HIV Risk Behavior in Treatment-Seeking Opioid-Dependent Youth: Results From a NIDA Clinical Trials Network Multisite Study

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Objective: To assess baseline rates of and changes in HIV drug and sexual risk behavior as a function of gender and treatment in opioid-dependent youth.

Methods: One hundred fifty participants were randomly assigned to extended buprenorphine/naloxone therapy (BUP) for 12 weeks or detoxification for 2 weeks; all received drug counseling for 12 weeks. HIV risk was assessed at baseline and 4-week, 8-week, and 12-week follow-ups. Behavioral change was examined using generalized estimating equations.

Results: Baseline rates of past-month HIV risk for females/males were 51%/45% for injection drug use (IDU) (ns), 77%/35% for injection risk ($P < 0.001$), 82%/74% for sexual activity (ns), 14%/24% for multiple partners (ns), and 68%/65% for unprotected intercourse (ns). IDU decreased over time ($P < 0.001$), with greater decreases in BUP versus detoxification ($P < 0.001$) and females versus males in BUP ($P < 0.05$). Injection risk did not change for persistent injectors. Sexual activity decreased in both genders and conditions ($P < 0.01$), but sexual risk did not.

Conclusions: Overall, IDU and sexual activity decreased markedly, particularly in BUP patients and females, but injection and sexual risk behaviors persisted. Although extended BUP seems to have favorable effects on HIV risk behavior in opioid-dependent youth, risk reduction counseling may be necessary to extend its benefits.

Received for publication October 15, 2009; accepted January 27, 2010.

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Supported by the following grants from the National Institutes of Health: P30-AI064518 (Weinhold) and U10-DA013711 (Hubbard) to Duke University, K05-DA017009 (Woody) and U10-DA013043 (Woody) to University of Pennsylvania, K24-DA022288 (Weiss) and U10-DA015831 (Weiss) to Harvard University, U10-013034 (Stitzer) and K12-DA000357 (Riggs) to Johns Hopkins University, and U10-DA015833 (Miller) to University of New Mexico.

Trial registration: ClinicalTrials.gov #NCT00078130; IND #64,578.

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Key Words: buprenorphine treatment, gender differences, HIV risk, injection drug use, opioid dependence, youth

(*J Acquir Immune Defic Syndr* 2010;55:65–72)

INTRODUCTION

Over the past decade, there has been a marked increase in illicit opioid use, including heroin and prescription analgesics, among adolescents in the United States,[1] with a substantial proportion of initiators progressing to dependence within 1 year.[2] Opioid dependence is often a chronic and relapsing medical condition, and the prognosis for opioid-dependent youth seems poor.[3,4] Among the many adverse consequences of opioid dependence is exposure to infectious diseases, including HIV.

In 2006, 34% of new HIV infections occurred in persons 13–29 years old—more than in any other age group,[5] and opioid-dependent youth may be at particularly high risk. Over half of young heroin users inject the drug and are at risk for contracting HIV through sharing of syringes, injection paraphernalia, and drug solution.[6–9] Noninjection drug use also contributes to the spread of HIV through its association with sex risk behavior. Previous research has found that heroin[10–13] and prescription opioid[8,14] users engage in high rates of sex risk behaviors, including multiple partners, unprotected intercourse, and sex trading. However, only 1 of these studies focused on youth.[8] A number of developmental factors make adolescents more vulnerable to HIV risk behavior than adults. These include hormonal and physical changes of puberty,[15,16] shifting relationship patterns, including development of romantic relationships, and increasing influence of peer norms,[17–20] a heightened sense of invulnerability,[21,22] cognitive immaturity leading to impulsive decision-making,[23] tenuous affect regulation,[16,24,25] and underlying brain changes associated with increased risk-taking propensity.[26–28] Because results from adult samples may not generalize to adolescents, it is critical to identify the rates and patterns of HIV risk behaviors among opioid-dependent youth.

Females now account for a quarter of new HIV/AIDS diagnoses, with high-risk heterosexual contact and injection drug use (IDU) accounting for nearly all of these infections.[29] Studies conducted among adult drug users suggest that women are more likely to engage in HIV risk behaviors, including sharing needles

and other injection paraphernalia,[30,31] having high-risk sex partners,[12,32,33] and engaging in sex trade.[13,34,35] Therefore, it is also important to examine whether gender differences in HIV risk behavior are apparent among opioid-dependent youth.

