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Reducing HIV and partner violence risk among women with criminal justice system involvement: A randomized controlled trial of two Motivational Interviewing-based interventions

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Abstract

Women with histories of incarceration show high levels of risk for HIV and intimate partner violence (IPV). This randomized controlled trial with women at risk for HIV who had recent criminal justice system involvement (n=530) evaluated two interventions based on Motivational Interviewing to reduce either HIV risk or HIV and IPV risk. Baseline and 3, 6, and 9-month follow-up assessments measured unprotected intercourse, needle sharing, and IPV. Generalized estimating equations revealed that the intervention groups had significant decreases in unprotected intercourse and needle sharing, and significantly greater reductions in the odds and incidence rates of unprotected intercourse compared to the control group. No significant differences were found in changes in IPV over time between the HIV and IPV group and the control group. Motivational Interviewing-based HIV prevention interventions delivered by county health department staff appear helpful in reducing HIV risk behavior for this population.

Keywords

randomized controlled trial; intervention; HIV prevention; partner violence; Motivational Interviewing; incarceration; criminal justice

INTRODUCTION

Women involved in the corrections system are at elevated risk for HIV. The prevalence of HIV is higher among female inmates (3%) than among male inmates (2.5%) (Hammett et al., 2002), and in 1999, an estimated 16% of all women living with HIV in the United States had been released from a correctional facility (Hammett and Drachman-Jones, 2006). Further, the U.S. Department of Justice reports that 30% of women in local jails or state prisons have been incarcerated for drug-related offenses (Greenfeld and Snell, 2000;

Harrison and Beck, 2006). Such offenses include injection drug use, crack use, and sex exchange -- behaviors known to increase women's risk of exposure to HIV and other sexually transmitted infections (STIs).

Clearly, the corrections system provides an opportunity to reach many women at high risk for HIV. Establishing interventions for inmates is often difficult, as the majority of inmates are in county and city jails where short stays are common (Hammitt et al., 2001). However, as Belenko and colleagues point out, HIV prevention interventions can be provided to formerly incarcerated people at risk for HIV by collaborating with community justice programs such as parole and probation departments (Belenko et al., 2004).

On release from incarceration, women often have limited resources to establish or re-establish life stability (Grella and Greenwell, 2007), with incarceration often having precipitated the loss of employment and housing (Richie, 2001). A number of other health and social problems are faced by women at high risk for HIV and women involved in the corrections system, including drug use, hepatitis C, STIs, mental health concerns, and economic impoverishment (Logan et al., 2002; O'Leary and Jemmott, 1995; Wallace, 1988; Whyte IV, 2006). Thus, women recently released from incarceration may face multiple concerns that can overwhelm the subjective importance of protecting oneself from HIV (Latkin and Knowlton, 2005).

Violence is particularly prevalent among women involved in the criminal justice system. The U.S. Bureau of Justice Statistics reported in 1999 that 44% of women under correctional authority indicated lifetime physical or sexual assault (Greenfeld et al., 2000). Among women with HIV risk in post-incarceration community settings, the estimated lifetime prevalence of physical abuse approaches 70% or more, and lifetime sexual abuse ranges from approximately 40 to 65% (Harris et al., 2003; Wilson-Cohn et al., 2002).

Violence is an important contributor to HIV risk among women. Violence and the threat of violence can limit a woman's control over when she will engage in sexual behavior and with what risk (Cohen et al., 2000; Cunningham et al., 1994; El-Bassel et al., 1998). For example, women who attempt to negotiate condom use with intimate partners may be coerced into unprotected sex, threatened with violence, or physically or sexually assaulted (El-Bassel et al., 2005; Gielen et al., 2002; Kalichman et al., 1998; Koenig and Moore, 2000; Saul et al., 2004; Wingood and DiClemente, 1997).

Violence is also related to HIV drug risk behavior. Recent research (El-Bassel et al., 2005) confirms that IPV can lead to increased drug use, and vice-versa. In injection drug-using sexual dyads, gender inequality may manifest itself through male control of the logistics of injection (Bourgois et al., 2004). As a result, women are often 'second on the needle,' elevating their risk of HIV infection (Harvey et al., 1998; Rhodes et al., 2005).

Because of the interrelationships between violence and HIV, interventions that incorporate HIV and IPV prevention may have synergistic effects on both types of risk. To date, there has only been one published intervention that simultaneously addressed IPV and HIV risk. In their pilot study with 34 women on methadone, Gilbert and colleagues (Gilbert et al., 2006) found that participating in group sessions to reduce drug use and improve relationship safety was associated with reductions in minor and severe psychological IPV and minor physical and sexual IPV. In their review of studies on HIV/AIDS and IPV, Gielen and colleagues (Gielen et al., 2007) were able to find no other trials that simultaneously addressed HIV and IPV among women at-risk for HIV.

One approach to address both HIV and IPV among women with criminal justice system involvement is Motivational Interviewing (MI) (Miller and Rollnick, 2002; Rollnick and

Miller, 1995). Motivationally-based interventions may reduce HIV risk by identifying the strengths these women evince and building upon their successes, thereby countering experiences and perceptions of limited power in relation to sex and drug-using partners. MI is both directive in that the interventionist guides conversation with the participant toward specific topics, and client-centered in that the client's experiences, views, and reluctance or readiness to change are central topics of discussion. Interventionists employ feedback to help participants notice the discrepancy between participants' current actions and actions participants wish to take. Interventionists offer empathic listening to participants while supporting their self-efficacy and assisting them in resolving their ambivalence regarding current behaviors and regarding behavior change.

