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Effectiveness of an HIV Prevention Intervention in Prison Among African Americans, Hispanics, and Caucasians

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Prisons and prison inmates present important targets for HIV/AIDS prevention interventions. Inmates often have histories of high-risk behavior that place them in danger of contracting HIV/AIDS, and rates of HIV/AIDS tend to be much higher in this population. The goal of this study was to assess the effectiveness of a prison-based HIV/AIDS intervention to change attitudes toward HIV prevention, norms supporting HIV prevention, perceived behavioral control (i.e., self-efficacy) for HIV prevention behaviors, and intentions to engage in HIV prevention behaviors postrelease. The intervention also had the goal of encouraging inmates to become HIV/AIDS peer educators. The intervention appeared most successful at influencing beliefs and behaviors related to peer education and somewhat successful at influencing beliefs and intentions related to condom use. Analyses also showed some significant differences in effectiveness by race/ethnicity. Results are discussed from the perspectives of both research and practice with regard to prison-based HIV prevention efforts.

Keywords: *HIV prevention; HIV intervention; prison; inmates; treatment efficacy; evaluation*

A high percentage of prison inmates are at risk for HIV infection due to histories of substance use and/or risky sexual behavior (Braithwaite, Hammett, & Mayberry, 1996), and, in fact, prisons have been described as “the most potentially dangerous incubators” of the HIV/AIDS epidemic in the United States (“AIDS in Prison,” 2001, p. A16;

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Hammett, Gaiter, & Crawford, 1998; Hammett, Maruschak, & Harmon, 1999). The prevalence of clinical AIDS is 5 times higher and the HIV seroprevalence up to 10 times higher in prison inmates than among the general population (Hammett, Rhodes, & Harmon, 1999). In a recent report on the state of the HIV epidemic in the United States, the Institute of Medicine (2000) recommended that prison inmates be a prime target for HIV prevention. Thus, prisons represent an important environment in which to implement and test HIV prevention interventions. Additionally, the millions of inmates who are released each year after serving short-term sentences may also place the larger community at risk for HIV infection (Dean-Gaitor & Fleming, 1999; Grinstead, Zack, & Faigeles, 1999; Kantor, 1998; Leh, 1999). Not only are these inmates at increased risk for HIV infection while in prison, they often continue to engage in high-risk behaviors postrelease. For these reasons, effective prison-based HIV prevention interventions targeting risk reduction, both in prison and after release, are so urgently needed.

As noted by Grinstead et al. (1999), "Prisons and jails present an opportunity for HIV education and prevention because of the concentration of at-risk individuals who are underserved with HIV education and prevention services in the community" (p. 226). Incarceration may be thought of as a time when individuals who engage in extremely high-risk activities, and who are difficult to reach otherwise, are a captive audience accessible for prevention intervention and education (Braithwaite et al., 1996). Thus, the prison setting is an important milieu to develop and implement successful HIV prevention interventions (Dean-Gaitor & Fleming, 1999). The current study builds on these ideas by evaluating the effectiveness of an HIV prevention program implemented in prisons in the Northeastern United States.

Although there is much agreement about the importance of developing successful prison-based HIV prevention interventions (Dean-Gaitor & Fleming, 1999), little quantitative evaluation of such programs has been done. A review of the literature in the past decade yielded few published quantitative evaluations of HIV interventions with incarcerated populations. A summary of these interventions is provided in Table 1.

Ideally, an optimally designed, prison-based HIV prevention intervention would be a randomized controlled design that could compare a theoretically guided HIV prevention intervention to an attention-placebo intervention or standard-of-care control condition. Largely because of the constraints of working within the corrections system, only one of the interventions to date (referenced in Table 1; Baxter, 1991) has met these stringent design requirements. Other studies compared two different HIV prevention interventions (El-Bassel et al., 1995; St. Lawrence et al., 1997), had a nonrandomized control group (Grinstead, Zack, & Faigeles, 2001), or had no comparison group at all (West & Martin, 2000). In terms of the gender composition of the samples, only two included both genders, and only one of those examined differences in intervention effectiveness for men versus women. Ironically, given the extremely disproportionate number of men who are in prison compared to women, three of the seven interventions included only women, and only one evaluated an intervention exclusively among men (Grinstead, Faigeles, & Zack, 1997). Finally, three of the interventions were targeted only to those inmates with a history of injection drug use rather than to the larger prison population (Baxter, 1991; El-Bassel et al., 1995; Magura, Kang, Shapiro, & O'Day, 1995).

The situational aspects of working within the corrections system also limit the ability of researchers to conduct adequate measurement of intervention constructs or outcomes at desired time points. The ideal situation would be to conduct immediate preintervention and immediate postintervention assessments with the intervention and control groups.

(text continues on p. 160)

Table 1. Summary of Previous Prison-Based HIV Prevention Interventions

Study	Purpose/Design	Sample Size	Control Group	Evaluation Period	Outcome Measures	Design	Findings
Baxter (1991)	Compared HIV education for injection drug-using (IDU) men and women in an Arizona jail to no-treatment control	N = 134 (94 women, 40 men)	Yes	Preintervention and 6 months postintervention prerelease follow-up	Knowledge of transmission, sharing of IDU paraphernalia, use of bleach to clean syringes, use of condoms/other protection during sex, development of more realistic risk assessments for HIV infection	Randomized trial comparing HIV prevention intervention to no-treatment control	6-month evaluation data showed no significant differences between intervention and control groups in self-reported HIV risk behaviors or knowledge
El-Bassel et al. (1995)	Skills building and social support enhancement intervention (SS) vs. AIDS information-only (AI) intervention, both designed to reduce postrelease HIV risk behavior	N = 145 women	No	Preintervention and 1-month postrelease follow-up	HIV transmission knowledge, safer sex, perceived vulnerability to HIV/AIDS, coping skills, sexual self-efficacy, perceived emotional support	Randomized trial comparing two different HIV prevention interventions	No differences between AI and SS groups in AIDS knowledge, perceived vulnerability to HIV/AIDS, and sexual self-efficacy; SS group showed significantly more use of coping skills, emotional support, and safer sex techniques than AI group at follow-up

Magura et al. (1995)	Compared AIDS education intervention for women drug users in a jail setting to a non-equivalent control group	N = 101 women	Yes	Preintervention and 7 months postrelease	Drug use: dependency, paraphernalia sharing, and cleaning; attitudes and beliefs about drug use; risky sexual behaviors, i.e., number of sexual partners, condom use	Quasi-experimental design where inmates who could not participate served as a non-equivalent control group	No significant differences in levels of postrelease behavior between intervention and control groups
Grinstead et al. (1997)	HIV education program for male inmates entering a state prison; randomly assigned to peer-led or professional-educator-led program or no-treatment control	N = 2,295 men	Yes	Baseline data collected at pretest from control group; outcome measure data collected immediately following intervention among two intervention conditions	HIV knowledge, perceived risk for HIV infection, intentions to engage in HIV risk behavior (posttest), inmate preference for intervention educator	Randomized controlled trial	Peer-led and professionally led groups showed increases in perceptions of HIV risk, intentions to use condoms, intentions to get tested for HIV; no difference between intervention groups, but 53% of all participants indicated a preference for the HIV peer-led intervention