Treatment for opioid dependence, including use of buprenorphine/naloxone (bup/nx), is an important component of HIV prevention.[36] Buprenorphine, a high-affinity μ-opioid partial agonist and κ-opioid antagonist, is a safe and effective medication for both opioid detoxification and long-term agonist therapy in adults[37–40] and adolescents.[41,42] To date, 4 studies have examined changes in HIV risk after bup/nx treatment. The first randomized 137 adults to bup/nx, methadone, or levomethadyl acetate.[43] Over 18 weeks of treatment, there were significant reductions in frequency of opioid injection and sharing of injection equipment, but no differences across conditions. Methadone was associated with decreased sexual activity, possibly due to its effect on libido,[44,45] but there was no change in number of sex partners in any condition. The second was an observational study of 166 adults initiating bup/nx treatment in a primary care clinic.[10] Over 24 weeks of treatment, there were significant declines in IDU, sharing of injection equipment, and sex while intoxicated but not in unprotected intercourse or sex with a new or secondary partner. The third study randomized 126 adults to 24 weeks of treatment with bup/nx, naltrexone, or placebo.[40] Among participants retained in treatment, there was a significant reduction in drug risk but not sex risk, and no differences across conditions. In the only published bup/nx treatment study that has examined HIV risk in youth, 36 adolescents were randomized to 4 weeks of detoxification with bup/nx or clonidine.[46] There was a significant decrease in drug risk during the first week but no difference by gender or condition. This study did not report on sex risk and was limited by a small sample and short assessment period. Cumulatively, these studies suggest that pharmacotherapy for opioid dependence may promote reductions in HIV risk behavior, particularly related to drug risk. However, given the increasing prevalence of opioid abuse and HIV infection among adolescents and young adults, further research is needed to understand if and how bup/nx may contribute to HIV risk reduction in opioid-dependent youth.

The current study, conducted within the National Institute on Drug Abuse Clinical Trials Network (CTN), was a multisite randomized clinical trial of bup/nx treatment for opioid-dependent youth.[41] As reported in the primary outcome article, participants who received extended bup/nx therapy had significantly better treatment retention, greater reductions in opioid, marijuana, and cocaine use and drug injection and less need for nonstudy addiction treatments (ie, higher level of care).[41] The aims of this secondary analysis were to (1) describe the prevalence of HIV drug and sex risk behaviors in the sample; (2) examine gender differences in HIV risk behaviors; and (3) determine whether HIV risk behaviors changed over time as a function of treatment and gender.

METHODS

Participants and Procedures

Full details of the methods have been reported previously.[41] The study met all requirements of human subjects protection and was approved by the institutional review boards of participating institutions. Recruitment was open to patients aged 15–21 years who met Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria for opioid dependence with physiologic features and sought outpatient treatment at community-based clinics between July 2003 and December 2005. Eligible participants were randomly assigned to either (1) 14-day bup/nx detoxification (DETOX), or (2) 12-week extended bup/nx therapy (BUP). Randomization was stratified by gender (male/female), age (14–17/18–21), ethnicity (white/other), and injection status (injecting/noninjecting). Participants completed assessments at baseline (pretreatment), weeks 4 and 8 (midtreatment), and week 12 (post-treatment).

Of 154 randomized individuals, 4 were excluded from this analysis (2 did not enter treatment, 2 did not provide HIV risk data), leaving a final sample of 150. Of these participants, 74 were allocated BUP and 76 were allocated DETOX. Follow-up rates were 85%, 74%, and 67% at weeks 4, 8, and 12, respectively. There was a significant decline in follow-up over time (Wald χ^2 (2) = 27.63, $P < 0.001$) but no differences in overall follow-up by condition (Wald χ^2 (1) = 1.91, $P = 0.17$) or gender (Wald χ^2 (1) = 0.66, $P = 0.42$). Furthermore, participants who completed the 12-week follow-up did not differ from those who did not on any baseline characteristics.

