeller, 1999). Further, studies show elevated HIV seroprevalence rates in persons with severe mental illnesses such as schizophrenia, recurrent major depression, and bipolar disorder (Cournos & McKinnon, 1997; Lyon, 2001). Women with mental illness have higher rates of sexual risk behaviors, such as multiple partners and exchange of sex for drugs or money, and lower rates of condom use (Carey, Carey, & Kalichman, 1997).

A personal history of victimization has also been associated with high rates of sexual risk behaviors for HIV infection, particularly in cases of male-perpetrated intimate partner violence (Bensley, Van Eenwyk, & Simmons, 2000; Wu et al., 2003) and childhood sexual abuse (Koenig & Clark, 2004). Women who have been sexually abused are less likely to have their partners use condoms and are more likely to have lower self-efficacy for engaging in AIDS prevention strategies than women who have not been abused; they also tend to have a greater number of sexual partners and sexually transmitted diseases (STDs), and are more likely to engage in commercial sex work (Chamion, Shain, Piper, & Perdue, 2001; Koenig & Clark, 2004; Wingood & DiClemente, 1997). Although the causal links between abuse and HIV risk or HIV infection have not been established, women's lower power in relationships is an important underlying factor that contributes to lower condom use among these women's partners (Pulerwitz, Amaro, DeJong, Gortmaker, & Rudd, 2002). In addition, women with a history of abuse rate their decision-making power as lower than nonabused women rate theirs (Pulerwitz, Gortmaker, & DeJong, 2000).

Several studies have demonstrated the efficacy of HIV interventions in reducing drug-related risk behaviors (Metzger, Navaline, & Woody, 1998; Sorensen & Copeland, 2000), but there is less evidence that HIV interventions have been effective in reducing HIV-related sexual risk behaviors among drug users (Ashley, Marsden, & Brady, 2003; Sorensen & Copeland, 2000). Addressing issues of trauma in HIV prevention may be especially critical because standard communication and condom skills-building interventions have been shown to be less effective with women who have a history of abuse (Greenberg, 2001). Although HIV prevention interventions for women with a history of substance abuse and mental health disorders have been developed

and tested, we know of no studies that have focused specifically on trauma treatment as a strategy for HIV sexual risk reduction among women.

Substance abuse treatment offers a window of opportunity for introducing interventions to reduce the sexual risk for HIV infection in women. Recent findings from the multisite Women, Co-Occurring Disorders and Violence Study (WCDVS), sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA), have demonstrated that integrated services for women with co-occurring substance abuse and mental health disorders and a history of trauma increase treatment retention (Amaro, Chernoff, Brown, Arévalo, & Gatz, 2007) and improve treatment outcomes (Amaro, Dai, Arévalo, Acevedo, Matsumoto, & Nieves, 2007; Coccozza et al., 2005; Finkelstein, Mazelis, Brown, Jackson, & Banks, 2005; Morrissey, Ellis, et al., 2005; Morrissey, Jackson, et al., 2005). A remaining question is whether integrated services that include trauma treatment are also effective in reducing sexual risk behaviors in this population of women. Given the high rates of trauma reported by women who use substances, and the increased risk of women who have experienced trauma acquiring HIV, we expected that an intervention focusing on addressing trauma symptoms would in turn reduce patterns of sexual risk behaviors.

This study sought to answer the following questions: (a) Are integrated trauma and substance abuse services related to a reduction in unprotected sex?; and (b) Are intermediate outcomes associated with decreased HIV sexual risk behaviors?

## **METHODS**

Data in this article came from participants in the WCDVS Boston study site (Boston Consortium of Services for Families in Recovery, hereafter referred to as BCSFR), the only site that collected data on HIV risk behaviors. (For a full description of the WCDVS study design, see McHugo, Kammerer, et al., 2005. For a description of the BCSFR model, see Amaro et al., 2004). The study used a quasi-experimental, nonequivalent group design with repeated measures. Women in the BCSFR study were enrolled in 2001 and 2002 in outpatient, methadone, or residential treatment programs. These programs were part of either the intervention or comparison group.