(continued)

Table 1 (continued)

Study	Purpose/Design	Sample Size	Control Group	Evaluation Period	Outcome Measures	Design	Findings
St. Lawrence et al. (1997)	Social Cognitive Theory (SCT) intervention vs. Theory of Gender and Power (TGP) intervention for incarcerated women	N = 90 women	No	Assessments at baseline, immediately postintervention, and 6 months postintervention; all assessments prerelease	AIDS knowledge, HIV prevention attitudes, perceived HIV risk, self-esteem, sexual and HIV prevention self-efficacy, current commitment to preventive behavior, intentions for condom use, ability to initiate discussion about condoms with partners, condom application skill, interpersonal skills pertinent to HIV risk reduction	Randomized trial comparing two different HIV prevention interventions	Both groups showed significant increases in self-efficacy, self-esteem, attitudes toward prevention, AIDS knowledge, communication skills, condom application skills; also, the SCT group showed greater increases in condom-use skill than the TGP group
West & Martin (2000)	Evaluation of a state's AIDS education program on male and female inmates	N = 140 (75 men, 65 women)	No	Measures at pretest and 1-month posttest prerelease	Perceived risk of infection in jail and on the street, HIV knowledge, i.e., routes, prevention; behavioral intentions	Preexperimental, single-group, pretest-posttest design	Male inmates' levels of perceived risk for HIV in jail and on the street declined, whereas female inmates' perceived risk for HIV in jail and on the street increased slightly but not significantly; no significant changes in intentions for both men and women

Grinstead et al. (2001)	HIV education program for HIV-seropositive male inmates within 6 months of release; inmates assigned to HIV intervention or no-treatment control	N = 123 men	Yes	Measures at pretest, 1-week posttest, and postrelease (mean of 8 months) ^a	Postrelease sexual activity, condom use at first postrelease sex, alcohol use at first postrelease sex, postrelease drug use, postrelease needle sharing, postrelease needle exchange use	Quasi-experimental, nonequivalent control design; any motivated inmate could take part; those who were interested but could not attend sessions served as control group	Intervention group members showed increased rates of condom use at first sex and less likelihood of having sex as compared to comparison group; intervention group members less likely to use injection drugs and share needles as compared to comparison group
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a. Time constraints in the prison setting did not allow for both a pretest and posttest survey for any condition.

Then, a final assessment would occur at some point postrelease to assess whether pre-post changes in intervention constructs resulted in actual HIV prevention behavior in the real world. As noted by St. Lawrence et al. (1997), "The ultimate test of any such intervention will be the extent to which changes in knowledge, attitudes, motivation, and skills acquired in prison subsequently generalize into the natural environment after release and produce meaningful behavior changes" (p. 508). None of the reviewed interventions achieved this end. Only two studies were able to conduct follow-up assessments postrelease, and neither of these conducted immediate postintervention assessments to determine whether intervention-induced changes in theoretical mediators were related to later behavior (El-Bassel et al., 1995; Magura et al., 1995).

Of particular interest is that interventions seemed to concentrate on the measurement of changes in HIV prevention behavior in jail (Baxter, 1991; Grinstead et al., 1997; St. Lawrence et al., 1997; West & Martin, 2000). St. Lawrence et al. (1997) noted that this poses a severe limitation to prison-based evaluations because "participants have few opportunities to practice their newly acquired risk reduction skills *in vivo*" (p. 508). Given the difficulty of obtaining postrelease data, it becomes particularly important to assess constructs that theoretically are proximal to behavior, such as intentions to engage in HIV risk reduction postrelease. Only half of the interventions reviewed assessed changes in intentions, and none specifically asked about postrelease intentions. If any prerelease behavior change is to be targeted and assessed, the behavior should be one that inmates have the opportunity to engage in (and that researchers have the ability to measure) while in prison. For example, one of the goals in the current study's intervention was to increase peer education behavior by inmates still in prison.

A further design issue is the critical importance of evaluations utilizing measures of constructs that are theoretically and empirically related to HIV prevention behavior. Some of the reviewed interventions focused only on HIV knowledge and perceived risk (Baxter, 1991; West & Martin, 2000)—neither of which has shown strong or even consistent relationships with HIV prevention behavior (Fisher, Fisher, Bryan, & Misovich, 2002).

As with other intervention research studies conducted within the prison system, we were unable to include a control group and were left with only a preexperimental pretest-posttest design (with all of the obvious limitations). Despite such serious limitations, we did attempt to take into account several of the other problematic aspects of research done in correctional settings. For example, following the theory of planned behavior as a model for our evaluation (Ajzen, 1991; Ajzen & Madden, 1986), we assessed preintervention to postintervention changes in attitudes toward HIV prevention, norms supporting HIV prevention, self-efficacy/perceived behavioral control for HIV prevention behaviors, and intentions to engage in HIV prevention behaviors postrelease. In the absence of the ability to contact inmates postrelease, and because the prison setting is less than optimal for the measurement and practice of newly acquired HIV/AIDS prevention behaviors for sexual or drug-using contexts, evaluating the intervention's effectiveness at increasing theoretically and empirically based mediators of behavior change (e.g., intentions to engage in HIV prevention postrelease) is especially important for prison-based risk-reduction programs.

In addition, the current study targets prison-appropriate behavioral outcomes for inmates who remain incarcerated postintervention. In their research, Grinstead et al. (1997) noted the potential of using other inmates as peer HIV prevention advocates in prisons. Following these results and other long-standing support for the effectiveness of using peers as HIV prevention advocates (Kelly, St. Lawrence, Stevenson, & Hauth,

1992; Shaw, Wagner, Arnett, & Aber, 1992), inmates in the current intervention were trained to serve as sources of HIV information for their peers and encourage HIV prevention behavior among those peers.

Finally, it is crucial to compare the effectiveness of interventions for men versus women and for different racial and ethnic groups. Previous interventions were either delivered to only one gender (El-Bassel et al., 1995; Grinstead et al., 1997; Magura et al., 1995; St. Lawrence et al., 1997) or were delivered to both genders without tailoring the format or content (Baxter, 1991; West & Martin, 2000). Although all of the previous studies had racially diverse samples, only Grinstead et al. (1997) examined and found differences based on race. The current study examines the potential racial and gender differences in the effectiveness of the intervention on mediators of HIV prevention behavior and on being a peer leader. Although there were very few women in our sample compared to men, the intervention we evaluated was conducted separately by gender and included gender-specific discussion content. Understanding differential intervention effectiveness by race and gender can help program planners better tailor their HIV prevention efforts based on the specific characteristics of the population being targeted.