Treatment

Consistent with standard bup/nx induction, patients were instructed not to use opioids for ≥6 hours and be in mild/moderate withdrawal before first dosing. Medication was administered under direct observation 5–7 days/week. BUP participants received a maximum dose of 24 mg/day of bup/nx for 9 weeks followed by a taper off the medication during weeks 10–12. DETOX participants were started on a maximum dose of up to 14 mg/day of bup/nx, followed immediately by a gradual taper off the medication during weeks 1–2, such that they were completed detoxified by day 14. In addition, participants in both groups were scheduled to receive standardized individual and group drug counseling weekly, with more frequent sessions if needed (www.nida.nih.gov/txmanuals/idca/idca1.html). Only 23 participants (15%) opted for extra sessions (12 had 1, 6 had 2, and 5 had 3 or more). The counseling focused on reducing drug use and relapse prevention (eg, providing education about addiction, promoting positive relationships, learning how to tolerate stressful events, developing ways to avoid drug using situations), but they did not directly address HIV risk reduction.

Measures

At each visit, HIV drug and sex risk behavior in the past 30 days was assessed using the Risk Behavior Survey, an interviewer-administered survey used widely in CTN studies.[47] The following behaviors were modeled as binary outcomes (yes/no): self-report of any opioid use, IDU, injection risk (eg, using dirty needles, sharing equipment, splitting drug solution), sexual activity (ie, vaginal or anal intercourse), multiple partners (ie, ≥2 sex partners), and unprotected intercourse (ie, noncondom use). Although opioid use and sexual activity are not necessarily HIV risk behaviors perse, they are a prerequisite for engaging in injection and sex

risk behaviors associated with HIV infection. The CTN Baseline Demographics Form collected information about substance use in the past month (days) and lifetime (years).

Data Analysis

First, prevalence of HIV risk behaviors was examined at baseline and weeks 4, 8, and 12, with gender comparisons made at each occasion using χ^2 tests. Next, longitudinal changes in drug and sexual behaviors were examined over time using the generalized estimating equations (GEE) method. Specifically, a logistic regression model was fit to the repeated binary outcomes to examine predictors of change in these behaviors over the course of treatment. This model, fitted using the GEE approach, assumed a compound symmetry correlation structure to account for the correlation among repeated measures over time; the reported standard errors were based on the so-called "empirical" variance estimator. The GEE analysis allows for missing data, so all available data for each study visit were included. A sequence of models was fit in a hierarchical manner with variables entered in the following blocks: (1) condition, time, and gender; (2) condition by time interaction, and (3) condition by time by gender interaction. Other 2-way interactions were included in the models but are not reported. For opioid use, the GEE analysis modeled drug use at weeks 4, 8, and 12 follow-up visits; the pretreatment visit could not be included because all participants had used opioids in the past month (ie, there was no variation in the baseline measure). For all other behaviors, the pretreatment visit was included as the baseline comparison. For drug behaviors, data from weeks 4 and 8 were modeled as a single intermediate visit reflecting behavior at midtreatment (ie, average IDU and injection risk); the rationale for doing so was the sparseness of data at week 8 when stratified by gender (eg, no females in BUP injected drugs). For sexual behaviors, all 4 visits were included. Analyses were conducted using SPSS 17.0.

RESULTS

Participant Characteristics

The sample included 61 females and 89 males. Participants were 15–21 years old (M = 19.15, SD = 1.49) and primarily (72%) white. The mean education was 11.21 years (SD = 1.60), and approximately three quarters (73%) were currently employed. As shown in Table 1, there were no gender differences on demographic variables. Females and males also had similar histories of substance use, except females had used cocaine for more years (1.08 vs. 0.47; $P < 0.05$). There were no significant gender differences in days of substance use in the month before baseline.

Baseline HIV Risk Behaviors

Table 2 shows the past-month prevalence of HIV risk behaviors by gender over time. At baseline, all participants had used opioids (as per inclusion criteria); nearly half reported IDU, with no difference by gender. Females were significantly more likely to report injection risk (77% vs. 35%, $P < .001$). Specifically, they were more likely to share a cooker, cotton, or rinse water (52% vs. 20%; $P = 0.005$) and to fix drugs and split the solution with someone else (52% vs. 20%; $P = 0.005$) but no more likely to use works after someone else (39% vs. 30%; $P = 0.44$).