### ***Comparison and Intervention Conditions***

Women in the comparison group received substance abuse treatment services-as-usual and did not participate in any of the BCSFR trauma-informed model components. Women in the intervention group were offered the BCSFR trauma-informed model components comprising comorbidity screening, trauma diagnostic assessment, and treatment planning, a modified version of the Trauma Recovery and Empowerment Model (TREM) groups, and four trauma-informed skills building groups.

TREM, a 25-session, structured, manualized, psychoeducational approach to trauma treatment, was implemented with the inclusion of three integrated HIV/AIDS prevention sessions developed by El-Bassel and Schilling (1992; for a full description see Amaro et al., 2004, and Harris, 1998). TREM focuses on helping women maintain personal safety, teaching them empowerment and coping skills, and helping them understand the links between substance abuse, mental health problems, and trauma. The HIV sessions focus on sexual negotiation with partners and sexual safety.

The trauma-informed skills building groups provided were (a) Women's Leadership Training Institute (Amaro, Nieves, & Saunders, 2004), a manualized 3-session

(5 hours per session) peer-run group intervention that comprises intensive leadership and communications training focused on the silencing effects of trauma and the process of regaining one's voice; (b) Economic Success in Recovery (Amaro & Nieves, 2004a) a manualized 8-session (2 hours per session) skills-based group that helps women with a history of economic dependence on abusive partners gain skills in money management and take charge of their finances; (c) Pathways to Reunification and Recovery (Amaro & Nieves, 2004b), a manualized 10-session (1.5 hours per session) skills-building group that helps women gain skills, information, and support related to child custody issues; and (d) Family Nurturing Program (Moore, Buchan, Finkelstein, & Thomas, 1995), a manualized 12-session (2 hours per session) skills-building group focused on parenting skills and family communication.

### **Sample**

To be included in the WCDVS, a woman had to (a) be at least 18 years old; (b) meet diagnostic criteria for a DSM-IV Axis I disorder or Axis II personality disorder; (c) meet diagnostic criteria for a DSM-IV substance-related disorder (excluding caffeine and nicotine); (d) have one of these disorders (mental health or substance abuse) currently (within the past 30 days) and have had the other within the past five years; (e) have ever experienced sexual or physical abuse; and (f) have had at least two distinct treatment service episodes within the mental health system, substance abuse system, or other care systems (excluding self-help, Alcoholics Anonymous, etc.). Although a complete list of all mental health disorders for each participant was not obtained, frequently mentioned disorders were major depression, anxiety, bipolar disorder, dissociative disorder, and personality disorder. Exclusion criteria included an inability to converse with an interviewer in English or Spanish, an unwillingness to sign an informed consent statement, and an unwillingness to be re-interviewed at all follow-up times.

A total of 342 women enrolled in substance abuse treatment completed the baseline interview (181 intervention group; 161 comparison group). Of these, 256 women (75%) were successfully re-interviewed at 6 months, and 211 women were re-interviewed at 12 months (62%). Analyses were limited to the sample for whom we had complete HIV risk data: 122 intervention group and 110 comparison group women at 6 months, and 81 intervention and 110 comparison group women at 12 months. The follow-up rates for completing any interview (6 or 12 months) were not statistically different for the intervention group (84.5%) and the comparison group (86.2%;  $p = .65$ ).

### **Measures**

The study's research measures came from two national protocols. Supplemental measures were also used at the Boston site. The national protocols were the WCDVS (for details on these measures, see McHugo, Kammerer, et al., 2005) and the Targeted Capacity Expansion–HIV Cluster (TCE–HIV), both sponsored by SAMHSA's Center for Substance Abuse Treatment.

The key outcome measure was whether a respondent reported at follow-up that she had had unprotected sex in the last 30 days; the measure was constructed from questions about sexual behavior taken from the TCE–HIV protocol. Unprotected sex was defined as vaginal, oral, or anal sex without use of a condom or other latex barrier, including (a) unprotected sex with a main partner, (b) unprotected sex with another person or persons other than the main partner but not known to be in a

