

Dissolution of Committed Partnerships during Incarceration and STI/HIV-Related Sexual Risk Behavior after Prison Release among African American Men

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Abstract Incarceration is strongly associated with post-release STI/HIV risk. One pathway linking incarceration and STI/HIV risk may be incarceration-related dissolution of protective network ties. Among African American men released from prison who were in committed partnerships with women at the time of incarceration ($N=207$), we measured the association between committed partnership dissolution during incarceration and STI/HIV risk in the 4 weeks after release. Over one-quarter (28%) experienced incarceration-related partnership dissolution. In adjusted analyses, incarceration-related partnership dissolution was strongly associated

with post-release binge drinking (adjusted odds ratio (AOR) 4.2, 95% confidence interval (CI); 1.4–15.5). Those who experienced incarceration-related partnership dissolution were much more likely to engage in multiple/concurrent partnerships or sex trade defined as buying or selling sex (64%) than those who returned to the partner (12%; AOR 20.1, 95% CI 3.4–175.6). Policies that promote maintenance of relationships during incarceration may be important for protecting health.

Keywords Incarceration · STI · HIV · African American · Partnerships

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Introduction

Incarceration is considered a social determinant of STI/HIV in the US [1] given its consistent association with post-release sexual risk behavior and STI/HIV [2–8]. One pathway that may link incarceration and STI/HIV risk is incarceration-related disruption of protective network ties. Incarceration disrupts substantial proportions of committed partnerships [9, 10]. If an inmate loses a partner during incarceration, he may seek new partners upon release. Partnership dissolution may impact mental health [11], leading to self-medication with substance use [12]; both mental disorders and substance use are established risk factors for sexual risk-taking and infection [13–15].

The purpose of this study was to describe the association between dissolution of committed partnerships during incarceration and former inmates' post-release STI/HIV-related sex risk-taking. We describe 1-month follow-up findings of Project DISRUPT, a study conducted among African American men incarcerated in North Carolina who were in heterosexual committed partnerships at prison entry and who were followed during community re-entry. We measure 1-month post-release outcomes given this is a period of instability and drug risk-taking [16, 17]; substantial proportions initiate sexual activity within weeks of release [18] and evidence suggests risky behaviors during this time period are common [19]. We recruited incarcerated men, because men experience a disproportionate burden of incarceration [20] and understanding STI/HIV determinants among men has relevance to risk among women given of the majority of women are infected as a result of sex with a male partner [21]. The study focused on heterosexual partnerships given strong extant evidence suggesting incarceration influences sexual risk behavior and STI/HIV among former male inmates and their female partners [2–8]. The aim of this study was to measure associations between incarceration-related committed partnership dissolution and STI/HIV-related sex risk [9, 10], as well as mental health and substance use factors given the association of these factors with STI/HIV risk [13–15].

Methods

Study Setting and Population

As previously described [22], Project DISRUPT recruited participants from minimum and medium security

facilities in the North Carolina Department of Public Safety (NCDPS) from September 2011 to January 2014. Participants were African American men at least 18 years of age scheduled to be released within 2 months; incarcerated less than 36 months; HIV-negative at prison entry based on testing at prison intake; not held in segregation; not currently incarcerated for rape, murder, or kidnapping; in a committed partnership with a woman at prison entry (i.e., “a woman in your life who you were having sex with regularly and who you felt committed to”); residing in the community for at least 6 months before the current incarceration; able to read and write in English; and willing to provide informed consent and post-release contact information. Of 477 eligible individuals, 207 enrolled. The Institutional Review Boards of NCDPS, New York University School of Medicine, the University of North Carolina at Chapel Hill, and the University of Florida approved all study activities.

Data Collection

At the baseline (in-prison) and follow-up study visit, trained research assistants (RAs) administered a survey that measured sociodemographics, mental health, substance use, sexual risk behavior, partner characteristics, and relationship characteristics. The 1-month follow-up visit window was 2–14 weeks after release; the median number of days after release that 1-month visits occurred was 43 days. Participants completing the visit in the window were asked to report on experiences and behaviors in the past 4 weeks. Among 14 participants who participated in a follow-up visit outside the study visit window, we administered a “one month catch-up” module and asked participants to report on behaviors and experiences in the 4 weeks after release from incarceration.

Post-release interviews were conducted by RAs either in-person in a private setting in the participant's community (73%) or via telephone when not feasible such as when the participant had moved outside of central NC (27%). Most of the survey components in face-to-face interviews used audio computer-assisted self-interview (ACASI) software to reduce social desirability bias. Remuneration for study participation was not provided during incarceration, per NCDPS policies. After release, participants received \$50 for completion of each follow-up interview.