Motivational Interviewing and its brief adaptations, often described as Motivational Enhancement (ME), have been demonstrated to facilitate HIV preventive behavior in a number of studies. For example, in comparing a brief intervention testing a combination of ME and skills training against an education-only condition, Belcher and colleagues (Belcher et al., 1998) found that this intervention facilitated reductions in the sexual risk behavior of low-income urban women. Carey et al. (Carey et al., 1997) observed benefits with a similar population in a test of a group-based intervention involving ME and skills training. In an intervention study with men who have sex with men (MSM), results indicated that that brief ME interventions facilitated reductions of sexual risk behavior (Picciano et al., 2001). Koblin et al. (Koblin et al., 2004) found in the multi-city Project EXPLORE that a 10-session intervention based in part on ME principles brought about reductions both in self-reports of sexual risk behavior and in HIV seroconversion.

Because of its focus on the resolution of ambivalence, the MI framework may also hold value in working with women who experience partner violence. Clients in an MI approach are invited to identify the potential costs and benefits of various courses of action, including costs and benefits of maintaining their current status quo. Clients are asked non-judgmentally how ready they are to move toward new courses of action, reasons for their readiness, and reasons for their reluctance (Rollnick and Miller, 1995). Typically women in violent relationships are not the perpetrators of violent behavior, but often their interest in self-protection has formed a basis for their contact with intervention programs. Such women often describe their relationships in ambivalent terms; for example, they express two-sidedness toward leaving their relationship or remaining in it (Panchanadeswaran and McCloskey, 2007; Wahab, 2005). Feelings of anxiety and attributions of self-blame may also coexist with women's thoughts of leaving violent relationships (Landenburger, 1989). It is reasonable to expect, then, that an effective intervention framework for women facing partner violence could be an approach such as MI which supports women to identify and resolve mixed feelings about these relationships. Additionally, the client-centered nature of MI means that interventionists call clients' attention to the successful steps clients take toward their own well-being. This is intended to facilitate a sense of self-efficacy among clients (Miller et al., 2002). Thus it is reasonable to expect an MI-based approach could help women facing partner violence to feel more capable of protecting themselves. To date, however, there are no reported findings of randomized trials to test the effectiveness of MI-based interventions for the prevention of partner violence.

This randomized controlled trial, the Portland Women's Health Study, tests two behavioral interventions based on MI among recently incarcerated women at risk for HIV. The first intervention entails motivational enhancement for HIV risk reduction and for addressing life stability issues. The second intervention entails motivational enhancement for HIV risk reduction, for the reduction of exposures to IPV, and for addressing life stability issues. This study compares the effects of these two interventions on HIV sex risk behaviors, HIV drug

risk behaviors, and IPV, compared to the standard HIV counseling and testing services offered by a local county health department.

METHODS

Study sample and recruitment

From November 2001 through January 2004, 530 women were enrolled in the study. Eligibility criteria included (1) being at least 18 years of age, (2) having been incarcerated in the past year or currently being on parole or probation, and (3) engaging in HIV risk behavior in the past year (i.e., injection drug use, crack use, intercourse with a male injection drug user, sex exchange, or sex with ten or more partners). Women were excluded who had a diagnosis of HIV infection, were unable to provide voluntary informed consent, had been homeless for three or more months at the time of the screening, or were at high risk of future homelessness.¹

Methods of participant recruitment varied by setting. Women in jail were informed of the study through face-to-face contact or fliers; women on parole or probation were informed through referral from their parole or probation officers, fliers, and mailings to their home addresses; and women in the community were informed through fliers and word-of-mouth. Screening and enrollment took place at the offices of the Multnomah County HIV Prevention Program. None of the women were incarcerated at screening. Of 3,024 women screened, 2,290 (76%) were ineligible (see Figure 1). Ineligible women did not meet one or more of the eligibility criteria regarding recent criminal justice system involvement (70%), HIV risk (58%), housing stability (10%), ability to give informed consent (9%), HIV serostatus (2%), and/or age (1%). Of the 734 women eligible for study participation, 78% consented to participate in the study. Of those who consented to participate, 92% returned to enroll in the study.

Interventions

Participants were randomized into (1) a control group, (2) an HIV risk reduction intervention group, or (3) an HIV and IPV (HIV/IPV) risk reduction intervention group. The randomization list consisted of equal numbers of group assignments randomly ordered by computer within blocks of 30. Group assignment was not revealed until the participant's study ID number was entered into an encrypted database program. Participants in all groups received counseling and testing for HIV, hepatitis C, and STDs, as well as a handbook of services available in the community.