high-risk sex group, and (c) sex with a known “risky” person or persons (i.e., someone who is HIV positive or has AIDS, who uses IV drugs, who uses other drugs such as cocaine, who is high on any substance, or with whom the woman engaged in sex in exchange for money or drugs). The key independent variable was treatment group status. Baseline covariates included demographic characteristics and current symptoms from WCDVS and TCE–HIV measures. We used the Alcohol Composite and Drug Composite Scores from the Addiction Severity Index (ASI) (McLellan et al. 1992) to measure the severity of alcohol and drug problems. Scores on these scales range from 0 (no symptoms) to 1.0 (highest severity). We used the Global Severity Index (GSI) from the Brief Symptom Inventory to measure mental health symptoms (Derogatis, 1993). Higher mean scores on the GSI correspond to more severe mental health problems. We used an indicator variable to identify women who self-reported HIV-positive status, because we expected that these women were less likely to have unprotected sex.

The trauma history and symptom measures we used were (a) the frequency of childhood abuse (FCA) Scale, (b) the current exposure to interpersonal abuse (CEIA) Scale, and (c) the Posttraumatic Stress Disorder Symptom Scale (PSS). The PSS assesses how bothersome 17 symptoms associated with posttraumatic stress disorder have been in the past month (Foa, Cashman, Jaycox, & Perry, 1997; Foa, Riggs, Dancu & Rothbaum, 1993). The score for each item ranges from 0 (*not at all or only one time*) to 3 (*five or more times per week/almost always*); a higher total PSS score indicates greater symptom severity. For information on the FCA and CEIA, please see McHugo, Caspi, et al. (2005).

Three other intermediate outcome measures from the 6-month interview were included in analysis models as potential confounding variables: (a) self-reported illicit drug use in the prior 30 days; (b) one or more days in a restricted environment in the past 30 days (psychiatric hospital, jail, detoxification, or residential substance abuse facility); (c) self-reported alcohol or drug abuse treatment in the prior 30 days.

Finally, for analyses restricted to respondents who had relationships in the past 6 months, we measured respondent perception of relationship control and decision-making with items from the Relationship Power Scale (RPS) (Pulerwitz et al., 2002). Higher scores indicate more perceived relationship power by the respondent; the total score combines a control subscale with agreement items (e.g., “I feel tracked or stuck in our relationship”) and a decision-making balance subscale with rating items (e.g., “Who usually has more say when you talk about serious things?”)

### **Statistical Analysis**

Analysis was restricted to women for whom follow-up data and completed HIV sexual risk behavior items were available (232 women at 6 months, 191 women at 12 months). We compared intermediate outcomes between the intervention and comparison groups using Cochran-Mantel-Haenszel Chi-square tests for categorical variables and analysis of covariance for continuous variables, with adjustments for corresponding baseline values. We used Breslow-Day tests to judge homogeneity of the estimates and choose the reported analysis. Multivariate regression models were used to examine the association of treatment group with 6- and 12-month sexual risk behavior, adjusting for baseline and 6-month covariates. A more limited model was restricted to women with complete RPS items.

The final model presented reflects what we learned from several preliminary models that we tested. Because we knew that intervention group status and 6-month restricted environment were confounded, we tested an interaction term, but its use did not result in different main findings. Thus, in this article, the interaction data are not presented but are discussed. Additionally, while we used separate indicator variables for Black and Hispanic race/ethnicity in preliminary models, we combined groups in the final model to be parsimonious. Self-report of hepatitis infection was tested but not included in the final model because it was not significant and was highly correlated with HIV status. The logistic model includes only the PSS because testing revealed that the FCA and CEIA were never significant predictors and were correlated with the PSS. We also conducted preliminary analyses of differential attrition by group using a multivariate logistic regression model that controlled for age, treatment modality (methadone or outpatient relative to residential), and race/ethnicity (non-Hispanic Black, Hispanic, or non-Hispanic Other relative to non-Hispanic White). Because the estimate for group was not significant, it does not appear that findings on group status were confounded with differential drop-out rate.