Measures

Exposure Committed partnership dissolution was based on report of the relationship status at baseline. However, to prevent exposure misclassification, additional information from follow-up was used to code exposure status among 29% of participants who were unaware of the relationship status during the incarceration (i.e., the partner may have ended the relationship yet the participant was not yet aware of this until after release).

Outcomes

Mental disorder symptoms, substance use, sexual risk-taking in the 4 weeks after release.

Mental Disorder Symptoms

Depressive symptoms were measured using a five-item version of the Centers for Epidemiologic Studies Depression (CES-D) scale, with scores ≥ 4 indicating symptoms indicative of major depressive disorder, the cut-point proportional to that for complete 20-item CES-D [13, 14, 22, 23]. Participants rated stress assessing domains including overall stress and stress about housing, food security, health, employment, and violence on a one to 10 scale [24]; responses to each of six topics were summed to create a score and dichotomized at the 75th percentile given the strong associations with psychopathology using this cut-point [14].

Substance Use

Binge drinking was defined as consuming ≥ 5 standard drinks on a typical day. We analyzed use of marijuana, the most commonly used drug, and crack/cocaine given the high prevalence and consistent correlations with sexual risk behaviors at baseline [22]. Use of these drugs was assessed using a modified version of the National Institute on Drug Abuse Risk Behavior Assessment (RBA) Tool [25].

Sexual Risk-Taking

We examined a combined indicator of multiple/concurrent sex partners or sex trade (concurrent partnerships, non-concurrent multiple partnerships, or buying or selling sex). Inconsistent condom use with new/casual partners was defined as failure to use a condom

100% of the time when having sex with these partners. Participants who reported having sex while drunk and/or high were considered to have had sex while intoxicated. Participants who reported sex with partners who “definitely” or “probably” had other sexual partners currently, had ever engaged in sex work, or had ever been diagnosed with an STI were coded as having sex with a partner at elevated risk of infection.

Potential Confounders

Antisocial personality disorder (ASPD) was measured using the Structured Clinical Interview for DSM-IV module [13, 26] and executive function (EF) with the Wisconsin Card Sorting Test [27] in which a raw perseverative error score at the highest quartile (score ≥ 14) was considered indicative of impaired executive function; history of perpetration of intimate partner violence by report of whether the participant and/or his partner used physical violence and/or a weapon against the other in the 6 months before the incarceration; and relationship happiness at baseline by report of being “very happy,” “extremely happy,” or “perfect” in the relationship. We considered the baseline measure of each outcome as a potential confounder. Because age, socioeconomic factors (education, employment), length of incarceration, and the number of children/dependents were not associated with partnership loss and/or the outcomes, these factors were not assessed as confounders to optimize statistical power.

Baseline Characteristics to Evaluate Differences by Follow-up Participation

We compared potential confounders and background factors including baseline age, education, employment, most serious offense for the current incarceration, marital status, and biologically confirmed STI based on urine nucleic acid amplification testing (NAAT) for detection of *Chlamydia trachomatis*, *Neisseria gonorrhoeae* (Aptima Combo 2, Hologic|Gen-Probe, Inc.), and *Trichomonas vaginalis* (Aptima T. vaginalis analyte-specific reagents, Hologic|Gen-Probe, Inc.) by follow-up participation status and relationship dissolution status.

Analyses

We compared characteristics by participation status and relationship dissolution status using *t* tests and chi-

Table 1 Baseline characteristics among participants who participated in follow-up versus did not participate in follow-up ($n = 207$)

