HIV and AIDS Risk Behaviors Among Female Jail Detainees: Implications for Public Health Policy

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This article examines the HIV and AIDS risk behaviors of female jail detainees. Public health professionals increasingly focus on women in the battle against HIV and AIDS.[1–3] Although the prevalence of HIV infection among men in the general population has stabilized or even begun to decline, rates among women continue to increase.[1,4–6] HIV infection rates are higher in correctional populations than in the general population among both men[7–11] and women.[12–17] In correctional settings, women have even higher infection rates than do men.[8,11–22]

HIV and AIDS risk behaviors among female jail detainees are important because the number of women jailed is increasing,[21,23] and most detainees return to the community in a few days.[24] In 1986, there were 13.1 arrests per 100 000 women in the United States.[25,26] By 1998 (the most recent data available), there were 23.6 arrests per 100 000 women, an increase of 80%.[27]

Jails serve a clientele at high risk for HIV and AIDS.[6,20,28] Some HIV and AIDS risk behaviors are illegal and can result in arrest: public alcohol intoxication, drug use,[15,29–39] and prostitution.[39–43] In addition, some groups are at increased risk both for arrest and for HIV infection. Minorities,[1,31,44–48] inner-city residents,[49] homeless persons,[50–52] mentally ill persons,[53–65] young adults[1,45]—especially young women[5,66]—and women with histories of physical or sexual abuse[67–71] all have higher than average HIV and AIDS risk behaviors and higher than average arrest rates. For these reasons, the jail is a promising site for intervention in the struggle against HIV and AIDS.[7,18,23,72–75]

This article has 2 objectives: (1) to describe sex- and injection drug use–related HIV and AIDS risk taking among female jail detainees and (2) to identify key subgroups of female jail detainees who are at especially high risk for contracting HIV or AIDS.

Objectives. We examined the sexual and injection drug use HIV and AIDS risk behaviors of female jail detainees.

Methods. The sample (n=948) was stratified by charge type (felony vs misdemeanor) and race/ethnicity (African American, non-Hispanic White, Hispanic, other).

Results. Non-Hispanic White women, women arrested for less serious charges, women who had prior arrests, women arrested on drug charges, and women with severe mental disorders were at especially high risk for sexual and injection drug transmission of HIV and AIDS.

Conclusions. Many women at risk for HIV and AIDS—women who use drugs, women who trade sex for money or drugs, homeless women, and women with mental disorders—eventually will cycle through jail. Because most jail detainees return to their communities within days, providing HIV and AIDS education in jail must become a public health priority. (*Am J Public Health.* 2002;92:818–825)

METHODS

Subjects, Sampling, and Instruments

Subjects were participants in a larger study of psychiatric disorder among female jail detainees.[76–78] The sample included 1272 female arrestees entering the Cook County Department of Corrections in Chicago, Ill, directly from pretrial arraignment between 1991 and 1993. The sample was stratified by charge type (felony vs misdemeanor) and race/ethnicity (African American, non-Hispanic White, Hispanic, other). That is, larger percentages of some groups were sampled to ensure adequate samples of more rare groups for statistical analysis (e.g., felons, non-Hispanic Whites, and Hispanics). Our refusal rate was 4.2%. Subjects' ages ranged from 17 to 67 years (mean=28.75, median=28); 40.4% were African American, 33.6% were non-Hispanic White, 24.7% were Hispanic, and 1.3% were other race/ethnicity; nearly 80% were unemployed; and mean and median education was 11 years.

Interviews were conducted in private, and data were protected by a federal Certificate of Confidentiality. Interviewers were clinically trained or experienced; most had master's level clinical training. Subjects were assured that anything they told us would be confidential. Interviewers administered items on sexual behaviors and drug use near the end of the interview after rapport had been established. Subjects were asked about their criminal history, drug use practices, and HIV and AIDS sexual risk behaviors. We also obtained the subjects' arrest charges from official records. Subjects charged with both misdemeanors and felonies were categorized as felons. Interviewers also administered the National Institute of Mental Health Diagnostic Interview Schedule, Version III-R, to assess psychiatric disorder.