## RESULTS

The intervention group differed from the comparison group at baseline in several ways (Table 1). Intervention group women were younger, more likely to be non-Hispanic Black and less likely to be Hispanic or non-Hispanic White. They also had lower baseline drug severity scores (as indicated by the ASI-D). Comparison group women were more likely to be sexually abstinent at baseline (66% versus 59%,  $p < .01$ ) and more likely to report using latex protection when engaging in sex (16% versus 7%,  $p < .01$ ). Nine intervention group women were HIV positive (7%), half the proportion found in the comparison group (14%;  $p = .12$ ). Type of treatment setting differed by intervention condition ( $p < .003$ ). Intervention group women were recruited less frequently from residential treatment programs (21% versus 36%) and more frequently from outpatient treatment programs (44% versus 25%). The percentage of women in methadone treatment was comparable between groups (34% in the intervention group versus 39% in the comparison group; some data not in table).

Study tracking records indicated that 75% of intervention group women enrolled in at least one intervention class (TREM  $n = 96$ ; Women's Leadership Training Institute  $n = 77$ ; Economic Success in Recovery  $n = 47$ ; Pathways to Reunification and Recovery or Family Nurturing Program  $n = 45$ ). Among TREM participants, the mean number of TREM classes completed was 9.70 ( $SD = 6.67$ ). Data on receipt of individualized services were not tracked.

Table 2 presents unadjusted trends in intermediate outcomes of interest and HIV risk behavior, with statistical tests controlled for baseline values. A greater proportion of the comparison group (52%) reported illicit drug use at baseline than the intervention group (39%,  $p < .05$ ), and this difference persisted during the follow-up period.

While there were no differences in rates at baseline, intervention group women were more likely than comparison group women to report having received treatment for drug and/or alcohol problems in the past 30 days at 6-month follow-up (72% versus 41%,  $p < .001$ ) and were more likely to have lived in restricted environments, such as residential treatment programs or jail, in the past 30 days (28% versus 15%,  $p < .05$ ). However, these differences were not significant at 12-month follow-up. Baseline

**Table 1. Description of Intervention and Comparison Group Women at Baseline (N = 232)**

<i>Measure</i>	<i>Intervention (n = 122)</i>	<i>Comparison (n = 110)</i>
Demographics		
Age (years)**, <i>M (SD)</i>	36.3 (7.5)	39.1 (7.9)
Race (%)***		
Hispanic	24.6	35.5
Black	48.4	15.5
White	23.8	46.4
Other	3.3	2.7
Baseline substance abuse		
ASI score—alcohol, <i>M (SD)</i>	0.10 (0.24)	0.08 (0.19)
ASI score—drug*, <i>M (SD)</i>	0.11 (0.13)	0.15 (0.14)
Baseline mental health		
GSI score, <i>M (SD)</i>	1.44 (0.83)	1.43 (0.81)
Baseline trauma history		
FCA score, <i>M (SD)</i>	3.44 (3.00)	3.51 (2.83)
CEIA (%)	42.7	44.6
Total PSS score, <i>M (SD)</i>	25.47 (12.02)	24.30 (11.59)
Baseline HIV status (%)		
Positive	7	14
Baseline sexual risk behavior, past 30 days (%)**		
Abstinent	59.0	65.5
Protected sex	6.6	15.5
Unprotected sex, not risky person	24.6	10.0
Unprotected sex, risky person	9.8	9.1
Baseline RPS		
Total score <i>M (SD)</i>	2.84 (0.62)	2.73 (0.52)

*Note.* ASI = Addiction Severity Index. GSI = Global Severity Index. FCA = Frequency of Childhood Abuse. CEIA = Current Exposure to Interpersonal Abuse. PSS = Posttraumatic Stress Disorder Symptom Scale. RPS = Relationship Power Scale. The RPS was calculated for 206 women who had relationships at baseline, of whom 113 were in the intervention group and 93 were in the comparison group.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

values on relationship power were equivalent; however, intervention group women reported significantly higher scores on the RPS at both follow-ups than comparison group women ( $p < .01$  at 6 months;  $p < .001$  at 12 months).

### ***Are Integrated Trauma and Substance Abuse Services Related to a Reduction in Unprotected Sex?***

Figure 1 shows trends in the proportion of each group reporting unprotected sex during the last 30 days, and Table 2 presents the distribution by sexual risk behavior. The intervention group had a stable proportion of women who reported unprotected sex at baseline and at 6 months (Figure 1, 34% and 29%, respectively). The comparison group, by contrast, had a substantial increase in the proportion of women reporting unprotected sexual acts between baseline and 6-month follow-up (19% and 44%, respectively, unadjusted Chi-square  $p = .004$ ).