Participants in the intervention groups also participated in up to twelve (mean = 4.7; range = 0–12) intervention sessions over three months, with 23.4% completing one or no sessions and 24.5% completing eight or more sessions. There was no significant difference in the number of sessions completed by the HIV group (mean = 4.8) versus the HIV and IPV group (mean = 4.5). The one-on-one intervention sessions were conducted by staff trained in ME. In both intervention groups there were four components that addressed HIV risk behavior. First, recent episodes of substance use and sexual activity were identified using the Timeline Followback (TLFB) calendar method (Sobell et al., 1996), which may increase self-perceived risk for HIV infection (Weinhardt et al., 2000). Second, the participant discussed her self-assessed risk for HIV, STIs, and hepatitis C. Third, the participant completed an assessment of readiness to address risk. Fourth, the interventionist lead stage-

¹Women who were chronically homeless or at high risk for future homelessness were excluded because of the likelihood of limited intervention effectiveness and poor subject retention. Specifically, women currently housed were excluded if they had been homeless for three or more of the past six months and could not identify a future residence. Women who were currently homeless were excluded if they had been homeless for three or more of the past six months or could not identify a specific, future residence.

based discussions addressing ambivalence about behavior change, plans of action, or maintenance of behavior change (Prochaska et al., 1994). Participants in both intervention groups were also given the opportunity to discuss life stability concerns, such as food, housing, legal issues, education, and employment. Life stability concerns were identified using a checklist and addressed through an assessment of readiness to address concerns and stage-based discussions. In the HIV/IPV group, IPV risk was also addressed, using a similar approach as that used for HIV risk behavior.

Interventionists were hired as community health specialists, a non-professional employment position within the Multnomah County Health Department. Three had completed a bachelor's degree and one, a master's; none was a trained counselor. Study interventionists were hired partly on the basis of their competence as reflective listeners as observed during an interview role-play and their experience working with marginalized populations of women. Interventionists received approximately 65 hours of initial training from senior research staff regarding MI and the ME interventions. During the intervention phase, interventionists met monthly with a project consultant who was a member of the Motivational Interviewing Network of Trainers (MINT) for group trainings and consultations and for individual performance reviews.

All intervention sessions (n = 1,658) were audiotaped. The trainer evaluated intervention fidelity by coding 208 randomly selected tapes using the Motivational Interviewing Skill Code (Miller, 2000). All interventionists surpassed standard threshold proficiency levels on all five dimensions of MI (acceptance, egalitarianism, empathy, genuineness, warmth, and spirit) and surpassed ideal (90%) levels of MI consistency in their behavioral utterances during intervention sessions. Finally, an average of 78% of expected intervention components (e.g., summarizing the HIV component of the session, or conducting the partner violence risk self-assessment) was addressed during each reviewed intervention session. Thus the evaluation by the trainer provides strong evidence that staff delivered the interventions with fidelity.

Assessments

Assessment interviews were conducted at study entry and at approximately three, six, and nine months thereafter. Prior to each assessment, a TLFB interview was administered to cue memory of risk behaviors and experiences of violence in the last 30 days and to reduce the potential for reporting bias among the groups. The primary assessment questionnaire addressed sociodemographics, relationships, drug use, sexual behavior, psychological and social well-being, criminal justice involvement, and social service utilization. The TLFB and assessment lasted an average of 1.5 to 2 hours. The first 293 participants (55%) received interviewer-administered paper-and-pencil questionnaires; the remainder completed audio computer-assisted self-interviews (ACASI).² While all intervention staff also conducted assessments, no staff member conducted interventions and assessments with the same participant.

Assessments were completed by 74% of participants at the three-month assessment, 74% at the six-month assessment, and 84% at the nine-month assessment. There were no significant differences in completion of follow-up assessments by group (see Figure 1 for follow-up rates by group). Of the 1,227 follow-up interviews, 33 were conducted in jail or prison, 15 via telephone, and the remainder at the project site. There were no significant differences

²ACASI was implemented to reduce costs and staff time associated with interview administration and data entry. One participant who received a baseline interviewer-administered baseline received an ACASI at one follow-up. Twelve participants who received baseline ACASI received an interviewer-administered follow-up assessment; eleven of these interviews were conducted in jail or prison where ACASI was not feasible.

among participants who did not complete each follow-up assessment in regards to any baseline variables examined. As incentive and compensation, participants received store gift cards for all phases of study participation, including screening (\$20) biological testing (\$25), each intervention session (\$15), each assessment (\$25-\$50), and maintaining contact between assessments (\$10-\$15).

Measurement

Socio-demographics—Socio-demographic questions addressed age, race/ethnicity, educational attainment, marital status, current main partner status, and criminal justice system involvement. Main partner status was assessed with the question, “Do you currently have a main partner? By main partner I mean someone that you have had sex with, and that you feel committed to above anyone else.” Any arrest or incarceration in the last three months or in the last twelve months was based on self-report or incarceration at time of assessment.

HIV risk behaviors—Questions from the Risk Behavior Assessment (RBA) questionnaire of the NIDA National AIDS Demonstration Research Cooperative Agreement were adapted to measure recent alcohol and drug use, history of injection drug use, and recent sexual risk behavior. These measures have previously been shown to be reliable and valid with a predominately male population of out-of-treatment crack cocaine and injection drug users (Needle et al., 1995; Weatherby et al., 1994). Differences from the RBA questions included minor changes in phrasing and the separate assessment of sexual behavior with main partners and with other individuals. The two sexual risk behavior outcomes included any unprotected intercourse (i.e., vaginal or anal intercourse without a condom) in the last 30 days and number of episodes of unprotected intercourse in the last 30 days. The two drug risk behavior outcomes were any injections with a shared needle (i.e., injection drug use with a needle used by somebody else before) in the last 30 days and number of episodes of injecting with a shared needle in the last 30 days.