TABLE 1. Participant Characteristics at Baseline by Gender

	Females, n = 61	Males, n = 89	Test of Difference
Age, M (SD)	19.18 (1.52)	19.13 (1.48)	t (148) = 0.183
Race, n (%)			
White	44 (72.1%)	64 (71.9%)	χ^2 (1) = 0.001
Other	17 (27.9%)	25 (28.1%)	
Years of education, M (SD)	11.30 (1.64)	11.15 (1.56)	t (148) = 0.563
Occupational status, n (%)			
In school	11 (18.0%)	13 (14.6%)	χ^2 (2) = 0.352
Working	44 (72.1%)	66 (74.2%)	
Unemployed	6 (9.8%)	10 (11.2%)	
Years of substance use, M (SD)			
Heroin	1.85 (1.73)	1.46 (1.52)	t (147) = 1.454
Methadone	0.07 (0.32)	0.24 (1.22)	t (147) = 1.055
Other opioid	1.48 (1.94)	1.49 (1.76)	t (147) = 0.036
Marijuana	3.55 (2.87)	4.10 (2.87)	t (147) = 1.150
Cocaine	1.08 (1.97)	0.47 (1.08)	t (147) = 2.440*
Alcohol	0.92 (1.70)	0.91 (1.83)	t (147) = 0.022
Days of substance use (past month), M (SD)			
Heroin	20.25 (12.75)	18.33 (13.44)	t (147) = 0.875
Methadone	1.67 (4.92)	1.45 (4.16)	t (147) = 0.290
Other opioid	9.05 (12.18)	10.62 (12.80)	t (147) = 0.752
Marijuana	8.90 (11.48)	10.15 (11.78)	t (147) = 0.640
Cocaine	3.16 (6.54)	1.70 (4.10)	t (147) = 1.690
Alcohol	0.60 (1.90)	0.83 (2.39)	t (147) = 0.627
Hepatitis C infection, n (%)	11 (18.0%)	16 (18.2%)†	χ^2 (1) = 0.001

*$P < 0.05$.
†One person had missing data.

At baseline, the majority of participants (77%) were sexually active in the past month. Among the sexually active, 20% had multiple partners and 66% engaged in unprotected intercourse. There were no significant gender differences in these sexual behaviors at any time point, except that significantly more males than females reported multiple sex partners at week 4 (31% vs. 8%, $P = .01$) and week 8 (29% vs. 10%, $P = .05$).

Changes in Drug and Sexual Behaviors

Table 3 presents the results of the GEE analyses predicting changes in drug behaviors over the course of treatment. As reported in the main outcome article,[41] there was a significant overall reduction in opioid use from 100% at baseline to 71%, 49%, and 57% at weeks 4, 8, and 12, respectively ($P < 0.001$). At each follow-up visit, BUP patients were less likely than DETOX patients to have used opioids ($P < 0.001$). For example, at week 8 (before the taper), 33% of BUP patients had used opioids compared with 67% of DETOX patients. There was no gender difference in opioid use over the course of treatment.

For IDU, there were significant effects for time, condition by time, and condition by time by gender. This means that, compared with baseline, the rate of IDU decreased

TABLE 2. Percent of Females and Males Engaging in Past Month HIV Risk Behaviors Over the Course of Treatment

	Baseline				Week 4 Follow-up			
	Female, n = 61, %	Male, n = 90, %	$\chi^2(1)$	*P*	Female, n = 50, %	Male, n = 77, %	$\chi^2(1)$	*P*
Drug behaviors								
Opioid use	100.0	100.0	0.00	1.00	64.0	76.7	2.38	0.12
IDU	50.8	44.9	0.50	0.48	30.0	31.2	0.02	0.90
Injection risk*	**77.4**	**35.0**	**12.63**	**<0.001**	53.3	29.2	2.28	0.13
Sexual behaviors								
Sexual activity	82.0	74.2	1.26	0.26	72.0	63.6	0.96	0.33
Multiple partners†	14.0	24.2	1.88	0.17	**8.3**	**30.6**	**6.17**	**0.01**
Noncondom use†	68.0	64.5	0.15	0.70	60.0	66.7	0.39	0.53