Characteristic	Participated in follow-up ($n = 94$)* n(%) / mean \pm std	Did not participate in follow-up ($n = 113$)* n(%) / mean \pm std	<i>p</i> value
Age	36.9 \pm 9.6	32.4 \pm 9.0	< 0.001
Education status			0.84
Completed high school	58 (67.4)	70 (66.0)	
Did not complete high school	28 (32.6)	36 (34.0)	
Employment status [†]			0.99
Employed full/part-time	49 (61.3)	62 (61.4)	
Not employed	31 (38.8)	39 (38.6)	
Current incarceration for a violent crime			0.99
Yes	25 (26.6)	30 (26.6)	
No	69 (73.4)	83 (73.4)	
Married to committed partner			0.11
Yes	20 (23.8)	15 (14.6)	
No	64 (76.2)	88 (85.4)	
Degree of relationship happiness [†]			0.82
Happy	29 (34.9)	34 (33.3)	
Unhappy	54 (65.1)	68 (66.7)	
Participant perpetrated IPV [†]			0.07
Yes	36 (45.0)	32 (31.7)	
No	44 (55.0)	69 (68.3)	
Committed partner perpetrated IPV [†]			0.46
Yes	45 (55.6)	50 (50.0)	
No	36 (44.4)	50 (50.0)	
Depressive symptoms [†]			0.64
Yes	32 (34.0)	42 (37.2)	
No	62 (66.0)	71 (62.8)	
Elevated stress [†]			0.29
Yes	21 (25.0)	33 (32.0)	
No	63 (75.0)	70 (68.0)	
Antisocial personality disorder			0.07
Yes	17 (20.0)	11 (10.7)	
No	68 (80.0)	92 (89.3)	
Impaired executive function			0.70
Yes	22 (26.2)	29 (28.7)	
No	62 (73.8)	72 (71.3)	
Binge drinking on typical day [†]			0.49
Yes	19 (24.4)	19 (20.0)	
No	59 (75.6)	76 (80.0)	
Lifetime frequent marijuana use			0.03
Yes	50 (60.2)	76 (75.3)	
No	33 (39.8)	25 (24.8)	
Lifetime crack/cocaine use			0.03
Yes	40 (48.2)	33 (32.4)	
No	43 (51.8)	69 (67.6)	
Multiple/concurrent partnerships [†]			0.49
Yes	41 (50.6)	45 (45.5)	

*Individual indicator percentages may not sum to totals due to missing value

[†]In the 6 months before participant's incarceration

Table 1 (continued)

Characteristic	Participated in follow-up (<i>n</i> = 94)* n(%)/ mean ± std	Did not participate in follow-up (<i>n</i> = 113)* n(%) / mean ± std	<i>p</i> value
No	40 (49.4)	54 (54.5)	
Sex trade involvement†			0.15
Yes	12 (14.5)	8 (7.8)	
No	71 (85.5)	94 (92.2)	
Inconsistent condom use with new/casual partners†			0.53
Yes	37 (46.3)	49 (51.0)	
No	43 (53.8)	47 (49.0)	
Sex while intoxicated†			0.92
Yes	67 (82.7)	83 (82.2)	
No	14 (17.3)	18 (17.8)	
Sex with high-risk partners†			0.80
Yes	21 (26.6)	28 (28.3)	
No	58 (73.4)	71 (71.7)	
Biologically -confirmed STI			0.51
Yes	9 (10.7)	8 (7.9)	
No	75 (89.3)	93 (92.1)	
Partnership status			0.73
Together	60 (71.4)	75 (72.8)	
Not together	15 (18.9)	19 (18.5)	
Do not know	8 (9.5)	9 (8.7)	

squared tests. We estimated unadjusted and adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for associations between committed partnership dissolution and adverse outcomes. We used backwards elimination to identify the set of confounding variables necessary to include in each final model to optimize validity and parsimony [28] ensuring the OR derived from each final model was no greater than 10% different than the OR derived from the fully-adjusted model which included all potential confounders. All analyses were conducted using SAS v9.4 (Cary, NC).

Results

Participant Baseline Characteristics

Approximately 55% were lost to follow-up (LTF). Those who completed follow-up were comparable to those LTF on most factors (Table 1). However, participation was associated with higher levels of lifetime crack/cocaine use, and though not significant at the

0.05 level, higher risk of buying and/or selling sex, ASPD, and violence in relationships, suggesting participants represented a group at elevated STI/HIV risk versus those LTF.

Associations between Partnership Dissolution during Incarceration and Baseline Characteristics

Among those who participated in the follow-up, 28% (*n* = 26) were categorized as having experienced incarceration-related committed partnership dissolution. Relationship dissolution status was not associated with most characteristics measured on the baseline interview (Table 2). However, those who experienced relationship dissolution during incarceration were more likely to report experience of depressive symptoms, frequent marijuana use, and sexual risk behaviors in the 6 months before incarceration versus those who remained with partners during incarceration.