For assessments, missing data on sexual risk behavior (n=19) or drug use behavior (n=7), the 30-day calendar instrument from the supplemental Timeline Followback interview was reviewed to replace the missing data. This calendar, which covered the same 30-day timeframe as the main assessment instrument, documented the occurrence of substance use, injecting with a shared needle, and unprotected intercourse.

Violence—A modified version of the Revised Conflict Tactics Scale (CST2) (Straus et al., 1996) was used to measure minor or severe sexual coercion, injury, and physical assault experienced by the participant. Separate questions addressed violence from a current main partner and from others; the other perpetrators’ relationships to the participant were also identified. Any sexual coercion, injury, or physical assault perpetrated by a current main partner or a current or former sex partner (but not a sex customer) was categorized as IPV. The primary violence outcome was any IPV in the last three months.

Life stability—Measures of housing stability, income, and schooling or employment were used to characterize participants’ life stability. Participants living in a house or apartment that they considered to be theirs alone or in conjunction with others were categorized as stably housed, and all other participants were categorized as unstably housed. Participants’ average monthly income over the last three months was dichotomized as \$300 or less or more than \$300. Participants who were currently in school or who received income from a job were categorized as in school or employed.

Analysis

The primary analyses examine whether participants assigned to the intervention groups versus the control group have greater reductions at the follow-up assessments in the likelihood of any unprotected intercourse and any needle sharing and greater reductions in the number of episodes of unprotected intercourse and needle sharing. The primary analyses also examine whether participants assigned to the HIV/IPV group have greater reductions in the likelihood of having experienced IPV than participants assigned to the control group. Secondary analyses examine whether participation in either intervention group is associated with greater improvements in life stability. Data from all participants were included in these intention-to-treat primary and secondary analyses.

We first investigated potential baseline group differences in various characteristics. For these analyses, the Mantel-Hansel chi-square statistic in SPSS 15.0 (2006) was used for categorical variables, and the Wald statistic in the SAS 9.1.3 GENMOD procedure with a negative binomial link function (SAS Institute, 2005) was used for count variables.

Outcome analyses of changes in unprotected intercourse, needle sharing, violence, and life stability over time were conducted with generalized estimating equations (GEE) (population-average models) using the SAS 9.1.3 GLIMMIX procedure. These models take advantage of the multiple observations available through a repeated-measures design while accounting for within-participant correlations (Diggle et al., 2002). Within-participant correlations were fit through first-order autoregressive working covariance matrices, and standard errors were based on empirical (sandwich) estimators which are robust against misspecification of the covariance structure and adjust for small-sample bias (Diggle et al., 2002).

Dichotomous outcomes (i.e., any unprotected intercourse in the last 30 days, any injections with a shared needle in the last 30 days, any IPV in the last 3 months, current housing stability, monthly personal income, and currently in school or employed) were modeled as binomial distributions using a logit link function. Count outcomes (i.e., episodes of unprotected sex in the last 30 days and episodes of needle sharing in the last 30 days) were modeled as negative binomial distributions using a log link function. The negative binomial model is a standard generalization of the Poisson model which can better account for unobserved heterogeneity through the inclusion of an overdispersion parameter (Cameron and Trivedi, 1998).

As there were no significant differences at any assessment timepoint between the HIV group and the HIV/IPV group in regards to sexual risk behavior, drug risk behavior, and life stability (data not presented), both intervention groups were combined and contrasted with the control group. In analyses of IPV, the HIV/IPV group was contrasted with the control group.

Both unadjusted and adjusted models were fit for assessing changes in each dichotomous and count outcome variable. In the unadjusted models, we included dichotomous indicator variables for each follow-up assessment wave and the group contrast of interest. We also included interaction terms between each follow-up assessment wave and group contrast to test whether the change in risk behaviors between baseline and each follow-up assessment varied by group. Exponentiating the coefficients yielded odds ratios (ORs) for models with dichotomous outcomes and incidence rate ratios (IRRs) for models with count outcomes. The adjusted models contained all of the variables in the unadjusted models and also contained baseline covariates. The baseline covariates included mode of interview administration, education level, main partner status, health status, alcohol use, marijuana use, other drug use, and exchanging sex. As the ORs and IRRs for the group contrasts at

follow-up differed little between the adjusted and unadjusted models, only the results from the adjusted models are presented.

RESULTS

Table I presents baseline data on sociodemographics, criminal justice system involvement, drug use, sexual behavior, and life stability for participants by group assignment. Women of color composed 45% of the sample, and the mean age was 35.7 years ($SD = 8.8$; range = 18 – 62). At baseline, 62% had a main partner (95% male and 5% female or transgender), but few participants were currently married (10%). Over one-third (39%) had been incarcerated in the last three months and 82% had been incarcerated in the last year.

Among participants who used drugs other than marijuana at baseline, crack cocaine was most commonly used (39%), followed by amphetamines (38%), heroin (32%), and cocaine (27%). While 373 (71%) participants reported ever injecting drugs at baseline, only 83 (16%) reported injection drug use in the prior 30 days, and only 24 (5%) reported injecting with a shared needle in the prior 30 days. Unprotected intercourse in the last 30 days was reported by 47% of participants; 45% reported no intercourse, and 9% reported only protected intercourse. Exchanging sex in the last 30 days was reported by 13% of participants, and of those, 73% reported exchanging sex for money, 22% for drugs, 21% for housing, and 7% for food.