The literature to date offers no concrete answers as to what makes a successful prison-based HIV prevention program, yet we believe that each of the studies we reviewed makes an incremental contribution to what is arguably a scarce literature. Of the interventions reviewed here, three showed no significant changes as a result of the interventions they evaluated (Baxter, 1991; Magura et al., 1995; West & Martin, 2000). Of those that showed significant results, it appears that the exact form of the intervention (e.g., peer led versus professionally led) does not influence its success as long as constructs that are theoretically important for HIV prevention (e.g., self-efficacy, attitudes, intentions) are addressed. In the St. Lawrence et al. (1997) study, both interventions were successful, with the intervention based on social cognitive theory showing larger increases in condom-use skill. In the El-Bassel et al. (1995) study, only the skills-building and social-support enhancement intervention resulted in changes in meaningful correlates of behavior, whereas the information-only intervention did not.

A larger number of evaluation studies are important, because it is extremely difficult to conduct a well-designed, rigorously evaluated, definitive study of a prison-based HIV prevention program. The constraints imposed on educators and researchers by the prison system often prevent randomized controlled trials, the use of no-treatment controls, the collection of pretest and posttest data, and, depending on when the intervention is implemented, the assessment of postrelease HIV risk behavior (Grinstead et al., 1999). Furthermore, there have not been enough intervention trials conducted, evaluated, and reported to conduct a meta-analytic or even qualitative review of the literature. Thus, at this stage of HIV risk-reduction intervention research, we must rely on a preponderance of the evidence from numerous studies, each with different limitations, to evaluate what intervention strategies or components lead to a successful HIV prevention intervention for prison inmates.

METHOD

Participant Recruitment

All participants were members of HIV prevention education groups within their prison facility. Inmates arrived in these groups via two routes. In the maximum-security

facilities, an announcement was made about the opportunity to participate voluntarily in Beyond Fear, a multisession HIV education program. In the two minimum-security facilities, participation in the Beyond Fear program was mandatory. It is important to note that in both types of facilities, participation in this study was completely voluntary. Thus, even inmates who were under mandate to be in the Beyond Fear program were not under any mandate to answer the pretest and posttest questionnaires. Educators for all groups were trained and certified in HIV education, and most had extensive experience in the field of HIV prevention and education. There were five women (four Caucasian and one Hispanic) and two men (both Caucasian) who served as educators for the groups. A total of 37 groups (with a median group size of 6) completed the Beyond Fear program during the course of the study.

The Beyond Fear Program

The Beyond Fear program was developed by the Connecticut Department of Corrections' Addiction and Health Services unit, and it is currently implemented at 19 of their correctional facilities. The program was designed to address inmates' knowledge, fears, perceptions, beliefs, and concerns about HIV and to promote the training of inmate HIV/AIDS prevention advocates (peer educators). The intervention itself was based on several overlapping theoretical models, including social cognitive theory (Bandura, 1994, 1997), the health belief model (Rosenstock, 1990), cultural sensitivity (Ramirez, 1999; Sue & Sue, 1999), and problem solving (D'Zurilla & Goldfried, 1971; Nezu & D'Zurilla, 1981; Platt, Taube, Metzger, & Doume, 1988).

Beyond Fear aims to bolster participants' awareness of HIV/AIDS risk behaviors, their ability to anticipate high-risk situations, self-efficacy (i.e., perceived behavioral control), problem-solving abilities, and coping skills. In addition, the program seeks to enable participants to evaluate their own social networks, strengthen ties to healthy support networks, and utilize supportive individuals for help in reducing their own HIV/AIDS risk behavior and solving life problems. The program's goals and the supporting educational materials were adapted from the American Red Cross HIV Educators Curriculum (American Red Cross, 1998).

There are five specific objectives of the program. The first objective is to educate inmates about HIV transmission, prevention, and infection. Inmates are taught the ways in which HIV is transmitted and how to prevent HIV infection (i.e., abstinence, condom use, not sharing needles). Second, Beyond Fear discusses and disabuses common myths about HIV antibody counseling and testing. Specific details about the HIV testing process (i.e., informed consent to be tested, confidentiality) are discussed as well as what the results of the test mean. Inmates also learn about the resources that are available to them if they want to be tested or need additional health services. The third objective is to increase inmates' ability to anticipate high-risk situations. Inmates discuss possible situations that can lead to HIV exposure and are encouraged to ask questions and share personal anecdotes of situations in which they may have been at risk. Fourth, to increase self-efficacy for HIV prevention, educators attempt to reduce psychosocial barriers to making healthy choices, such as prejudice, fear, and denial of risk. Inmates role-play different situations in which they confront common barriers to healthy choices and practice identifying, addressing, and overcoming those barriers to change. The final objective of the Beyond Fear program is to promote and encourage inmate peer educator behaviors. Inmates are taught that effective peer educators can help reduce other inmates' anxieties and fears about HIV and HIV testing through the effective communication of support and appro-

priate HIV-related information. Through discussion and role-playing with the inmates, the educators model effective, positive, and respectful communication skills.

Participants met in structured groups for a weekly 90-minute session during a 6-week period. In each group, one certified HIV/AIDS educator taught the curriculum and helped inmates achieve their objectives. Participants practiced skills in role-plays and simulated situational exercises while receiving coaching and feedback from the facilitators and other members. Group educators encouraged inmates to ask questions and discuss personal issues related to HIV. Homework assignments targeting the objectives of the program were assigned and reviewed in each subsequent session.

Measurement Instrument

All measures were adapted from previous successful HIV prevention intervention outcome measures (Bryan, Aiken, & West, 1996; Fisher et al., 2002; Fisher, Fisher, Williams, & Malloy, 1994). After extensive consultation with individuals involved at different levels of the Connecticut prison system, some of the language used on the survey was modified to make it more relevant to prison inmates. The complete measure is available by request from the first author.

Demographics and Risk-Behavior History. Items assessed participants' age, gender, racial background, and education level. Participants were asked about their relationship status at the time they became incarcerated and were asked their lifetime number of sexual partners. Using a 5-point Likert-type scale (with responses ranging from 1 = *none of the time* to 5 = *all the time*), participants were also asked how much of the time they had used condoms while having sex. With regard to needle use, participants were asked if they had ever used needles to inject drugs and, if so, if they had ever shared needles. They were also asked if they had ever gotten a tattoo and whether they had ever shared tattooing equipment. These questions used a yes/no response format. Participants were also asked if they had been tested for HIV and, if so, to self-report their HIV status.