**Table 2. Description of Intermediate Outcomes and HIV Risk Behaviors at 6- and 12-Month Follow-ups**

	<i>Intervention</i> (6 m. n = 122) (12 m. n = 81)	<i>Comparison</i> (6 m. n = 110) (12 m. n = 110)
Intermediate outcomes		
Any illicit drug use (%)		
Baseline*	38.5	51.8
6 months*** <sup>a</sup>	21.3	48.2
12 months*** <sup>b</sup>	17.3	40.0
Any treatment for alcohol or drug use (%)		
Baseline	61.5	57.3
6 months*** <sup>c</sup>	72.1	41.3
12 months <sup>d</sup>	45.7	40.9
Live in restricted environment (treatment, jail) (%)		
Baseline	25.4	30.9
6 months* <sup>c</sup>	27.9	14.6
12 months <sup>f</sup>	8.6	5.5
RPS score, <i>M (SD)</i> <sup>g</sup>		
6 months**	3.14 (0.67)	2.78 (0.42)
12 months***	3.28 (0.73)	2.72 (0.44)
HIV risk behaviors, past 30 days <sup>h</sup>		
6-month follow-up (%)**		
Abstinent	62.3	41.8
Protected sex	9.0	14.6
Unprotected sex, non-risky person	23.0	26.4
Unprotected sex, risky person	5.7	17.3
12-month follow-up (%)		
Abstinent	49.4	40.9
Protected sex	19.8	18.2
Unprotected sex, non-risky person	24.7	30.0
Unprotected sex, risky person	6.2	10.9

<sup>a</sup>Breslow-Day Test for Homogeneity of Odds Ratio when controlling for baseline status:  $p = .0565$ . Among women who reported no recent illicit drug use at baseline:  $p = .23$ ; among those who reported recent illicit drug use at baseline:  $p < .001$ .

<sup>b</sup>Breslow-Day Test for Homogeneity of Odds Ratio when controlling for baseline status:  $p = .003$ . Among women who reported no recent illicit drug use at baseline:  $p = 0.66$ ; among those who reported recent illicit drug use at baseline:  $p < .001$ .

<sup>c</sup>Breslow-Day Test for Homogeneity of Odds Ratio when controlling for baseline status:  $p = .07$ .

<sup>d</sup>Breslow-Day Test for Homogeneity of Odds Ratio when controlling for baseline status:  $p = .21$ .

<sup>e</sup>Breslow-Day Test for Homogeneity of Odds Ratio when controlling for baseline status:  $p = .21$ .

<sup>f</sup>Breslow-Day Test for Homogeneity of Odds Ratio when controlling for baseline status:  $p = .37$ .

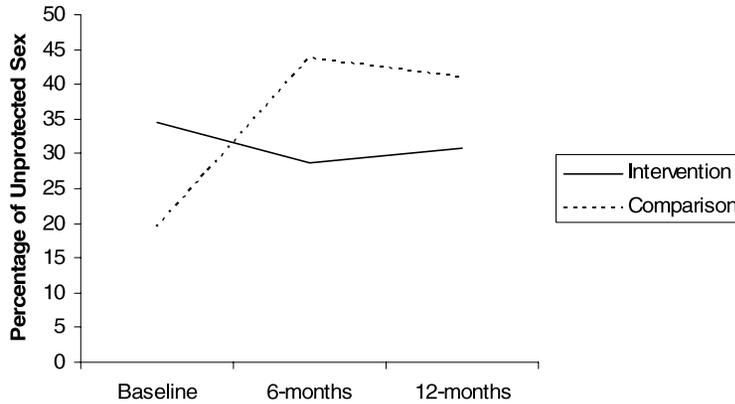
<sup>g</sup>RPS = Relationship Power Scale. The RPS was calculated for 159 women who had relationships at 6 months (97 in the intervention group and 62 in the comparison group) and for 160 women who had relationships at 12 months (92 in the intervention group and 68 in the comparison group). Baseline data are reported in Table 1.