Unequal distributions of the baseline characteristics among the groups were examined for through tests of overall association and through comparisons of specific group contrasts used in the analyses. Level of education was significantly associated with group assignment ($p = 0.04$), with the HIV/IPV group having a higher level of education than the control group ($p = 0.01$). While the overall test assessing group differences in any unprotected intercourse in the last 30 days did not reach significance ($p = 0.09$), participants in the control group were less likely to have had any unprotected sex at baseline than participants in the intervention groups ($p = 0.04$). No significant group differences were found at baseline for number of episodes of unprotected sex in the last 30 days, for any needle sharing in the last 30 days, and any IPV in the last three months. Although number of episodes of needle sharing in the last 30 days did not reach significance for the overall group effect ($p = 0.06$), participants in the control group injected less frequently at baseline than participants in the intervention groups ($p = 0.048$).

Sexual risk behavior

Figure 2a shows that at each of the follow-up assessments, the proportion of participants reporting any unprotected intercourse in the last 30 days was lower than at baseline for the intervention groups and higher than at baseline for the control group. In the adjusted GEE model the odds of having any unprotected sex increased after baseline in the control group, with these changes reaching statistical significance at the 9-month follow-up (see Table II). For the intervention groups the odds of any unprotected intercourse were significantly lower at the 3 and 6-month follow-ups relative to baseline, but did not reach significance at the 9-month follow-up. Comparing the intervention groups to the control group, the odds of any unprotected intercourse were significantly higher for the intervention groups at baseline and significantly lower for the intervention groups at all three of the follow-up assessments. Assignment to an intervention group versus the control group was associated with a 45 to 54% greater reduction in the odds of any unprotected intercourse at the follow-up assessments.

The adjusted negative binomial GEE model of episodes of unprotected intercourse in the last 30 days revealed higher counts for the control group at the follow-up assessments that

reached significance at the 9-month follow-up, and lower counts for the intervention groups that reached significance at the 6-month assessment. Compared to the control group, the counts of unprotected intercourse decreased significantly more in the intervention groups at the 6 and 9-month assessments, and decreased more, though not significantly more ($p = 0.052$), at the 3-month assessment.

Drug risk behavior

The proportion of participants reporting any injections with a shared needle in the last 30 days was lower at follow-up than at baseline for the intervention groups and higher at follow-up than at baseline for the control group (see Figure 2b). In the adjusted logistic GEE model, the odds of any needle sharing for the control group were higher at the follow-up assessments than at baseline, although not significantly (see Table II). The wide confidence intervals for these odds ratios likely reflect the small number of control participants who reported any injections with a shared needle. For the intervention groups, the odds of any needle sharing relative to the baseline assessment decreased at each follow-up and reached significance at the 9-month follow-up assessment. There were no significant differences between the intervention and control groups in the odds of injecting with a shared needle in the prior 30 days at the baseline assessment, or in changes in these odds at the follow-up assessments. However, their general pattern is of note: over time, the intervention group, compared to the control group, showed greater reductions in needle sharing behavior, and this difference approached significance at the 9-month assessment ($p = 0.06$).

In a *post hoc* examination of this relationship, any injections with a shared needle in the last 30 days was modeled for each group as a linear function of assessment timepoint (i.e., with time as an interval predictor variable) in the adjusted model. For the control group, there was no significant change in the odds of injecting with a shared needle from one assessment to the next ($OR = 1.42$; 95% $CI = 0.71 - 2.82$), whereas for the intervention groups the odds significantly decreased at each subsequent assessment ($OR = 0.62$; 95% $CI = 0.39 - 0.99$). The difference between the slopes for the control and intervention groups approached significance ($p = 0.053$).

In the adjusted model of episodes of injecting with a shared needle, there were no significant changes after baseline for the control group. For the intervention group, the counts of needle sharing decreased during follow-up and reached significance at the 6 and 9-month assessments. In comparing the intervention and control groups, there were no significant differences in counts of needle sharing at baseline or in change in this behavior at any of the follow-up assessments. The pattern of change in IRRs over time in the frequency of injecting with a shared needle was similar to the change in the pattern of ORs over time in the analysis of any injections with a shared needle. In a *post hoc* analysis using the adjusted model with time as an interval variable, there was no significant change over time in the incident rate of injecting with a shared needle for the control group ($IRR = 1.18$; 95% $CI = 0.73 - 1.91$), but there was a significant drop at each subsequent assessment for the intervention groups ($IRR = 0.59$; 95% $CI = 0.43 - 0.81$). Furthermore, the difference between the slopes for the control and intervention groups was significant ($p = 0.02$).

Violence

The proportion of participants experiencing IPV in the last three months at each of the follow-up assessments was lower than the proportion at baseline for both the control and HIV/IPV intervention group (see Figure 2c). The adjusted GEE model reveals that for both the intervention groups and the control group the odds of experiencing any IPV were significantly lower at each of the follow-up assessments than at the baseline assessment (see Table II). However, there were no significant differences between the HIV/IPV group and

the control group in the reduction of IPV at any of the assessments. Additional analyses were conducted to examine the prevalence and incidence of violence from a current main partner in the last three months. These analyses (data not shown) also found no significant differences between the HIV/IPV and control groups in changes in these measures at any of the follow-up assessments.