	Week 8 Follow-up				Week 12 Follow-up			
	Female, n = 44, %	Male, n = 68, %	$\chi^2(1)$	*P*	Female, n = 40, %	Male, n = 61, %	$\chi^2(1)$	*P*
Drug behaviors								
Opioid use	45.5	51.5	0.39	0.53	55.0	58.7	0.14	0.71
IDU	15.9	20.9	0.43	0.51	27.5	22.2	0.37	0.54
Injection risk*	42.9	35.7	0.10	0.75	45.5	14.3	2.97	0.09
Sexual behaviors								
Sexual activity	68.2	60.3	0.72	0.40	82.5	67.2	2.88	0.09
Multiple partners†	**10.0**	**29.3**	**3.86**	**0.05**	9.1	22.0	2.23	0.14
Noncondom use†	60.0	61.0	0.01	0.93	69.7	65.0	0.18	0.67

*Among participants who injected drugs (eg, using dirty needles, sharing injection equipment, slitting drug solution).
†Among participants who were sexually active.

over the course of treatment in both conditions ($P < 0.001$), but the decrease was significantly greater in BUP versus DETOX patients ($P = 0.03$). For example, at week 8, 9% of BUP patients compared with 30% of DETOX patients had injected drugs. Furthermore, the effect of condition differed by gender ($P = 0.02$). Figure 1 illustrates this 3-way interaction effect, suggesting that the benefit of BUP in terms of reducing the relative risk of IDU was greater for females than males. This effect was driven primarily by changes from baseline to midtreatment (Wald χ^2 (1) = 5.49, $P = 0.02$) rather than changes from baseline to post-treatment when bup/nx had been tapered in both conditions (Wald $\chi^2(1) = 0.06$, $P = 0.81$). Among all injectors, however, there was no significant reduction in injection risk over time or by condition. For participants who continued to inject drugs, the odds of engaging in injection risk behavior did not decrease for either gender, but female injectors had a significantly higher overall rate of injection risk behavior compared with male injectors ($P = 0.001$).

Table 3 also shows the results of parallel GEE analyses predicting change in sexual behavior. Over the course of treatment, there was a significant reduction in sexual activity for all participants ($P = 0.008$). At baseline, 77% were sexually active, compared with 67%, 63%, and 73% at weeks 4, 8, and

TABLE 3. GEE Analyses Predicting Drug and Sexual Behaviors

	Opioid Use*		Injection Drug Use†		Injection Risk†		Sexual Activity‡		Multiple Partners‡		Non-Condom Use‡	
	Wald χ^2	*P*	Wald χ^2	*P*	Wald χ^2	*P*	Wald χ^2	*P*	Wald χ^2	*P*	Wald χ^2	*P*
Step 1												
Condition	**16.74**	**<0.001**	3.56	0.06	1.10	0.30	0.34	0.56	0.14	0.71	1.87	0.17
Time	**25.76**	**<0.001**	**34.30**	**<0.001**	5.05	0.08	**11.76**	**0.008**	0.90	0.83	2.22	0.53
Gender	1.23	0.27	0.09	0.77	**10.60**	**0.001**	2.45	0.12	**7.61**	**0.006**	0.002	0.97
Step 2												
Condition*Time	0.25	0.88	**6.83**	**0.03**	0.93	0.63	6.49	0.09	2.18	0.54	3.88	0.28
Step 3												
Condition*Time*Gender	0.19	0.91	**7.61**	**0.02**	2.90	0.24	0.86	0.84	7.24	0.07	4.46	0.22

All 2-way interactions were included in the analysis but are not shown here.
*Time points = week 4 (early/mid), week 8 (late/mid), and week 12 (post).
†Time points = week 0 (pre), week 4/8 (mid), and week 12 (post).
‡Time points = week 0 (pre), week 4 (early/mid), week 8 (late/mid), and week 12 (post).

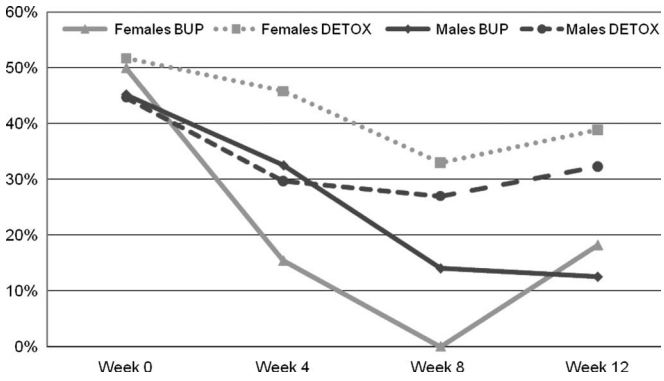

FIGURE 1. Percent of participants who injected drugs in the past month by condition and gender over the course of treatment.