HIV Knowledge and Perceived HIV Risk. HIV knowledge and perceived risk were assessed, as these are two variables commonly used to assess the efficacy of HIV prevention programs. Although knowledge and perceived risk were not the focus of our outcome analyses and neither variable has demonstrated a reliable empirical association with HIV prevention behavior (Magura, Shapiro, & Kang, 1994; Reitman, St. Lawrence, Jefferson, Brasfield, & Shirley, 1996), they were included so that our study might be compared more directly with the empirical literature. Knowledge was assessed with 12 true/false items based on previous work on the assessment of HIV prevention information and were adapted for this population of prison inmates (Ford et al., 1995; Magura et al., 1995). The coefficient alpha at pretest was .60. Sample items include, "Using condoms can prevent the spread of HIV," "Saliva (spit) can spread HIV," and "A person can get AIDS by sharing needles and tattoo equipment." Perceived risk was assessed with three questions asking participants about the probability that "you will catch HIV/AIDS" while in prison or in their lifetime and then about the probability that they are already HIV-positive. Response options ranged from 1 (*no chance*) to 4 (*very high chance*) (pretest $\alpha = .60$).

Theory of Planned Behavior Constructs. Attitudes toward condoms were measured with five items targeting specific behavioral efficacy (e.g., "It would be a good idea for me to use condoms all the time") and hedonistic beliefs (e.g., "I like using condoms") related

to condom use. Response options ranged from 1 (*I disagree a lot*) to 4 (*I agree a lot*). The items were averaged to yield a scale score such that higher numbers indicated more positive attitudes (pretest $\alpha = .60$). Attitudes toward sharing needles/tattoo equipment were measured with two items, "For me, sharing needles for using drugs would be . . ." and "For me, sharing tattoo equipment would be . . ." Answers ranged from 1 (*very bad*) to 4 (*very good*). Items were reverse-scored and averaged so that higher scores indicated more positive attitudes toward *not* sharing (pretest $\alpha = .54$). Attitudes toward being a peer leader were assessed with two items regarding the participant's feelings about talking to a peer about HIV and being known as someone who could answer questions about HIV. The response scales for these items were the same as the *very bad* to *very good* scale just described. Pretest reliability for these items was rather low ($\alpha = .42$).

Norms about condom use were measured with three items that asked the extent to which participants thought that their partner, friends, and "most people who are important to them" felt that they should use condoms all the time. Items were averaged and scored such that higher scores indicated more normative support for condom use. Answers ranged from 1 (*not true at all*) to 4 (*very true*) (pretest $\alpha = .71$). Norms about sharing needles/tattoo equipment were measured with six items that mirrored those for condom use but asked about their partners', friends', and important others' feelings about whether they should *not* share needles/tattoo equipment. The response scale was identical to the condom norms measures and had good reliability (pretest $\alpha = .82$). Norms for being a peer educator were assessed with three items that asked about partners', friends', and important others' feelings about whether they should educate peers about HIV and AIDS. This construct also had high reliability (pretest $\alpha = .95$).

Self-efficacy was operationalized using the theory of planned behavior's construct of perceived behavioral control and was measured with two items that reflected the extent to which participants felt confident in their ability to use condoms ("How hard would it be for you to use condoms all the time?") and discuss condom use ("How hard would it be for you to talk about using condoms with your partner?"). Answers ranged from 1 (*very hard*) to 4 (*very easy*), and the two items were averaged to yield a scale score such that higher numbers indicated higher self-efficacy (pretest $\alpha = .63$). Self-efficacy for not sharing injection and tattoo equipment was measured with four items. Two of the items asked, "How hard would it be for you to *never* share [needles/tattoo equipment]?" The other two items asked, "How hard would it be for you to tell someone you care about that you *won't* share [needles/tattoo equipment] with them?" Answers ranged from 1 (*very hard*) to 4 (*very easy*). Again, the items were averaged to yield a scale score such that higher numbers indicated higher self-efficacy not to share injection or tattoo equipment (pretest $\alpha = .86$). Finally, three items assessed self-efficacy for being a peer educator and asked how hard or easy it would be to "talk to your peers about," "answer your friend's questions about," and "be known as someone who people can talk to about" HIV/AIDS. Response options and scale construction were the same as for other self-efficacy items (pretest $\alpha = .72$).

Four items were used to assess intentions to engage in safer sexual behaviors after release from prison. Sample items include, "I'm going to talk to my partner about condoms when I get out" and "I'm going to use condoms every time I have sex after I get out." Answers ranged from 1 (*definitely won't*) to 4 (*definitely will*) (pretest $\alpha = .87$). The intention not to share needles was measured by the single item, "I'm not going to share needles for using drugs or getting tattoos after I get out." Answers ranged from 1 (*definitely won't share*) to 4 (*definitely will share*) and was reverse-coded so that higher numbers reflected intentions not to share. Intentions to be a peer educator were also measured by a single

item that stated, "I'm going to talk to my peers about HIV and AIDS while I'm in prison." Answers again ranged from 1 (*definitely won't*) to 4 (*definitely will*).

Peer Educator Behavior. Peer educator behavior was assessed with four items that asked how often in the past 3 months a participant had talked to friends about HIV and AIDS, their friends had asked questions about HIV and AIDS, they talked to other inmates about HIV and AIDS, and they had other inmates ask questions about HIV and AIDS. Answers were 1 = never, 2 = once or twice, 3 = three or four times, and 4 = five or more times (pretest $\alpha = .90$). All posttest items were identical to the pretest in both wording and response options.

RESULTS

First, we report demographics and risk behaviors of the sample by race and gender. Because the intervention occurred in groups, we took a random-coefficient regression approach (also known as multilevel modeling or hierarchical linear modeling; Koester, 1994) to the analysis. This approach allows for the analysis of clustered data (Keough, Zimbaro, & Boyd, 1999). A difference score was computed for each outcome variable (e.g., postintervention attitudes minus preintervention attitudes), and this value was the criterion in each regression model. For each outcome variable, we first estimated an unconditional cell-means model to determine the degree of intraclass correlation (ICC) for that measure. This is equivalent to a random-effects ANOVA model in which the group is the sole factor and the criterion is the change on one of the theoretical mediators or peer education behavior. The random intercept in this model is thus the test of whether a nonzero change in the construct occurred as a result of the intervention. There were no control variables or moderators (race) included in this initial model; thus, it provides the overall estimate of changes in these constructs for the full sample ($N = 196$). We then estimated a random-coefficient regression model in which the intercept was again specified as a random (Level 1) factor, and gender, age, education, security level of the facility, and ethnicity were entered as Level 2 predictors. Because we were only able to use those participants who were African American, Hispanic, or Caucasian, this model estimated only a subsample of the data ($n = 176$). All data analyses were conducted using SAS 8.0 (Davison & Sharma, 1988), and the models were estimated using the PROC MIXED procedure (Gregoire & Driver, 1987; Keough et al., 1999).