Relationship dissolution status was not significantly different among those who completed the survey with

Table 2 Baseline characteristics by incarceration-related partnership dissolution status ($N = 94$)

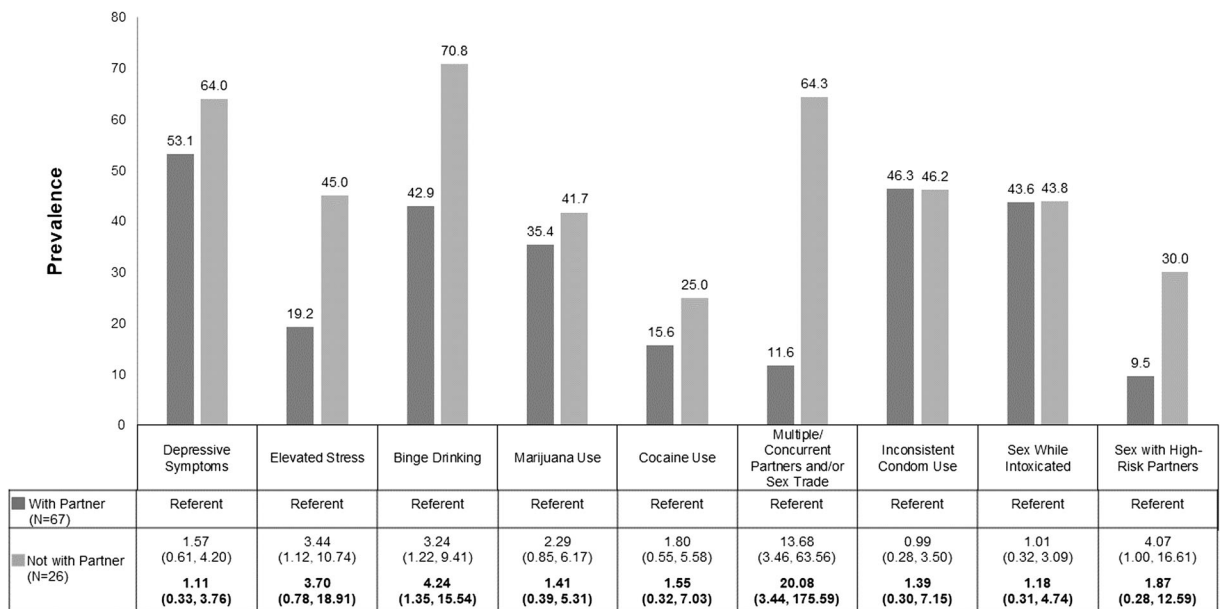
Characteristic	Still with committed partner ($N = 67$) n(%) / mean \pm std	No longer with committed partner ($N = 26$) n(%) / mean \pm std	<i>p</i> value
Age	37.3 \pm 9.4	36.2 \pm 10.5	0.62
Education status			0.91
Completed high school	40 (66.7)	17 (68.0)	
Did not complete high school	20 (33.3)	8 (32.0)	
Employment status [†]			0.96
Employed full/part-time	35 (61.4)	14 (60.9)	
Not employed	22 (38.6)	9 (39.1)	
Current incarceration for a violent crime			0.08
Yes	14 (20.9)	10 (38.5)	
No	53 (79.1)	16 (61.5)	
Married to committed partner			0.15
Yes	17 (27.9)	3 (13.0)	
No	44 (72.1)	20 (87.0)	
Degree of relationship happiness [†]			0.38
Happy	38 (62.3)	16 (72.7)	
Unhappy	23 (37.7)	6 (27.3)	
Participant perpetrated IPV [†]			0.75
Yes	25 (43.9)	11 (47.8)	
No	32 (56.1)	12 (52.2)	
Committed partner perpetrated IPV [†]			0.04
Yes	28 (48.3)	17 (73.9)	
No	30 (51.7)	6 (26.1)	
Depressive symptoms [†]			0.05
Yes	19 (28.4)	13 (50.0)	
No	48 (71.6)	13 (50.0)	
Elevated stress [†]			0.20
Yes	13 (21.3)	8 (34.8)	
No	48 (78.7)	15 (65.2)	
Antisocial personality disorder			0.14
Yes	10 (16.1)	7 (30.4)	
No	52 (83.9)	16 (23.5)	
Impaired executive function			0.10
Yes	13 (21.3)	9 (39.1)	
No	48 (78.7)	14 (60.9)	
Binge drinking on typical day [†]			0.49
Yes	9 (16.4)	10 (43.5)	
No	46 (83.6)	13 (56.5)	
Lifetime frequent marijuana use			0.04
Yes	32 (53.3)	18 (78.3)	
No	28 (46.7)	5 (21.7)	
Lifetime crack/cocaine use			0.15
Yes	26 (43.3)	14 (60.9)	
No	34 (56.7)	9 (39.1)	

*Individual indicator percentages may not sum to totals due to missing values

[†]In the 6 months before participant's incarceration

Table 2 (continued)