12, respectively; there was no effect of condition or gender. Among sexually active participants, males were more likely than females to have multiple partners ($P = .006$). There was no change in the rate of multiple partners over time or by condition. Engagement in unprotected intercourse was unrelated to gender, time, or condition.

DISCUSSION

This is the first study to report on gender differences in HIV risk behaviors among opioid-dependent youth receiving outpatient bup/nx treatment and to examine changes in drug and sexual behaviors as a function of gender and treatment. The majority of males and females in this sample reported 1 or more HIV risk behaviors in the month before treatment, including injection risk (eg, sharing needles, splitting drug solution), unprotected intercourse, and multiple sex partners. These behaviors place opioid-dependent youth at high risk for infection with HIV and other diseases. This is especially alarming given that 18% of this sample were seropositive for hepatitis C virus at baseline and 4 of the 83 participants (5%) who were seronegative at baseline converted to seropositive status by week 12.[41]

Over the course of treatment, there were significant reductions in opioid use and IDU in both treatment conditions, but these reductions were greater for participants in BUP. By the end of treatment, only 15% of BUP participants were injecting compared with 35% of DETOX participants. This finding of decreased opioid use and IDU associated with bup/nx treatment is consistent with previous trials conducted among adults[10,40,43] and adolescents.[46] Given that opioid-dependent youth are at such high risk for relapse to drug use,[48] these results provide further support that bup/nx treatment is a safe and effective option that should be considered. However, among participants who continued to inject drugs, there was no reduction in injection risk over time. This suggests that extended BUP alone maybe insufficient for stopping behavioral risk among persistent drug injectors.

Although males and females were equally likely to be injectors, females were significantly more likely to engage in injection risk behavior. For example, in the month before enrollment, 77% of female injectors compared with 35% of male injectors reported injection risk. Specifically, females were more likely to share a cooker, cotton, or rinse water and to fix drugs together and split the solution. These types of injection risk behaviors may be an increasingly important route of HIV and hepatitis C transmission.[49] Although further research is needed to better understand this gender difference, studies with adult injectors suggest that intimate partnerships may play a role. Women are more likely than men to attribute their initiation to and continued use of heroin to social reasons, particularly the influence of an opioid-using partner.[50–52] Furthermore, the primary reason injectors report sharing equipment is the use of drugs with sex partners.[52–54] Qualitative and social network research with young drug users may help elucidate the interpersonal dynamic and context associated with injection risk in females.

Interestingly, females responded particularly well to extended BUP. Females in BUP had larger declines in IDU compared with females in DETOX, whereas males in both groups showed only modest declines. The cause of this gender difference is unclear, but it cannot be explained by reductions in opioid use, as no gender difference in opioid use was observed. Due to social and economic disparities, women may be more likely to depend upon male partners to obtain drugs, perpetuating a pattern of using, injecting, and sharing drugs with them. Young females may be particularly vulnerable to such dependency. The physiological benefits of extended BUP may, for some females, weaken this dependency, allowing them to change their patterns of drug use, including less IDU. Future research should test this and other potential explanations.

In terms of sexual risk, males and females were equally likely to be sexually active and not use condoms, but males were more likely to have multiple partners. This gender difference is consistent with nationally representative surveys of adolescents and young adults.[55,56] Having multiple sex partners, particularly concurrent partners, is associated with sexually transmitted infections,[57,58] and this subgroup of young males with multiple sex partners may play an important role in the transmission of HIV and other infections among drug-using youth.

As in other studies of treatment-seeking opioid abusers,[43,59] there was a slight drop in the rate of sexual activity during treatment. It is unclear from our results whether this was a deliberate attempt by participants to reduce their sexual activity or a reflection of their increased focus on recovery during the early part of treatment. This change was not sustained, however, as the rate of sexual activity returned to nearly baseline levels by the end of treatment. More importantly, there was no change in the rate of multiple partners or unprotected intercourse. Many other studies have found that drug treatment is not associated with reductions in sex risk behaviors.[10,43,46,60] Thus, bup/nx and other treatments seem to have greater impact on drug risk and may be insufficient for promoting sex risk reduction.