<sup>h</sup>Baseline data are reported in Table 1.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

### **Are Intermediate Outcomes Associated With Improvement in HIV Sexual Risk Behaviors?**

A bivariate association between reported unprotected sex at follow-up and intermediate outcomes (receiving alcohol or drug treatment or use of illicit drugs) was not



**Figure 1.** Changes in sexual risk behavior from baseline to 6-month and 12-month follow-ups by treatment group.

found at either the 6- or 12-month follow-ups. However, reported unprotected sex at follow-up was confounded with living environment (at 6 months, 20% of those in restricted living environments reported having had unprotected sex versus 40% of those not in restricted living environments,  $p = .009$ ). Women who reported unprotected sex at the 6-month follow-up also reported lower relationship power (mean RPS = 2.80,  $SD = 0.39$ ,  $n = 72$ ) than women who did not report unprotected sex (mean = 3.16,  $SD = 0.70$ ,  $n = 86$ ;  $p < .001$ ), and this relationship persisted at 12 months ( $p = .002$ ).

Logistic regression analyses (Table 3) found a strong significant association between intervention status and sexual risk behaviors at follow-up. Comparison group women had 2.8 times the likelihood of engaging in unprotected sex at 6 months compared with intervention group women (Odds Ratio [OR]: 0.36, 95% CI: 0.17–0.77) after adjustment for baseline characteristics and intermediate outcomes. Furthermore, at follow-up, women of color (African American and Hispanic women) had 3 times the likelihood of engaging in unprotected sexual behaviors as White women (OR: 2.97, 95% CI: 1.40–6.31). Consistent with bivariate associations, women in restricted environments were less likely to engage in unprotected sexual behaviors than women who were not confined. In sensitivity analyses in a model excluding the three intermediate outcome measures (results not shown), the coefficient of treatment group variable was not substantially different (adjusted OR: 0.32, 95% CI: 0.16–0.66). When we used 12-month follow-up data, the main finding (i.e., a strong significant association between intervention status and sexual risk behaviors) was replicated (OR: 0.22, 95% CI: 0.093–0.52; results available from the authors); comparison group women had 4.5 times more likelihood of engaging in unprotected sex than intervention group women. At 12 months, the coefficient estimates for race/ethnicity and living in a restricted environment were no longer significant, and participant age was negatively associated with unprotected sex.

The main finding was also replicated among the more restricted group of women in a recent relationship (Table 3, right-hand columns). For women in recent relationships, those with higher RPS scores were less likely to engage in unprotected sexual behaviors than women with lower scores. We were unable to test this model with 12-month follow-up data because of insufficient sample size.

**Table 3. Multiple Logistic Regression Estimates for Women's Sexual Risk Behavior at 6-Month Follow-Up**

Explanatory variables	All women <sup>a</sup>		Women with recent relationships <sup>b</sup>	
	OR	95% CI	OR	95% CI
Treatment status				
Intervention group <sup>c</sup>	0.36**	0.17, 0.77	0.29*	0.10, 0.79
Demographics				
Age	0.97	0.92, 1.01	0.98	0.92, 1.04
Race/ethnicity—women of color <sup>d</sup>	2.97**	1.40, 6.31	2.91*	1.31, 7.51
Baseline sexual risk behavior				
Unprotected sex in past 30 days	1.94	0.96, 3.92	1.51	0.64, 3.55
Baseline substance abuse				
ASI score—alcohol	1.02	0.87, 1.18	1.19	0.97, 1.47
ASI score—drug	1.35*	1.03, 1.77	1.16	0.82, 1.66
Baseline mental health				
GSI score	0.62	0.34, 1.10	0.48	0.22, 1.02
Baseline trauma history				
Total PSS score	1.02	0.98, 1.06	1.02	0.96, 1.07
Baseline HIV status				
% positive	1.94	0.96, 3.92	1.56	0.67, 3.63
6-month drug use				
Any illicit drug use in past 30 days (%)	0.25*	0.07, 0.86	0.12**	0.03, 0.55
6-month treatment status				
Any alcohol/drug use treatment in past 30 days (%)	1.07	0.52, 2.23	0.95	0.36, 2.54
6-month restricted status				
Lived in a restricted environment in past 30 days (%)	1.30	0.64, 2.64	1.54	0.62, 3.82
6-month relationship power				
Total RPS Score	N/A		0.35**	0.17, 0.72

<sup>a</sup>*N* = 220; *R*<sup>2</sup> = 0.24. <sup>b</sup>*N* = 148; *R*<sup>2</sup> = 0.37. <sup>c</sup>Reference = comparison group. <sup>d</sup>Reference = White women.