Sample Demographics

A total of 196 individuals incarcerated in correctional facilities in the Northeastern United States participated in this study. Demographic characteristics of this sample are shown in Table 2. Ninety percent of the study participants were male, and the mean age of the sample was 30.4 years (range = 17 to 60 years). In terms of ethnic/racial distribution, 40% of the participants were African American, 22% were Caucasian, and 28% were Hispanic. Approximately half of the sample had completed high school. At the time of their arrest, about half of the participants were married, living with a partner, or dating one person exclusively. Seven participants did not answer the question regarding HIV status. Of those who did, 16% of women and 5% of men disclosed that they were HIV-positive. The state of Connecticut classifies incarceration facilities by level, where level 2 is minimum security, level 3 is medium security, and level 4 is maximum security. In our

Table 2. Sample Characteristics

Variable	Frequency	%
Gender (<i>n</i> = 196)		
Male	176	90
Female	20	10
Age (<i>n</i> = 196)		
Younger than 20 years	28	14
20-35 years	117	60
36-50 years	45	23
Older than 50 years	6	3
Race/ethnicity (<i>n</i> = 195)		
African American	78	40
Caucasian	43	22
Hispanic/Latino	54	28
Native American	1	< 1
Mixed race	13	7
Other	6	3
Education completed (<i>n</i> = 192)		
Less than high school	46	24
High school or equivalent	98	51
Some college	46	24
College degree	2	2
Relationship status (<i>n</i> = 193)		
Married or living with partner	70	36
Single, dating one person exclusively	29	15
Single, dating more than one person	55	29
Single, not dating anyone	35	20
Lifetime number of sexual partners (<i>n</i> = 149)		
10 or fewer	59	37
11-20	29	19
21-30	15	10
31-40	9	6
More than 40	37	25
Lifetime condom use (<i>n</i> = 194)		
None of the time	17	9
Less than half the time	93	48
About half the time	40	21
More than half, but not all the time	38	19
All the time	6	3
Injection drug use (<i>n</i> = 193)		
Have ever injected drugs	41	21
If yes, ever shared needles (<i>n</i> = 41)	34	83
Tattoos (<i>n</i> = 193)		
Have ever gotten a tattoo	90	47
If yes, ever shared equipment (<i>n</i> = 87)	22	25
HIV status (<i>n</i> = 196)		
HIV-negative	157	80
HIV-positive	10	5
Do not know	22	11
Did not respond	7	4

sample, five facilities were classified as level 2, three facilities were level 3, six facilities were level 4, and two facilities had more than one security level. Most of our participants (43%) came from maximum-security facilities, 20% came from medium-security facilities, 29% came from minimum-security facilities, and 8% came from facilities that housed multiple levels of security. In cases where facilities had more than one security level, they were coded as the highest security level in the facility for analyses.

Pretest Measures

The distribution of lifetime sexual partners reported by these participants was highly skewed with a range from 2 to 800, a mode of 10, and a median of 15. Few participants (3%) reported having used condoms consistently (i.e., "all the time") with all partners. About one fifth of participants said that they had used needles to inject drugs in the past; of these, most reported having shared needles. Almost half of participants reported having gotten a tattoo; of these, only 25% reported having shared tattooing equipment.

We also examined these demographic characteristics by race. Only African Americans ($n = 78$), Hispanics ($n = 54$), and Caucasians ($n = 43$) had sufficient numbers to allow separate analyses. The cell sizes for women were very small (8 African Americans, 5 Hispanics, and 6 Caucasians), so we descriptively examined gender after testing the overall race main effects. There were differences by age and education among ethnic groups. For education, 38% of Caucasian participants had some college education, 22% of African American participants had some college education, and only 12% of Hispanic participants had any college education. This difference was significant, $\chi^2(4, n = 167) = 10.35, p < .05$. There were also significant differences in age by race, $F(2, 168) = 5.63, p < .01$. The average age of Caucasians was 33.5 years, the average age of African Americans was 30.9 years, and the average age of Hispanics was 27.7 years. We found no differences in the number of sexual partners and no significant differences in condom use among the three ethnic groups. Compared to either Hispanics (13%) or African Americans (16%), a higher number of Caucasians (42%) had used needles to inject drugs, $\chi^2(2, n = 172) = 14.2, p < .001$, but there were no race differences for sharing needles among those who had used them. There were also differences regarding whether participants had gotten a tattoo. Hispanics (65%) reported the highest frequency of tattoos, followed by Caucasians (49%) and then African Americans (31%), $\chi^2(2, n = 172) = 14.94, p < .001$, but there were no differences in reports of sharing tattoo equipment. Among those who knew and reported their HIV status, there were no significant differences in self-reported seropositive status across racial/ethnic groups.

In general, there was much more variability in the reported number of sexual partners for women (range 2-800) compared to men (range 2-200), but the modal number of sexual partners for men (10) was higher than that for women (5). Compared to men, women showed a tendency to be more likely to use condoms when having sex ($M_s = 2.75$ vs. 2.59 on a 5-point scale). There were no other gender differences observed for HIV risk behaviors.

Intervention Analysis: Random-Coefficient Regression Models

Raw, unadjusted, pretest and posttest means on all constructs for the full sample included in the initial, uncontrolled, random-coefficient regression model appear in Table 3. We present these data as they are inclusive of our full sample and because these overall results are largely unchanged by the inclusion of control variables. The third column

Table 3. Means (Standard Deviations) and Tests for Significant Change From Pretest to Posttest

Variable	Pretest	Posttest	Test for Significant Overall Change ^a	ICC ^b	<i>z</i> Test for Group Effect ^c
Knowledge	9.48 (2.03)	10.71 (1.64)	1.29 (0.18), <i>p</i> < .001	.12	1.57, <i>p</i> = .06
Perceived risk	2.09 (0.67)	2.08 (0.63)	-0.017 (0.044), <i>ns</i>	.02	< 1, <i>ns</i>
Condom attitudes	3.17 (0.57)	3.26 (0.57)	0.085 (0.040), <i>p</i> < .05	.00	< 1, <i>ns</i>
Condom norms	2.85 (0.83)	2.88 (0.83)	0.0401 (0.057), <i>ns</i>	.02	< 1, <i>ns</i>
Condom self-efficacy	3.09 (0.84)	3.22 (0.81)	0.14 (0.067), <i>p</i> < .05	.04	< 1, <i>ns</i>
Condom intentions	3.29 (0.73)	3.50 (0.63)	0.21 (0.046), <i>p</i> < .001	.04	< 1, <i>ns</i>
Attitudes for not sharing needles	3.89 (0.41)	3.94 (0.24)	0.052 (0.032), <i>ns</i>	.01	< 1, <i>ns</i>
Norms for not sharing needles	3.69 (0.63)	3.67 (0.63)	-0.027 (0.051), <i>ns</i>	.00	< 1, <i>ns</i>
Self-efficacy for not sharing needles	3.64 (0.75)	3.79 (0.51)	0.15 (0.072), <i>p</i> < .05	.09	1.38, <i>p</i> = .08
Intentions to not share needles	3.70 (0.83)	3.80 (0.70)	0.064 (0.071), <i>ns</i>	.00	< 1, <i>ns</i>
Peer education attitudes	3.66 (0.46)	3.73 (0.47)	0.067 (0.045), <i>ns</i>	.05	< 1, <i>ns</i>
Peer education norms	2.87 (1.07)	2.88 (1.00)	0.030 (0.075), <i>ns</i>	.002	< 1, <i>ns</i>
Peer education self-efficacy	3.31 (0.65)	3.49 (0.59)	0.18 (0.052), <i>p</i> < .01	.03	< 1, <i>ns</i>
Peer education intentions	2.80 (0.86)	3.08 (0.77)	0.28 (0.071), <i>p</i> < .001	.00	< 1, <i>ns</i>
Peer education behavior	1.85 (0.74)	2.23 (0.83)	0.37 (0.060), <i>p</i> < .001	.05	< 1, <i>ns</i>