Although BUP is an important component of HIV prevention for opioid-dependent youth, additional risk reduction counseling may be needed to promote greater decreases in both drug and sex risk behaviors. In one of the only randomized controlled trials to target drug-using

adolescents, St Lawrence et al[61] tested a 12-session group treatment based on the Information-Behavior-Motivation Model among 161 adolescents in residential treatment. Compared with participants in the information only condition, participants who received both information and behavioral skills components had greater increases in condom use and sexual abstinence. Among adolescents in general, theoretically based group interventions that are tailored to meet the needs of specific subgroups of adolescents can effectively increase condom use and reduce number of sex partners.[62]

To the best of our knowledge, no interventions have been developed to reduce injection drug risk among adolescents, though many trials have included adolescents and young adults. For example, early in the HIV epidemic, Des Jarlais et al[63] tested the effects of a 4-session intervention based on Social Learning Theory among heroin sniffers with a mean age of 27 years. Participants who were randomized to the intervention rather than the control group were less likely to transition to IDU. Comprehensive reviews of the adult literature suggest that interventions can effectively reduce both drug and sex risk behaviors among IDUs.[64–66] Successful programs have been theory based and include the following components: HIV/AIDS education; assessment of personal risk and responsibility; behavioral skills training in safer sex and drug behaviors; development of intrapersonal skills (eg, problem solving); reinforcement of positive changes; and discussion of practical and emotional issues related to HIV risk reduction.[64] Thus, youth receiving bup/nx or other pharmacological treatments for opioid dependence may benefit from multicomponent HIV prevention services that include cognitive-affective-behavioral skills training delivered in group formats. Clinical trials are needed to test the effectiveness of such programs among youth receiving psychopharmacological treatment.

Several limitations of this study should be noted. First, the sample size was modest, although this is the largest randomized clinical trial of bup/nx treatment for adolescents conducted to date. It is also the first to examine gender differences in and the effects of bup/nx treatment on HIV risk among opioid-dependent youth. Second, the follow-up rate was 67%, but there was no difference by treatment condition or gender, and participants who completed the week-12 assessment did not differ from those who did not on baseline demographic characteristics, substance abuse, and HIV risk behavior. Third, no HIV testing was performed and self-reported HIV risk data are subject to response bias. However, the latter remains the standard assessment method for obtaining personal data, and other studies of substance abusers have documented test–retest reliability and predictive validity of self-reported sexual and drug use behaviors.[67,68] Finally, although the use of a convenience sample of treatment-seeking volunteers raises the possibility of selection bias, the multisite design of this study attempts to improve generalizability. Yet, results may not generalize to adolescents who are not seeking addiction treatment or are unwilling to participate in a clinical trial.

CONCLUSIONS

Most opioid-dependent youth in this study engaged in 1 or more drug and sex risk behaviors that place them at heightened risk for HIV, hepatitis C, and other infectious diseases. This is particularly concerning in light of the growing HIV epidemic among youth in the United States.[5] Gender differences were evident, with females engaging in higher rates of injection risk behavior and males being more likely to have multiple sex partners. Extended BUP was associated with significantly greater reductions in opioid use and IDU, and it should be considered as a safe and effective treatment option for opioid-dependent youth. However, it seems that adjunctive risk reduction counseling may be needed to promote greater decreases in injection and sex risk behaviors. Additional studies are warranted to determine the optimal length of bup/nx treatment and to identify effective behavioral risk reduction interventions for opioid-dependent youth that can be combined with extended bup/nx treatment and drug counseling.

ACKNOWLEDGMENTS

We thank the staff and participants at the community treatment programs and the regional research and training centers of the National Institute on Drug Abuse Clinical Trials Network for their involvement in this project, including Mountain Manor Treatment Program (Mid-Atlantic Node), Duke Addictions Program (North Carolina Node), Mercy Hospital (Northern New England Node), Addiction and Substance Abuse Program (Southwest Node), and Brandywine Treatment Center (Delaware Valley Node). We also thank the staff of the Clinical Coordinating Centers (Michele Strauss, National Institute on Drug Abuse CCC and Christopher Bertz, CCRA), the Data and Statistics Center (Duke Clinical Research Institute), and the Center for the Clinical Trials Network at the National Institute on Drug Abuse for their work on this project. Finally, we acknowledge Karen Dugosh, PhD, and Kevin Lynch, PhD, for their analysis of the primary outcomes.

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