OR = Odds Ratio. CI = Confidence Interval. ASI = Addiction Severity Index. GSI = Global Severity Index. RPS = Relationship Power Scale.

\**p* < .05; \*\**p* < .01; \*\*\**p* < .001.

## DISCUSSION

Our findings suggest that integrated trauma and substance abuse services may lead to improvement in intermediate outcomes, such as reduced drug use and increased relationship power. These integrated services may also have a favorable impact on rates of unprotected sex at follow-up compared with services-as-usual. Furthermore, relationship power was significantly associated with sexual risk behavior. These findings are consistent with previous studies that incorporated trauma services into substance abuse treatment (Najavits, Weiss, Shaw, & Muenz, 1998; Ouimette, Moos, & Finney, 2000). Thus, addressing trauma history and symptoms in an integrated manner with substance abuse treatment may be an effective way to obtain positive outcomes. This integrated approach is particularly important for women's treatment, because a large proportion of women in substance abuse treatment have experienced physical or sexual abuse as children or adults or both (Amaro, Nieves, Johannes, & Cabeza, 1999; Medrano, Zule, Hatch, & Desmond, 1999).

These findings also suggest that women who received trauma-integrated services may engage in treatment longer; they are consistent with other findings from the WCDVS that showed that women in residential substance abuse treatment programs that integrated treatment of trauma and mental health disorders had longer lengths of stay (Amaro et al., 2007). Although the current study did not specifically look at length of stay in original treatment program, as studies of treatment retention do, one can extrapolate that an improvement in continuity of care for substance abuse, regardless of whether it is in the same or a different program, may be related to improved outcomes.

Finally, our finding of increased relationship power among intervention group women appears to show the success of the intervention's focus on increasing women's self-efficacy in relationships through more equality in sexual decision-making and more control over engaging in HIV-protective behaviors.

The major finding of this study was that women who did not receive trauma-integrated services were almost three times as likely at 6-month follow-up and five times as likely at 12-month follow-up to engage in unprotected sex than women who did receive these services. This finding has important implications for substance abuse treatment for women, especially women with co-occurring disorders. Trauma-informed services and trauma-sensitive staff appear to improve substance use outcomes as well as HIV-risk reduction in women who are at high risk of acquiring HIV because of their trauma histories and substance use.

The finding that Black and Hispanic women were three times more likely to engage in unprotected sex at 6-month follow-up than White women is consistent with national trends that show women of color have higher rates of heterosexual transmission of HIV than White women (CDC, 2002b), and calls for special attention to this population in the prevention of HIV infection.

Among women who were or had recently been involved in a relationship, high relationship power was a protective factor against engagement in unprotected sex. This finding is consistent with those of another study that found a strong association between sexual relationship power and condom use (Pulerwitz et al., 2002). That study and our study both suggest that relationship power is a promising factor in HIV risk reduction programming.

Our conclusions must be tempered because of the study's limitations. First, the study was not designed to evaluate individual components of the intervention. While it is unlikely that the three HIV sessions alone were solely responsible for changes in sexual-risk behavior, we do not know the independent associations among the HIV sessions, other TREM sessions, and other skills-building groups with study outcomes. Second, the quasi-experimental study design resulted in the confounding of baseline differences in important personal characteristics, drug use behavior, and sexual risk behavior with intervention group status. While logistic regression models included control variables for known differences between the samples, there may have been other unobserved differences that accounted for the association of intervention group status and the unprotected sex outcome. Finally, there is the threat of bias from study attrition. However, this bias is unlikely to explain our main findings, because the rates for completing either a 6-month or 12-month follow-up interview did not differ by treatment group.

To our knowledge, this is the first study to examine changes in sexual HIV risk-related behaviors through the integration of trauma-related services into treatment for substance abuse disorders. More studies are needed to replicate this finding, particularly studies that incorporate an experimental design.

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