Life stability

Life stability was evaluated through GEEs with the dichotomous outcomes of current stable housing, average monthly personal income in the last three months of at least \$300, and currently being in school or employed. The results of the analyses show significantly higher odds of each of these positive outcomes for each assessment as compared to baseline for both the control and intervention groups (data not shown). However, there were no significant differences between the intervention and control groups in changes in these outcomes at any follow-up assessment.

DISCUSSION

The major research finding of this trial is that compared to the control group, participants in the intervention groups had 45 to 54% greater reduction in the odds of any unprotected intercourse at the follow-up assessments. Similarly, the intervention groups showed a 35 to 42% greater reduction in the frequency of unprotected intercourse than the control group. These reductions in any unprotected intercourse and the frequency of unprotected intercourse were largely sustained during the nine months of follow-up.

The findings regarding drug risk behavior are somewhat equivocal. Significant decreases from baseline to the follow-up assessments in any needle sharing and episodes of needle sharing were seen for the intervention groups relative to the control group. However, while the odds and incidence rates were substantially lower for the intervention groups versus the control group at most of the follow-up assessments, the standard errors associated for these estimates were large and the *a priori* tests did not reach significance. The magnitude of the standard errors may largely be attributed to the limited number of participants who reported needle sharing—at each assessment, less than 18% reported injection drug use in the last 30 days and less than 5% reported needle sharing. Consequently, there was very limited power for detecting significant differences between the groups for even large effect sizes, such as those that are represented by the odds ratios and incidence rate ratios observed in this study.

As *post hoc* tests, modeling any needle sharing and the frequency of needle sharing as linear functions of time revealed that the differences between the intervention groups and the control group in the rates of change of these outcomes approached significance for any needle sharing and reached significance for frequency of needle sharing. While these observed reductions in needle sharing are consistent with an intervention effect, studies with larger sample sizes of active injectors will be needed to provide a more definite answer as to whether ME interventions can effectively reduce needle sharing among women with recent history of criminal justice involvement.

This study has negative findings regarding IPV and life stability. While the odds of experiencing IPV decreased significantly for the HIV/IPV intervention group, the same pattern was observed for the control group. There are several possible explanations for the lack of an intervention effect. First, the ME intervention was designed to address concerns within the control of its participants, and much of the conversation between participant and interventionist involves bringing the participant's attention to her own actions and decisions. With regard to IPV, there are aspects of prevention an individual exposed to this particular risk can control – such as safety planning – but she ultimately may not be able to control the

aggression itself. Proximal indicators of self-protection against partner violence such as the developing of safety plans, strengthening of ties with supportive others, or cultivation of financial resources outside the partner relationship were beyond the scope of this report. Although such intermediate outcomes are not partner violence, they are related to partner violence and may be responsive to an MI-based intervention approach (Wahab, 2005).

Second, debriefing sessions with the interventionists and earlier focus groups with women from the study population reveal that many women who experienced IPV (as objectively defined) did not consider such experiences as constituting IPV. For many participants violence was ubiquitous (in the three months before baseline, 31% experienced violence from an intimate partner and 19% from other than an intimate partner (Weir et al., 2008)), and such violence may have been experienced throughout their lives. Women inured by commonplace violence may come to accept IPV and thus do not see it as a problem in need of redress. De-normalizing relationship violence may be better achieved through group interventions that increase positive norms and build social support (Gilbert et al., 2006), community-wide educational campaigns about the nature of IPV, and, for this population, through IPV education and group interventions conducted in jails, prisons, or through community justice departments.

Third, some participants who did recognize their victimization as IPV were unwilling to consider taking steps to reduce the risk of future violence. This reluctance may reflect the relatively high hurdle for deciding to leave a violent relationship or the fear of the consequences of making such a decision. Whereas taking steps to reduce sexual risk behavior through maintaining a supply of condoms or talking with partners about condom use does not entail major life changes, deciding to leave a violent relationship, for example, may entail significant costs in addition to benefits. The possibility of increased violence following a decision to leave a violent partner may be prohibitive for many women. Women who lack employment and have limited personal incomes may face significant financial barriers to leaving abusive relationships, and women with substance use may face barriers to accessing domestic violence shelters.

Improving economic independence and reducing barriers to alternate housing may be essential for allowing women to substantially reduce their risk of partner violence (Websdale and Johnson, 2005). Interventions that provide women with resources (Parker et al., 1999; Pronyk et al., 2006), or advocates (Sullivan and Bybee, 1999; Sullivan et al., 2002) and mentors (McFarlane et al., 2000) may help women get the resources they need, in addition to providing information, options and assisting them with safety planning. It may be important to add resource provision or help in accessing resources to MI-based IPV prevention interventions, and research is needed to test the impact of combined approaches among women at risk for HIV and with criminal justice involvement.

The second negative finding is that changes in life stability were not associated with group assignment. All study participants received a brochure listing social service agencies which provide clothing, housing, food or other resources, and women in the intervention groups were provided the opportunity to discuss life stability issues and developing plans of action. While not primary aims of the study, it was thought that participants in the intervention groups versus the control group might show improvements in employment, education, personal income, and housing stability as a result of the life stability component of the intervention. The analyses revealed that this was not the case. During the course of the study, however, life stability, as measured by being employed or in school, having a personal income greater than \$300 per month, and having stable housing, improved significantly regardless of group assignment.