Characteristic	Still with committed partner (N = 67) n(%) / mean ± std	No longer with committed partner (N = 26) n(%) / mean ± std	p value
Multiple/concurrent partnerships†			0.002
Yes	23 (39.7)	18 (78.3)	
No	35 (60.3)	5 (21.7)	
Sex trade involvement†			0.001
Yes	4 (6.7)	8 (34.8)	
No	56 (93.3)	15 (65.2)	
Inconsistent condom use with new/casual partners†			0.24
Yes	24 (42.1)	13 (56.5)	
No	33 (57.9)	10 (43.5)	
Sex while intoxicated†			0.01
Yes	44 (75.9)	23 (100.0)	
No	14 (24.1)	0 (0.0)	
Sex with high-risk partners†			0.02
Yes	11 (19.3)	10 (45.4)	
No	46 (80.7)	12 (54.6)	
Biologically -confirmed STI			0.22
Yes	5 (8.2)	4 (17.4)	
No	56 (91.8)	19 (82.6)	



*Graph indicates prevalence of outcomes by partnership dissolution status and table below indicates unadjusted (plain text) and adjusted (bold) odds ratios for associations. Potential confounders included ASPD, executive function, IPV by either partner or self, degree of happiness, and corresponding outcome measured at baseline. Backwards elimination was used to identify confounders based on a 10% change in the estimated effect size.

Fig. 1 Associations between dissolution of committed partnerships during incarceration and mental health, substance use, and sexual risk-taking in the 4 weeks after release*

ACASI (28%) versus a phone interview (23%; $p = 0.61$).

Associations between Partnership Dissolution during Incarceration and Mental Health, Substance Use, and Sexual Risk-Taking in the 4 Weeks after Release

Incarceration-related partnership dissolution was not associated with post-release depressive symptoms (Fig. 1) but was strongly associated with stress (OR = 3.44, 95% CI 1.12, 10.74). In adjusted models, the strength of the association appeared to remain, though it became less precise and was not significant at the 0.05 level (adjusted OR = 3.70, 95% CI 0.78, 18.91) (see [Supplemental Table](#) for confounders retained in backwards elimination model-building procedure). In both unadjusted and adjusted analyses, incarceration-related partnership dissolution was associated with binge drinking (AOR = 4.24, 95% CI 1.35, 15.54) but was not statistically significantly associated with drug use. Participants who experienced incarceration-related partnership dissolution were much more likely to report having multiple/concurrent sex partners or sex trade (64%) than those who returned to a partner (12%; OR = 13.68, 95% CI 3.46, 63.56). The association remained in multivariable models though adjustment greatly reduced precision (AOR = 20.1, 95% CI 3.44, 175.6). Those who lost a partner during incarceration were more likely than those returning to a partner to have sex with someone at elevated infection risk after release (OR = 4.07, 95% CI 1.00, 16.61) but the association was attenuated in adjusted models and became less precise. Loss of a committed partner was not associated with inconsistent condom use with new/casual partners or sex while intoxicated.

Discussion

In this small cohort, we observed that African American men who experienced incarceration-related partnership dissolution faced disproportionate stress, binge drinking, sexual risk behavior, and exposure to high-risk sex partners in the weeks after release compared with those returning to partners. Over 60% who experienced partnership dissolution reported multiple/concurrent partnerships or sex trade upon release versus approximately 10% of those whose partnerships remained intact, and this strong association persisted in multivariable

analyses that considered a broad range of confounders measured at baseline including mood and personality factors, executive function, relationship characteristics, and baseline drug and sexual risk factors. The most important study limitation is the modest cohort size which was further diminished by considerable attrition. Though participants were comparable to those lost to follow-up on most characteristics, analyses suggest those who participated may represent a somewhat higher-risk group. There is no extant literature to inform understanding of the impact of losing a partner during incarceration in higher- versus lower-risk populations hence we cannot make inferences about the direction of the potential bias. Additional important limitations include the potential for social desirability bias which may have been differential by relationship status though underreporting was mitigated by ACASI use across groups and by the potential for residual confounding despite attempts to carefully measure and control for a range of confounders.

Despite study limitations, the results provide preliminary evidence to suggest dissolution of partnerships during incarceration/release plays a role in the established association between incarceration and post-release STI/HIV risk.[2–8]. The results highlight the need for further research on incarceration-related partnership dissolution and STI/HIV risk in larger samples and different types of couples and for testing of couple-level STI/HIV prevention interventions that foster relationship skills while reducing relationship violence [29–32]. The findings also indicate criminal justice policies that maintain current levels of visitation and reduce barriers to communication during incarceration, important for inmates' well-being, may protect against post-release STI/HIV risk.

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