The HIV and AIDS risk component was developed after data collection began. We had data on injection drug use risk behaviors for 948 subjects. Eight of these subjects had missing data on sexual risk variables, so the sample size for the sexual risk analyses was 940. Additional information on our sample, methods, procedures, and instruments is published elsewhere.[76–78]

RESULTS

Our analysis had 2 steps:

1. We examined specific sexual and injection drug use HIV and AIDS risk behaviors to describe sex- and injection drug use–related HIV and AIDS risk taking among female jail detainees.

TABLE 1—Sex-Related AIDS Risk Behaviors Among Women in Jail

	Total (n = 940)	African American (n = 371)	Non-Hispanic White (n = 307)	Hispanic (n = 247)
No. of sex partners, past y				
Mean	40.4	21.2	138.5	44.9
Median	2.0	2.0	2.0	1.0
75th percentile	4.0	4.0	10.0	3.0
Percentage				
0	2.8	2.2	3.8	7.8
1	43.3	43.0	41.2	52.9
2–3	27.4	28.6	23.1	23.0
4–100	23.9	25.2	21.9	12.6
>100	2.6	1.1	10.0	3.8
Protective sex behaviors, past y, %				
Any vaginal sex[a]	97.2	97.8	96.2	92.1
Never used protection	32.0	29.3	40.4	47.7
Always used protection	45.1	47.0	40.9	30.0
Any oral sex[a]	46.1	40.8	74.4	44.7
Never used protection	50.4	48.2	52.0	67.6
Always used protection	34.8	38.3	28.8	18.8
Any anal sex[a]	5.2	3.5	12.1	9.3
Never used protection	74.4	75.0	73.8	72.7
Always used protection	22.1	18.9	26.2	27.3
Traded sex for money or drugs				
Ever	32.5	32.2	39.4	20.5
Weekly or more often	24.3	22.7	35.4	17.2

[a]The first row of each panel reports the percentage of women in jail who reported each sexual risk behavior. The subsequent rows report the protective practices of women who engage in the behavior.

2. We generated summary scores of sexual and injection drug use HIV and AIDS risk to identify key subgroups of female jail detainees who were at especially high risk for contracting HIV or AIDS.

Analysis of Specific HIV and AIDS Risk Behaviors

We examine sexual and injection drug use HIV and AIDS risk behaviors separately.

Sexual HIV and AIDS risk behaviors. Table 1 reports sex-related HIV and AIDS risk behaviors. Ninety-seven percent of the women reported having had sex in the past year. Non-Hispanic White women tended to report greater risk behaviors than did African American or Hispanic women. Only 1.1% of the African American women had 100 or more partners in the past year, compared with 10.0% of the non-Hispanic Whites. His-panic women were least likely to report ever using protection for vaginal and oral sex (47.7% and 67.6%, respectively). (HIV and AIDS protection practices include use of con-doms, dental dams, and spermicidal gels and no fluid exchange.) Five percent of the women had anal sex in the past year; three-fourths of these women never used protection. One-third of the sample reported that they ever traded sex for money or drugs. Non-Hispanic Whites reported the highest rate of trading sex for money or drugs, and Hispanics reported the lowest (39.4% and 20.5% respectively; odds ratio = 2.52). Twenty-four percent of the women reported trading sex for money or drugs "weekly or more often."

Injection drug use HIV and AIDS risk behaviors. Table 2 reports injection drug use behaviors among women in jail. Overall, 18.8% reported ever injecting drugs. Rates were much higher among non-Hispanic Whites (41.9%). Similarly, 8.5% of the women shared needles, and needle sharing was most prevalent among non-Hispanic Whites (24.9%). The same pattern held for needle sharing in the past 2 weeks: 2.0% of the women shared needles in the past 2 weeks, compared with 7.9% of the non-Hispanic White women.