NOTE: Possible range for all variables except knowledge is 1 to 4 where higher numbers indicate more positive endorsement of the construct. For knowledge, the range is 1 to 12. ICC = intraclass correlation.

a. The parameter estimate (*SE*) and significance level obtained from the random-coefficient regression model. This tests whether the intercept, specified as a random parameter, is significantly different from zero.

b. Calculation of the ICC coefficient by group for the measure of interest.

c. Test of whether the group accounts for a significant portion of within-subjects variability for change on the measure of interest.

reflects the parameter estimate, standard error, and significance level for the test of whether the change in the construct was significant from pretest to posttest. A parameter estimate for the intercept that is significantly different from zero reflects a significant change in the construct from pretest to posttest. As shown in the table, there were positive changes on HIV knowledge and no change on perceived risk. Overall, the intervention appeared most successful at influencing beliefs and behaviors related to peer education, only somewhat successful at influencing beliefs and intentions related to condom use, and largely unsuccessful at influencing beliefs and intentions related to needle/tattoo-equipment sharing. In addition, the intervention showed stronger and more consistent effects across behaviors of interest for self-efficacy than for norms, attitudes, or intentions.

Because only a subset of our participants had ever used needles to inject drugs (21%) or had gotten a tattoo (51%), we reanalyzed changes in cognitions related to needle sharing/tattoo-equipment sharing only among participants who reported such behaviors (possible total $n = 104$).¹ Because of the reduction in sample size, we conducted simple repeated-measures analyses of variance on each of the needle-related/tattoo-related cognitions. We found no change in attitudes about not sharing, $F(1, 103) = 1.65, p = .20$, or in norms about not sharing, $F(1, 101) = 0.05, p = .82$. As with the full sample, we again found significant changes in perceived behavioral control over not sharing, $F(1, 98) = 8.05, p < .01$, such that perceived behavioral control was higher at posttest ($M = 3.77, SD = 0.54$) than at pretest ($M = 3.54, SD = 0.81$). Unlike the full sample, these analyses showed significant changes in intentions to not share postrelease, $F(1, 98) = 8.05, p < .01$, among those participants who had ever used needles or gotten tattoos. The pattern was the same, such that intentions to not share were higher at posttest ($M = 3.87, SD = 0.59$) than at pretest ($M = 3.65, SD = 0.86$).

The final two columns in Table 3 are the estimates of the ICC computed for each measure. The ICC is a measure of the proportion of the total within-subjects variation that can be accounted for by group membership (Keough et al., 1999). The final column is the z test for the random effect of group computed in the random-coefficient regression model and can be viewed most simply as a test for whether the ICC is significantly different from zero. Technically, it is a test of the extent to which there is random variation among the intercepts of the individual groups (Keough et al., 1999). The ICCs ranged from .00 to .12, and none of these correlations achieved traditional levels of statistical significance. Given the sheer number of tests conducted, we are loathe to interpret the two marginal effects as significant given the overall pattern of findings (no ICC) and the possibility of Type I error. Our conclusion is thus that the clustering of the data in groups did not have a significant impact on outcomes.

The second set of random-coefficient regression models included only those participants who reported African American, Hispanic, or Caucasian ethnicity ($n = 176$). In each equation, the intercept was again specified as a level 1 random factor, and group was again a level 2 factor. Another difference between this equation and the previous one estimated in the full sample is the inclusion of age, gender, education level, and security level of the facility as control variables. The two questions we wished to address in this set of analyses were as follows: (a) Does race/ethnicity moderate the efficacy of the intervention? and (b) Are there effects of any demographic or environmental variables that affect changes on our constructs? To test the moderating effect of race/ethnicity, two contrast codes were created using standard regression procedures for testing the effect of the intervention for Hispanics versus Caucasians and for African Americans versus Caucasians. Because none of these analyses changed the overall pattern of results, we do not table the full complement of results but present only significant findings in the text.

There were no effects of any of the control variables for gains in attitudes toward condom use, attitudes toward sharing needles/tattoo equipment, norms for condom use, norms regarding sharing needles/tattoo equipment, norms regarding being a peer educator, self-efficacy for being a peer educator, self-efficacy for not sharing needles, intentions to engage in peer education, and intentions to not share needles/tattoo equipment.

Gender and age were related to changes in knowledge such that women gained more knowledge from the intervention than did men (parameter estimate = -1.69 , $SE = 1.35$; $p < .01$) and younger inmates gained more knowledge than older inmates (parameter estimate = -0.046 , $SE = 0.65$; $p = .01$). Although there were no overall gains in perceived risk, inmates with lower education levels gained more in terms of perceived risk than inmates with higher education levels (parameter estimate = -0.18 , $SE = 0.08$; $p < .05$). Also, although there were no overall gains in attitudes toward being a peer educator, male inmates were less likely than female inmates to increase positive attitudes toward being a peer educator (parameter estimate = -0.39 , $SE = 0.18$; $p < .05$). Older inmates were more likely than younger inmates to engage in peer education behavior (parameter estimate = 0.01 , $SE = 0.008$; $p < .05$), and there was a marginal effect for inmates in higher security facilities to engage in more peer education behavior (parameter estimate = 0.18 , $SE = 0.09$; $p = .06$).

Two significant race/ethnicity effects emerged, and they both concerned effects on theoretical predictors of condom use behavior. First, Hispanic participants showed smaller gains than Caucasians in condom use self-efficacy (parameter estimate = -0.43 , $SE = 0.20$; $p < .05$). In fact, examination of the means (controlling for gender, age, education, and level of security of the facility) shows that whereas African Americans and Caucasians showed increases in condom use self-efficacy, Hispanics actually showed a slight decrease in self-efficacy following the intervention (see Figure 1). Second, both African American participants (parameter estimate = -0.34 , $SE = 0.12$; $p < .01$) and Hispanic participants (parameter estimate = -0.34 , $SE = 0.14$; $p = .01$) showed smaller gains than Caucasians in intentions to use condoms. Caucasians reported the greatest increases in condom use intentions (from 3.10 to 3.55), whereas African Americans (from 3.29 to 3.40) and Hispanics (from 3.44 to 3.55) showed smaller increases. Given our findings for changes in cognitions related to sharing needles/tattoo equipment, we conducted a final set of repeated measures ANOVAs asking whether differential effects by race also appeared within the subsample of participants who had a history of needle use or tattooing. The only moderating effect of race/ethnicity was marginal and appeared for changes in attitudes toward not sharing, $F(2, 85) = 2.58$, $p = .08$. As with the other moderating effects, whereas African Americans and Caucasians showed slight increases in positive attitudes about not sharing, Hispanic participants showed a slight decrease.