These improvements for all groups may reflect the life circumstances of the women when they were recruited. Release from jail or being on parole or probation is a low point for many individuals, with, for example, incarceration having led to loss of employment, income, and housing. Women lacking these resources are likely well represented in the study sample as the monetary incentives for participation may be stronger. During the course of the study, this low point became more distal, and some participants were able to achieve more normalcy in their lives through finding opportunities for employment, training, and improved housing.

Beyond these outcomes, this study demonstrates that with the assistance of corrections health and parole and probation agencies, it is possible to establish contact and intervene with women recently involved in the corrections system. Not only were our study participants at risk for HIV infection, but they frequently had co-morbid conditions. At baseline, over one-third had experienced intimate partner violence in the last three months and 47% tested positive for hepatitis C antibodies. Mental health concerns were also common, with 24% having low self esteem, 23% having elevated anxiety, and 58% having depressive symptomology (Weir et al., 2008). Study participants also had limited resources. At study enrollment, 72% were neither employed nor in school, 58% had personal monthly incomes of less than \$300, and 34% did not have stable housing. Partnering with corrections agencies may provide an important new avenue for reaching this multiply-high risk population of women and intervening with this otherwise hard-to-reach population.

While concerns have been raised about the feasibility of the wholesale adoption of MI by health departments, parole and probation offices, and other agencies (Miller, 1999), in this study county health department staff members without a background in counseling were trained to deliver MI-based interventions with fidelity. Their success illustrates that service agency staff members inclined toward reflective listening and respecting the self-autonomy of clients can conduct ME when given adequate training and ongoing coaching by a professional MI trainer.

Study limitations

Despite its contributions the study also has several limitations. First, the sample is limited in that those who choose to participate were not a random sample of women at risk for HIV infection and with criminal justice involvement. Thus, our findings cannot be generalized to all such women. Further, regional patterns of drug use and of the racial or ethnic backgrounds of corrections populations are likely reflected in our sample. Also, the intervention may not be effective for women who were excluded from participation. Women were excluded, for example, if their life situations were so unstable or if their cognitive capacities appeared so limited that an intervention could not reasonably be expected to benefit them.

Second, all data were collected through self-report, and participants may have been reluctant to divulge partner violence and drug and sexual risk behavior because of social desirability or because these behaviors ran counter to their terms of parole or probation. To reduce underreporting, study staff stressed to the participants the value of sharing their experiences, the study's strict confidentiality procedures, and the federal Certificate of Confidentiality that protected personally identifying information from subpoena. Examining the reliability of assessment data reveals no evidence of unreliability in reports of risk behavior. For example, the level of agreement between the baseline and 9-month assessments was similar for the measure of ever having injected drugs ($\kappa = 0.89$) and the measure of considering oneself to be White ($\kappa = 0.86$), a measure that would be expected to be highly reliable.

Third, the greater reductions in reported HIV risk behavior for the intervention groups compared to the control group may have resulted from factors other than the intervention. For example, there may have been a differential reporting bias at follow-up between the control and intervention groups. Compared to participants in the control group, participants in the intervention groups may have developed stronger relationships with study staff, which may have lead to greater perceived expectancies about behavior change and greater underreporting of risk at follow-up. However, there is no consistent support for this explanation. While similar response demands would be expected for both HIV risk behaviors and IPV, there was no association between group assignment and change in IPV.

Fourth, it is not possible to disentangle the contributions of different aspects of the intervention to the observed reductions in risk behavior. The changes in risk behavior may have resulted from intervention components that are common to many methods of counseling, such as developing a therapeutic relationship and providing feedback. Alternatively, MI-specific components, such as developing a therapeutic *partnership*, examining and resolving ambivalence, and respecting client autonomy, may have been essential for bringing about behavior change. Judging the relative merits of this and other interventions requires comparative rather than controlled trials.

Fifth, the interventions represent sizable investments of staff time and other resources. Training of public health paraprofessionals, monitoring of their fidelity to MI standards, and staffing an intensive intervention may be too costly for public health departments to afford. Recruitment of participants through corrections contacts and tracking of participant locations over time also are costly. With this in mind a valuable next step for research is to investigate the impact of briefer interventions similar in content to these, and consistent with the “spirit” of MI. For example, brief one- to two-session motivational enhancement interventions may also be efficacious and much more affordable for local health departments.

Conclusions

This study provides strong evidence that interventions based on MI can be efficacious in reducing unprotected intercourse, and some evidence that such interventions may be efficacious in reducing needle sharing. Additional studies are needed to explore the long-term impact of such interventions and to explore the utility of briefer interventions employing a motivational enhancement framework.

Unfortunately, our intervention had no effect on the perpetration of violence against study participants. Violence against women, especially women in criminal justice settings, is one of the most pervasive and dangerous public health problems in our nation. Public health departments, corrections departments, and social service agencies should work together to further both research and practice so that the burden of violence against women can be lifted.

Many factors beyond the risk of HIV and violence affect the lives of women at risk for HIV who come into contact with the corrections system. The fundamental, underlying life context of limited resources and opportunities remains a pervasive challenge for women in this population. Thus, broad-based educational, social, and economic changes are needed to compliment individual-level interventions if at-risk women with criminal justice involvement lives are to better their lives.

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Figure 1.
Participant flowchart.

A. Any unprotected intercourse in the last 30 days.

B. Any injections with a shared needle in the last 30 days.

C. Any intimate partner violence in the last 3 months.

Figure 2. Change from baseline in the proportion of participants reporting unprotected intercourse, injecting with a shared needle, and intimate partner violence.