Summary Scores of HIV and AIDS Risk

Next, we used the data on specific HIV and AIDS risk behaviors (Tables 1 and 2) to calculate summary scores for each subject (Table 3). Our goal here was to identify the key subgroups at the highest risk for contracting HIV and AIDS. Ideally, summary scores should reflect measured differences in risk, not the researcher's judgment. For example, anal sex is a riskier behavior than oral sex.[79] It is difficult, however, to assign a value

TABLE 2—Injection Drug Use Risk Behaviors Among Women in Jail

	Total %	African American %	Non-Hispanic White %	Hispanic %
Injection drug use, ever	18.8	14.5	41.9	16.6
Needle sharing				
Ever shared needles	8.5	5.4	24.9	8.9
Shared in past y	3.8	2.1	12.3	5.3
Shared in past 6 mos	3.4	1.9	11.0	4.8
Shared in past mo	2.4	1.1	8.8	4.1
Shared in past 2 wks	2.0	0.8	7.9	3.7
Needle cleaning, past mo				
Always	7.3	5.1	18.7	8.1
Sometimes	0.5	0.3	1.6	0.4
Never	0.7	0.0	4.6	0.4

TABLE 3—Means and Selected Percentiles of Sexual Risk and Drug Risk Scores, by Demographic Traits, Arrest Status, History of Arrest, and Selected *DSM-III-R* Diagnoses

| | Sex Risk Score | | | | | Injection Drug Use Risk Score | | | | |
| | | | Percentiles | | | | Percentiles | | | |
	Mean	Significance[a]	50th	90th	Significance[b]	Mean	95th	99th	Significance[c]	N
Total	26.3		20.3	48.3		1.9	0.0	58.8		948
Race/Ethnicity		.000			.215				.000	
African American	25.3		20.3	47.3		0.7	0.0	41.2		373
Non-Hispanic White	33.0		32.2	59.2		7.6	58.8	100.0		311
Hispanic	23.7		18.8	48.3		2.7	7.8	58.8		249
Other	30.0		27.8	52.4		1.6	0.0	58.8		15
Age, y		.190			.091				.000	
17	21.0		16.9	57.9		0.0	0.0	0.0		23
18–21	26.0		20.3	47.3		0.4	0.0	0.0		151
22–29	26.4		20.3	50.8		0.9	0.0	48.9		402
30–39	27.4		21.7	51.8		3.4	41.2	58.8		292
≥40	24.1		18.8	47.3		5.6	58.8	58.8		80
Arrest charge[d]										
Any felony	23.9	.000	18.3	47.3	.010	1.4	0.0	58.8	.422	514
Misdemeanor only	28.8		27.8	52.4		2.4	7.8	58.8		434
Violent felony	18.3	.238	16.7	36.4	.514	0.6	0.0	48.9	.239	35
Felonious property	22.8	.293	16.7	47.3	.198	1.6	7.8	58.8	.956	137
Misdemeanor violence	22.8	.517	16.7	47.3	.221	1.6	7.8	58.8	.980	137
Misdemeanor property	27.4	.352	24.4	51.8	.002	3.2	41.2	58.8	.131	203
Drug charges	25.1	.004	18.8	47.3	.000	1.5	0.0	58.8	.000	226
Prior arrests (self-report; common crime names)[e]										
No prior arrest	18.2		16.7	36.2		0.0	0.0	0.0		131
Any juvenile arrest	29.4	.097	27.8	54.5	.001	2.6	30.5	58.8	.740	255
Any prior arrest (juvenile or adult)	27.5	.000	21.0	51.8	.298	2.1	0.0	58.8	.007	817
Murder or attempted murder	23.6	.403	16.7	32.2	.663	1.8	0.0	58.8	.698	11
Beating somebody	29.2	.481	24.4	51.8	.948	2.8	41.2	58.8	.150	166
Weapons charges	34.3	.020	36.2	59.2	.103	3.1	41.2	58.8	.966	55
Possession of drugs	28.7	.001	24.4	54.1	.002	3.0	41.2	58.8	.020	268
Sale of drugs	27.8	.019	24.4	47.3	.027	3.5	41.2	58.8	.029	104
Prostitution	40.8	.000	43.4	57.9	.000	4.2	41.2	58.8	.000	236
Theft or stealing	28.6	.000	24.4	52.8	.002	3.1	41.2	58.8	.000	381
DSM-III-R lifetime disorder (moderate or severe only)[f]										
No severe disorder	19.7	.000	16.7	43.4	.013	0.0	0.0	0.0	.017	326
Any severe disorder	32.7		27.8	63.8		3.2	41.2	58.8		159
Alcohol dependence	31.0	.001	30.2	54.5	.000	4.5	58.8	58.8	.000	304
Any drug dependence	30.9	.000	30.6	52.4	.006	3.4	41.2	58.8	.000	494