DISCUSSION

The goal of this research was to provide an evaluation of the efficacy of a previously established prison-based HIV/AIDS prevention intervention. Our results suggest that the Beyond Fear program appears to have had several positive effects. There were significant increases controlling for group membership observed in pretest to posttest scores for HIV knowledge, condom attitudes, condom self-efficacy, condom intentions, self-efficacy for not sharing needles, peer education self-efficacy, peer education intentions, and peer education behavior. Of these, the strongest increases were seen in measures of peer education behavior, and the weakest effects were those dealing with perceived risk for HIV, beliefs

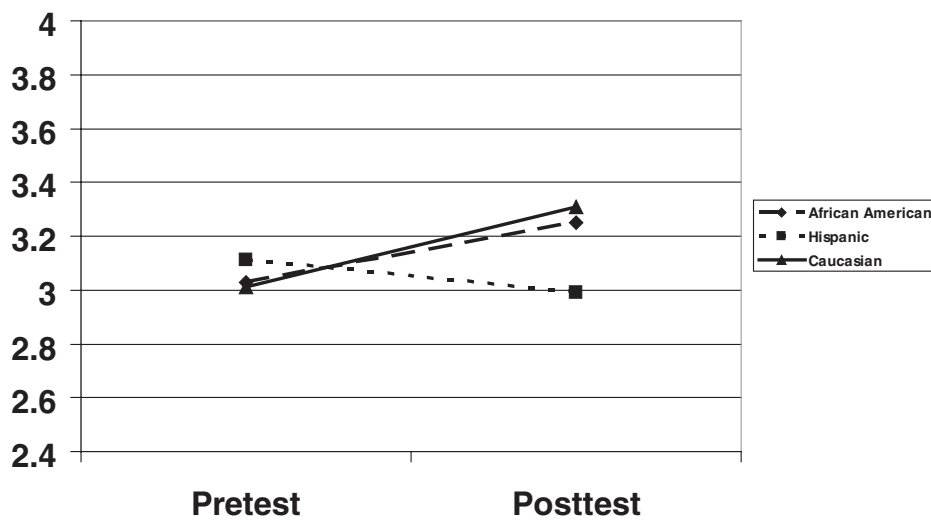


Figure 1. Changes in condom use self-efficacy/perceived behavioral control by race/ethnicity. NOTE: Means are adjusted for gender, age, education, and security level of the facility.

and intentions regarding needle sharing, or any aspect of normative support. For the subsample of participants with a history of needle use or tattooing, the program also appeared to increase intentions to not share needles or tattoo equipment postrelease.

Although this program appears to have increased inmates' knowledge regarding HIV prevention and transmission, it is important to note that knowledge at pretest was unrelated to previous sexual behavior and was, in fact, positively and significantly associated with needle risk in that higher initial knowledge was related to higher rates of needle use ($r = .23, p < .001$) and needle sharing ($r = .22, p < .01$). Furthermore, changes in knowledge were unrelated to changes in intentions regarding condom use, needle sharing, or peer education behavior. Thus, consistent with almost two decades of research in HIV prevention, our findings demonstrate that increases in HIV knowledge alone do not make HIV prevention interventions successful.

The finding that Hispanics showed lower gains in condom use self-efficacy and in condom use intentions, as well as lower gains in positive attitudes toward not sharing needles/tattooing equipment, was puzzling and may reflect deficits in the cultural relevance and appropriateness of the intervention material related to condom use. Although the program was intended to be sensitive to issues of diversity, it may be necessary to further target intervention content to increase the cultural relevance, appropriateness, and impact of the prevention messages depending upon the ethnic groups with whom one is intervening. As an example, after our evaluation, the Beyond Fear program administrators conducted focus group discussions with Hispanic inmates regarding issues that are particularly relevant to HIV prevention behavior in the local Hispanic community. One issue that emerged was the importance of the family and the extent to which consideration of the family plays into discussions about health and risk behavior generally. We suspect that this lack of emphasis on communication with significant others may be one of the possible explanations for our finding that self-efficacy for condom use decreased among Hispanic participants after the intervention. The revised version of the Beyond Fear intervention now includes discussions about the importance of family in health-related decisions.

It is hoped that this addition might make the intervention more relevant for inmates whose cultural backgrounds focus on family-centered approaches to health decision making. We caution that we have no data that directly tie Hispanic participants' less positive response to the intervention to this issue (or any of the others that were altered in response to our evaluation); our conclusions on this issue are merely speculative and borne out of focus groups with other Hispanic inmates.

A more obvious problem with the intervention was that it was presented exclusively in English. Currently, a Spanish-speaking educator now presents the program to inmates who feel that their English-language skills are not strong enough to discuss sensitive topics related to HIV risk. In addition, the intervention now includes discussion of the importance of considering one's family when making decisions about risk and protection related to HIV. These are just two examples of the changes that have been made to the Beyond Fear program in response to this evaluation.

Because attitudes, norms, self-efficacy, and intentions regarding sharing needles were already extremely positive in this sample, even among those with a history of needle use or tattooing, the lack of effects on more of the needle-sharing variables might be explained as ceiling effects. But it is encouraging that among those with a history of needle use or tattooing, the program demonstrated improvements in intentions to not share postrelease. In any case, there is clearly still a need to target needle use and needle sharing in this population. Although only 21% of all participants had ever used needles to inject drugs, a full 81% of those had shared needles at some time in the past. It is interesting to note that our finding of extremely positive attitudes and normative support for not sharing with a correspondingly high rate of actual sharing behavior is completely consistent with the extant literature (Carlson, Siegal, Wang, & Falck, 1996; Koester, 1994). This phenomenon is largely attributed to the scarcity of available clean injection equipment as opposed to beliefs that sharing is desirable (Koester, 1994). Thus, intervention content might need to focus more on the acquisition of clean injection equipment rather than attempts to increase perceptions that already support such behavior.

Caucasians were much more likely than other ethnic groups to have used needles for drug injection—a finding that has been observed elsewhere in the literature (Braithwaite et al., 1996). This phenomenon may be explained by several factors. First, injection equipment may be more accessible and affordable for Caucasians compared to minority drug users (Keough et al., 1999). It is possible that minority drug users wanting to purchase new syringes may face discrimination by pharmacies, even when such sales are legal. Additionally, one study has found that the police are more likely to confiscate the personal injection equipment of African Americans, thus providing a negative reinforcement to the use of injectable drugs as opposed to drugs that can be inhaled or smoked (Keough et al., 1999).