Table I

Baseline characteristics by group assignment.

	Control (n=175) %	HIV intervention (n=177) %	HIV & IPV intervention (n=177) %	p-value
Sociodemographics				
Race/ethnicity				0.29
White	55	56	52	
African American	19	15	21	
Hispanic/Latina	9	6	3	
Native American/American Indian	7	6	6	
Multiracial/other	10	16	18	
Age: mean (SD)	36.1 (8.9)	34.7 (8.2)	36.2 (9.4)	0.21
Education level				0.04
Less than high school	27	31	24	
High school grad/GED	51	44	40	
College or technical training	22	26	36	
Marital status				0.59
Never married	47	42	41	
Married	7	11	11	
Divorced, widowed, or seperated	45	47	48	
Has a main parnter	63	62	60	0.90
Criminal justice system involvement				
Arrested or incarcerated in last 3 months	38	37	40	0.86
Incarcerated in last 12 months	83	80	84	0.58
Drug use in last 30 days				
Alcohol	31	28	28	0.75
Marijuana	16	15	15	0.94
Hard drugs	33	31	37	0.45
Injected with used needle	3	6	5	0.42
Episodes of needle sharing: mean (SD)	0.03 (0.2)	0.06 (0.2)	0.05 (0.2)	0.56
Sexual behavior in last 30 days				
Exchanged sex	11	14	12	0.74
Unprotected intercourse	40	51	48	0.09
Episodes unprotected sex: mean (SD)	5.01 (12.7)	5.56 (10.0)	5.18 (10.9)	0.91
Violence in last 3 months				
Intimate partner violence	27	32	31	0.33
Life stability				
Income less than \$300 per month	62	57	54	0.30
Unstable housing	29	33	41	0.97
Neither in school nor employed	73	68	74	0.37

Table II

Odds ratios and incident rate ratios for recent unprotected intercourse, injecting with a shared needle, and intimate partner violence.^a

	Control group		Intervention groups		Intervention vs. control		Control group		Intervention groups		Intervention vs. control	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	IRR	(95% CI)	IRR	(95% CI)	IRR	(95% CI)
Any unprotected intercourse in last 30 days												
Assessment	Episodes of unprotected intercourse in last 30 days											
Baseline	1.00		1.00		1.70	(1.12, 2.58)	1.00		1.00		1.29	(0.89, 1.85)
-month follow-up	1.28	(0.82, 2.02)	0.71	(0.52, 0.97)	0.55	(0.32, 0.96)	1.26	(0.88, 1.81)	0.82	(0.63, 1.05)	0.65	(0.42, 1.01)
6-month follow-up	1.32	(0.81, 2.15)	0.70	(0.50, 0.99)	0.54	(0.29, 0.97)	1.25	(0.84, 1.85)	0.72	(0.56, 0.93)	0.58	(0.36, 0.92)
9-month follow-up	1.69	(1.09, 2.63)	0.78	(0.55, 1.11)	0.46	(0.26, 0.81)	1.52	(1.02, 2.26)	0.95	(0.74, 1.21)	0.62	(0.39, 1.00)
Any injections with a shared needle in last 30 days												
Assessment	Episodes of injecting with a shared needle in last 30 days											
Baseline	1.00		1.00		3.12	(0.44, 21.95)	1.00		1.00		1.94	(0.58, 6.48)
3-month follow-up	2.23	(0.27, 18.32)	0.90	(0.26, 3.16)	0.40	(0.03, 4.69)	0.87	(0.21, 3.63)	0.93	(0.38, 2.24)	1.06	(0.20, 5.71)
6-month follow-up	3.98	(0.31, 51.13)	0.61	(0.14, 2.62)	0.15	(0.01, 2.89)	1.70	(0.39, 7.40)	0.34	(0.12, 0.95)	0.20	(0.03, 1.21)
9-month follow-up	2.78	(0.28, 27.28)	0.21	(0.04, 0.95)	0.07	(0.00, 1.16)	1.40	(0.32, 6.16)	0.25	(0.09, 0.70)	0.18	(0.03, 1.09)
Any intimate partner violence in last 3 months												
Assessment	HIV/IPV group											
Baseline	1.00		1.00		0.87	(0.49, 1.54)	HIV/IPV vs. control					
3-month follow-up	0.46	(0.25, 0.81)	0.41	(0.21, 0.81)	0.91	(0.38, 2.20)	OR	(95% CI)	OR	(95% CI)		
6-month follow-up	0.30	(0.16, 0.58)	0.27	(0.13, 0.53)	0.89	(0.34, 2.30)						
9-month follow-up	0.49	(0.25, 0.97)	0.43	(0.22, 0.83)	0.86	(0.33, 2.22)						

Note: OR = odds ratio; IRR = incident rate ratio; CI = confidence interval; values in boldface significant at $p < 0.05$. Both intervention groups (HIV and HIV/IPV) are combined in models of unprotected intercourse and needle sharing. ORs and IRRs based on generalized estimating equations models with random intercepts. Models include the following baseline covariates: mode of interview administration, education level, main partner status, health status, hard drug use, alcohol use, marijuana use, and exchanging sex.

^aAt baseline, ORs and IRRs are for the association between the behavior and group assignment. At the follow-up assessments, ORs and IRRs are for the association between change in the behavior (from baseline to the given assessment) and group assignment.