Note. DSM-III-R = Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition.
[a]Tests of significance for the mean sexual risk scores were calculated with robust M-estimators. Significant differences indicate differences in the means, correcting for non-normal residuals. See the text for a full justification and details on the procedures we used.
[b]Tests of significance for percentile distributions of the sexual risk scores were calculated with the Kruskal–Wallis test after subtracting the median from each group. These tests are indicative of differences in the shapes of the distributions after removing differences in central tendency. See the text for a full justification and details on the procedures we used.
[c]Tests of significance for differences in the injection drug use distributions were computed with maximum-likelihood ordered logistic regression. These tests are indicative of differences in the distributions of injection drug use risk across groups. See the text for a full justification and details on the procedures we used.

Continued

TABLE 3—Continued

to this difference. Researchers have used 3 methods to calculate summary scores, each of which has limitations:

1. *Counting episodes of behaviors:* Some researchers count episodes of risk behaviors, presuming that the more frequently a subject engages in a behavior, the greater the risk.[80–89] This method is easily implemented but lacks sensitivity.

2. *Ranking behaviors based on opinion:* Other investigators rank the subjects' behaviors (less risky to more risky) and assign increments of risk based on investigators' opinions[80–89] or those of experts in the field.[90]

3. *Ranking behaviors based on the probability of seroconversion:* This approach is the most promising[79,91] but requires reliable and valid empirical data on the probability of seroconversion. However, these studies are currently in progress.

To overcome these limitations, we used the single-parameter item response model, also called the Rasch model.[92,93] We chose the Rasch model for 3 reasons. First, Rasch indexes are easily computed. Second, because Rasch indexes are based on observed criteria, distances on the scale are empirically derived, not imposed (as shown below). Third, the Rasch index is more sensitive than the 3 methods listed above, because it combines several observed behaviors into a single scale of risk that used empirical criteria to rank the relative HIV and AIDS risk of behaviors and to assign distances between them.[92–97] Although the computation of the Rasch model is straightforward, the suitability of the data to the model must be assessed carefully. We first discuss the computation of the model; we

then discuss the appropriateness of the model for these data.

In the logit scale, the Rasch model is represented as $\mathrm{logit}(p_{ij}) \mid \Theta_i = \Theta_i - \Delta_j$, where p_{ij} is the probability that subject i responded positively to item j; Θ_i is an estimated ability parameter for each subject (1 parameter for each subject); and Δ_j is a difficulty parameter for each item (1 parameter for each item). In the context of this study, the subject's *ability* refers to the risk level of the person, and the item *difficulty* refers to the level of risk associated with the behavior. Thus, p_{ij} represents the probability that the subject i actually engaged in behavior j. We wished to estimate Δ, or the difficulty of each of our polytomous responses. To do this, we replicated each case for each response category, computed indicator variables coded positive for subjects who chose each response, and applied conditional maximum likelihood,[98] treating the Θ parameters as fixed effects.[99] The result is unremarkable if a single polytomous variable is evaluated, because each observed response is simply ranked on how extreme it is relative to other responses. However, when evaluating more than 1 polytomous variable, the model assigns distances between categories simultaneously. The resulting index provides a continuous measure from less to more extreme behaviors; the behaviors are ranked on extremity in the context of other behaviors. The utility of the Rasch model for our purposes is that it ranks the responses to several questions simultaneously, and the assigned rankings are mutually conditioned by the several polytomous variables.

Although the computations are straightforward, the validity of the Rasch model must be assessed. Are more rare behaviors

in fact more risky? Is the behavioral dimension we identified in fact a measure of risky behaviors? We assessed the validity of the scale in 2 ways. First, we evaluated items for how well they fit with other items as indicators of risk. As shown in Table 1, the intermediate responses on the use of protection were relatively rare and thus more extreme in the Rasch scale. Examination found that more rare intermediate responses were associated with more risky behaviors. In fact, most women reporting 1 or 2 sex partners either always or never used protection, whereas women who reported many partners were more likely to report inconsistent protective practices. This was true for oral, anal, and vaginal sex. The face validity of the model was good; more extreme Rasch scores were associated with more extreme behaviors.