This study is not without substantial limitations, the most important of which is the lack of a control group. Readers are strongly cautioned to interpret our results only while keeping in mind the serious limitations of this study. In an applied setting such as this, it is often difficult because of logistical and/or ethical reasons to run tightly controlled randomized trials. In our case, both of these reasons contributed to the inability to include a no-treatment comparison group or, indeed, any comparison group at all. We recommend that subsequent evaluations of the Beyond Fear program include an attention-placebo or no-treatment control condition to rule out the possibility that any demonstrated increases are simply the result of special attention (i.e., Hawthorne effects) or of socially desirable responding. With respect to our findings, we see the latter as less of a possibility, because

a pattern of socially desirable responding would have resulted in observed increases in all areas, which did not happen in this study. In cases where a comparison condition is not possible, an improvement over our design would have been to include dosing information (i.e., how many sessions each participant attended) to determine whether seeing more of the intervention resulted in greater gains in theoretical predictors of HIV prevention behavior.

A second limitation is the small number of participants overall and particularly the small number of female participants. Women comprise a minority of the prison population but nevertheless are at extremely high risk of HIV infection through drug use and sexual behavior. In our sample, a greater percentage of women reported being HIV seropositive compared to men. These higher rates may be because of women's participation in commercial sex work or nonprofessional exchanges of sex for drugs or money. In fact, many of the women in this sample were reportedly incarcerated because of charges related to prostitution.

Another limitation was our inability to assess sexual behavior while incarcerated. Although it is officially not recognized by the corrections system, sexual and needle risk behaviors can and do occur in prison settings. When they do occur, it usually is not documented or openly acknowledged, because sexual activity and needle use during incarceration are violations of prison rules. In this particular study, the regulations for conducting empirical research in correctional settings prohibited us from asking questions about inmates' sexual and needle use practices while incarcerated. Our assessment of proximal measures of behavior (such as intentions to use condoms postrelease) was an attempt, albeit imperfect, to work around this limitation. The use of these measures did enable us to perform what is, at the very least, a preliminary evaluation of the Beyond Fear program and identify its strengths and weaknesses. In addition, a further possible limitation of our analyses is the use of Likert-type scales in parametric data analyses. However, we believe that the methodological literature has borne out that such usage is completely justified and thus consider this problem to be quite minor (Davison & Sharma, 1988; Gregoire & Driver, 1987; Rasmussen, 1989).

Finally, we were not able to specify a sampling frame in this study, so we are unable to make the claim that this is a random sample of the prison population. In some cases, there were two levels of volunteering (volunteering for the Beyond Fear program in maximum-security facilities and then volunteering to be a part of the evaluation study), thereby making a determination of the participation percentage virtually impossible. However, we do have census data from the time that this study was conducted, and we can say that our sample is largely representative of the Connecticut prison population in terms of gender distribution (i.e., our study was 90% male; the prison population was 93% male) and ethnic distribution (our study was 40% African American, 28% Hispanic, and 22% Caucasian; the prison population was 46% African American, 26% Hispanic, and 27% Caucasian). The race differences may well be due to our offering of a mixed race category. The prison system has no such category. Finally, the age of the participants was also fairly representative of the larger Connecticut prison population. In our study, 9% of the sample was younger than 25 years of age, 62% was 21 to 35 years old, 23% was between 36 and 45 years old, and 6% was older than 46 years of age. In comparison, 13% of the general Connecticut prison population was younger than 20 years, 56% was between 21 and 35 years of age, 23% was between 36 and 45 years of age, and 8% was older than 46 years old.

Implications for Practice

An ideal evaluation design would utilize a randomized controlled trial in which inmates are randomly assigned to view a theoretically motivated and culturally tailored intervention designed for the prison setting or an attention-placebo control condition. Measurement of change in theoretical mediators of program efficacy should be combined with measures of risk behaviors (both sexual and needle related) in prison. In addition, such a study would include following participants after their release from prison, as this would allow for the possibility of assessing sexual and drug-related risk behaviors in real-world, nonprison settings. Showing positive differences in intervention participants' risk behavior versus control participants' risk behavior postrelease from prison is the ultimate test of a prison-based HIV prevention intervention. Such data are desperately needed for the design and implementation of future prison-based prevention programs as well as for planning effective postrelease linkages to community-based HIV prevention, counseling, and care programs for newly released inmates. Unfortunately, many times, the prison system itself places numerous restrictions on researchers that make conducting this type of tightly designed research close to impossible.

The development and implementation of effective HIV prevention interventions for those in prison should be a public health priority. To develop such interventions, it is critically important to empirically evaluate the interventions that exist, determine what aspects of those programs are successful, make recommendations for improvements, and refine interventions so that they more appropriately address the prevention needs of incarcerated men and women. Furthermore, studies such as this one suggest that extensive elicitation research be conducted with ethnic and racial subgroups within the prison population so that programs can specifically address HIV prevention issues particular to each racial/ethnic group.

One might ask, after the long list of limitations described above, whether studies such as these make any unique contribution to the literature. Careful scrutiny of the existing literature on evaluation studies of HIV risk-reduction interventions in prison settings leads to the following conclusions: (a) Intervention studies with this population are rare, (b) each facility seems to impose different constraints on investigators (some do not allow for follow-up, some do not allow for the inclusion of a control group, etc.), (c) none of these studies are as complete or as tightly designed as one would hope, (d) many included only one gender, and (e) few investigated differential intervention effectiveness by race/ethnicity. But importantly, we believe that each study, flawed as it was, provides an incremental contribution to what is currently a sparse literature. We are not to the point in this particular area where we can make broad conclusions, such as in a meta-analytic or qualitative review, about the characteristics of an effective intervention to decrease HIV risk behavior among inmates in prison or postrelease. By the same token, we feel that our study, still flawed, but with strengths that some of the others do not have, does provide an incremental contribution to the literature. We show that changes in theoretical mediators of behavior change can occur in prison settings, multi-item measurement of many of these constructs is possible and reliable, knowledge and perceived risks do not relate to risk behavior (or relate in the opposite direction), and, crucially, interventions in prison settings must be attentive to the characteristics and behaviors of the populations with whom they intervene.

Although we make no claim that this study is in any way definitive, it does seem that until it becomes easier to conduct tightly designed intervention trials in prison settings, studies such as ours do have something to add to both the literature on HIV prevention

intervention in prison settings and the actual practice of such interventions. With continued research in this area, it should be possible to eventually undertake a meta-analytic review of prison-based HIV prevention programs to determine which components appear to successfully decrease risk behavior. Such a review would include as an independent variable the impact of the design of the study (e.g., randomized controlled trial, nonequivalent control-group design, nonexperimental pretest-posttest design) on the size of estimated program effects. The present study is a step in this direction.

Note

1. We thank an anonymous reviewer for the suggestion to delve deeper into our findings regarding changes in cognitions related to sharing needles/tattoo equipment.

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