The Rasch model is the simplest item response model. It imposes the fewest assumptions and estimates the fewest parameters. This simplicity makes Rasch more appealing than more complex models. For example, the graded response model[100] would seem appropriate given the apparent ordinal ranking of the scale from "never use protection" to "always use protection." However, imposing ordinality would conceal the association between intermediate levels of protection and risky behaviors.

We also examined the data for heterogeneity in the Δ parameters. We examined age, race/ethnicity, and numbers of sex partners for heterogeneity in the Δs. We found that the Δs varied across quartiles of the number of sex partners. Thus, we included parameters for these quartiles in the final model to condition for this heterogeneity.

Because the position of the final scale on the number line is arbitrary, we scaled the final sexual and injection drug use risk scores to range from 0 to 100. Details of both the sexual risk and the injection drug use risk measurement models are available from the first author. We used different statistical techniques to analyze the sexual risk and the injection drug use HIV and AIDS risk scales.

Analysis of Sexual HIV and AIDS Risk Behaviors

The sexual risk measure was highly skewed, as was the distribution of least squares residuals. Because Rasch indexes use empirical criteria to assign distances between points and because the thick tail of the distribution contains important information, it is inappropriate to transform the distribution toward normality.

Our analysis had 2 aims. First, we assessed differences in the central tendency of the sexual risk measure across groups. Second, we compared differences in the shapes of the distributions across groups.

We chose a robust m-estimator[101–104] to test differences in central tendency. M-estimators downweight cases with large residuals. There are numerous formulas for assigning weights, but in all cases, the results are more resistant to the influence of a relatively few cases or to skewed distributions. We used the 2-stage robust regression module in Stata.[103,105] Huber's median absolute deviation first downweights cases with large absolute residuals. Tukey's biweight is then used to downweight all cases as a smooth decreasing function of the residual. This combination offers Gaussian efficiency while correcting for outlying observations. We examined several potential tuning constants to assess the best estimator. Because our sample was stratified by race/ethnicity and charge type, we conditioned all tests on these variables.[106,107] For the remainder of this article, *average* refers to the central tendency of a distribution; the *mean* and the *median* are distinct and specific indicators of central tendency.

To assess differences in the shapes of the sexual risk distributions, we used the Kruskal–Wallis test, the most efficient non-parametric test for comparing distributions across multiple groups.[108] We first subtracted the median from each group to remove the influence of the central tendency. Thus, our tests reflected differences in the shapes of the sexual risk distributions.

Analysis of Injection Drug Use HIV and AIDS Risk Behaviors

We collected relatively few indicators of injection drug use risk (Table 2). The injection drug use risk score has only 8 categories; 92.8% of the sample scored zero (reported no injection drug use). For this reason, the distribution of the injection drug use Rasch index is too coarse for many statistical techniques. We therefore treated the injection drug use risk measure as an ordinal categorical variable and applied maximum-likelihood ordered logistic regression to assess differences in injection drug use risk across groups. Ordered logistic regression makes minimal distributional assumptions but offers efficient tests of significance for an ordered dependent variable.[109,110] Again, because the sample was stratified by race/ethnicity and charge type, all tests were conditioned on these variables.[106,107]

Which Key Subgroups Are at Greatest Risk?

Table 3 reports the final HIV and AIDS risk scales, by demographic characteristics, arrest status, history of arrest, and selected *Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition (DSM-III-R)* diagnoses. We report means for both scores. We report medians and 90th percentiles for the sexual risk score and 95th and 99th percentiles for the injection drug use risk score to indicate differences in the shapes of distributions. We used the summary scores to identify which key subgroups are at greatest risk.

Demographics. Table 3 shows that there are striking differences in sexual and injection drug use risk scores across race/ethnicity. Non-Hispanic White women had higher mean sexual and injection drug use risk scores than did other female jail detainees. Hispanic women had somewhat higher injection drug use risk scores than did African American women. Older women were more likely to report high injection drug use risk. The median injection drug use risk for women younger than 30 was zero; the median for women older than 30 was greater than 40.

Arrest charge. An arrest is often accompanied by several charges. We examined several classifications of arrest charge (e.g., violent vs nonviolent, felony vs misdemeanor, drug vs nondrug). Table 3 shows that women charged with a felony had significantly lower sexual risk scores than did those jailed on only misdemeanor charges. The injection drug use risk score, however, did not vary by type of charge. Specific classes of felony showed no significant differences in sexual or injection drug use risk, and arrest for misdemeanor violence (usually simple assault) did not distinguish women on either sexual or injection drug use risk scores. Women arrested for misdemeanor property charges did not report higher average sexual risk but did have thicker upper tails on the sexual risk distribution. Drug charges were strongly associated with higher sexual risk distributions and higher injection drug use risk scores.

Prior arrests. Women in jail for the first time had significantly lower sexual risk scores than did women with any prior arrest; the upper tails of the sexual risk scores were higher for women with a prior juvenile arrest or any prior arrest. Women with prior juvenile arrests did not report higher injection drug use risk. However, women with any prior arrest did report higher injection drug use risk. Women with prior arrests for serious crimes (e.g., attempted murder and assault) did not report higher sexual or injection drug use risk. However, women with prior arrests for several less serious charges did report higher HIV and AIDS risk behaviors. Women with prior misdemeanor weapons arrests reported higher average sexual risk. Women with prior arrests for possession of controlled substances, sale of drugs, prostitution, and theft or stealing all reported higher average sexual risk scores, thicker tailed sexual risk distributions, and higher injection drug use risk scores. Except for weapons charges, less serious misdemeanor charges were associated with higher injection drug use risk scores.

Mental disorder. Table 3 shows that women with severe *DSM-III-R* disorders had quite high mean sexual risk scores and the highest 90th percentile sexual risk score of any reported group. The median for this group was not the most extreme (27.8). This indicates that a subset of women with serious mental

illness engaged in the most extreme sexual risk behaviors: 1 in 10 women with severe mental disorder scored 63.8 or higher on the sexual risk scale. Severe mental disorder also was associated with higher injection drug use risk behaviors. However, this association was not as extreme as for the sexual risk score. Not surprisingly, women with alcohol or drug dependence had higher average levels of sexual risk and more extreme sexual and injection drug use risk scores.

DISCUSSION

Our study provides empirical evidence that HIV and AIDS risk behaviors are extremely prevalent among women in jail and that there are distinct markers for women at greatest risk:

• Non-Hispanic Whites are at high risk for sexually and injection drug use–transmitted HIV and AIDS.

• Older women in jail are at particular risk for injection drug use–transmitted HIV infection and AIDS.

• Women arrested for misdemeanors and nonviolent crimes—drug crimes, prostitution, and theft—are at high risk for both sexually and drug-transmitted HIV infection and AIDS.

• Women with substance abuse disorders are at high risk for both sexually and injection drug use–transmitted HIV infection and AIDS.

• Women with severe mental illness have the most extreme sexual risk behaviors.

Interventions should begin—but not end—with the women jailed for less serious offenses. These women engage in the most serious HIV and AIDS risk behaviors, and these women will return to the community the soonest.

This study had several limitations. First, we had data from only 1 urban jail. Although our subjects were similar to those in urban jails nationwide (e.g., poor, young, and disproportionately racial/ethnic minorities),[111] we need studies of smaller jails, especially those in rural areas. Second, the data were collected in the 1990s. Because of the importance of educating jail populations in reducing the overall HIV and AIDS epidemic, research on these populations must become a priority.

Despite these limitations, our study suggested that providing HIV and AIDS education to jail detainees could reduce the HIV and AIDS epidemic in the population as a whole. Our findings confirmed the view of public health professionals who have long emphasized the need to intervene with jailed and imprisoned populations.[28,112–115] Many women at particular risk for HIV and AIDS—women who use drugs, women who trade sex for money or drugs, homeless women, and women with mental illness—will eventually cycle through the jail. Because most jail detainees return to their communities within days, providing HIV and AIDS education in the jail must become a public health priority. In short, good correctional health *is* good public health. ■

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Contributors

G.M. McClelland directed the data operation, conceptualized and executed the analysis, drafted the article, and prepared all tables. L.A. Teplin, the principal investigator, directed the project and helped craft the presentation. K.M. Abram directed the field study. N. Jacobs assisted with the literature review and did preliminary analyses of the data. All authors participated in the preparation of the final article.

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