



HIV-Related Sexual Risk among African American Men Preceding Incarceration: Associations with Support from Significant Others, Family, and Friends

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Abstract We evaluated the association between social support received from significant others, family, and friends and HIV-related sexual risk behaviors among African American men involved in the criminal justice system. Project DISRUPT is a cohort study among African American men released from prison in North Carolina ($N=189$). During the baseline (in-prison) survey, we assessed the amount of support men perceived they had

received from significant others, family, and friends. We measured associations between low support from each source (<median value) and participants' sex risk in the 6 months before incarceration. Low levels of social support from significant others, family, or friends were associated with poverty and homelessness, mental disorders, and substance use. Adjusting for age, poverty, and other sources of support, perceiving low support from significant others was strongly associated with multiple partnerships (fully adjusted odds ratio (OR) 2.64, 95% confidence interval (CI) 1.29–5.42). Low significant other support also was strongly associated with sex trade involvement when adjusting for age and poverty status (adjusted OR 3.51, 95% CI 1.25–9.85) but further adjustment for low family and friend support weakened the association (fully adjusted OR 2.81, 95% CI 0.92–8.55). Significant other support was not associated with other sex risk outcomes including concurrent partnerships, anal sex, or sex with an STI/HIV-infected partner. Low family support was associated with multiple partnerships in analyses adjusting for age and poverty (adjusted OR 1.98, 95% CI 1.05–3.76) but the association weakened and was no longer significant after adjusting for other sources of support (fully adjusted OR 1.40, 95% CI 0.65–3.00); family support was not correlated with other risk behaviors. Friend support was not significantly associated with sex risk outcomes. Indicators of overall support from any source were not associated with sex risk outcomes. Helping inmates maintain ties may improve economic security and well-being during community re-entry, while supporting and strengthening relationships with a significant other in particular may help reduce sex risk. Studies should evaluate the protective

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effects of distinct support sources to avoid masking effects of support and to best understand the influence of social support on health.

Keywords Social support · Prison release · Sexual behavior · HIV · African American

Introduction

Individuals who pass through jails and prisons in the USA face disproportionate risk of HIV infection, both before incarceration and after release [1–4]. During re-entry into the community after incarceration, individuals must reestablish independence, employment, housing, and relationships. The stress associated with re-entry may amplify risk of HIV through sexual risk-taking or drug use that existed prior to incarceration [2, 4, 5]. Improved understanding of factors that may protect individuals involved in the criminal justice system against engaging in HIV risk behaviors in their community remains an important public health priority [2, 6]

The social support networks that inmates leave behind and to which they return may promote well-being and reduce sexual behaviors that drive HIV risk. According to the *Stress-Buffering Effect of Social Ties and Health Model*, social support protects health in the face of stressful life events by enabling positive coping and providing material/economic support; these factors in turn promote positive health decision-making [7]. During a stressful event, perceived or received social support may mitigate the negative emotional response or physiologic and/or behavioral response to stress [7]. Given that individuals involved in the criminal justice system are believed to experience higher levels of stress both before incarceration and during re-entry, perceived social support may act as a buffer from stress by enabling these individuals to cope, [7–13] which in turn may reduce determinants of risky sex including substance use and mental disorders [14–19].

Social support is protective against mental disorders and HIV-related drug use and sex risk among those involved in the criminal justice system [19–22]. In one study, social support indicators, such as social consistency, integration, and extensiveness, were protective against hard drug use and sexual risk behavior among former male inmates during the 6 months after release [19]. Specifically, participants whose social relationships remained relatively stable after release were much less likely to report hard drug use (18%) versus those with inconsistent relationships (57%), and

social consistency was associated with a nearly 50% reduction in number of sexual partnerships [19].

While social support may offer protection against some sexual risk behaviors during community re-entry, different sources of support—from a significant other, a family member, or a friend—may offer differential protection against sex risk while in the community. Members of our group and others have observed that having a significant other is strongly associated with protection against sexual risk-taking behaviors such as multiple and concurrent partnerships before incarceration and after release; however, the effects of other sources of support on sexual risk-taking were not assessed [23–25]. Significant other support may offer particularly strong protection against sexual risk-taking compared to other forms of support, and those who do not return home to a significant other after prison release may seek new and/or multiple partners to meet companionship or financial needs [19]. Other groups also have highlighted the potential importance of significant others in protecting against HIV-related outcomes, including drug use and unprotected sex [26, 27]. However, the characteristics of the relationship that may be most protective and driving the perception of support from significant others are unknown. Although marital and cohabiting relationships have been associated with reduced sexual risk behaviors, the impact of other relational characteristics on sexual risk-taking have not been explored [28, 29].

Support from family members, including parents, aunts, and children, has also demonstrated importance [20, 21, 30–32]. For example, Muñoz-Laboy et al. highlighted the role of family in protecting against depression, a consistent HIV risk factor, among formerly incarcerated Latino men [14, 21, 33]. The literature on the relationship between friend support and HIV risk, however, is mixed. While there is evidence that support from friends may be protective, there is vast literature suggesting peer networks also may increase risk-taking, such as drug use [11, 34, 35].

Few studies to our knowledge have directly compared the associations between different support types and HIV risk. Hence, there is a lack of understanding about which sources of social support may provide greatest protection against HIV sexual risk, including among those involved in the criminal justice system. Improved understanding of the sources of support in the community that are most strongly associated with protection against HIV risk for those involved in the criminal justice system could inform expansion of correctional facility-based pre-release and discharge programs and community based re-entry programs that aim to mitigate HIV risk by helping inmates bolster protective

community ties. If family ties offer the greatest protection, family strengthening programs that currently focus on marital or cohabiting partnerships should be expanded to include other family members [36].

The purpose of the current study was to assess associations between different sources of social support and HIV-related sex risk before incarceration among African American men incarcerated in North Carolina. The study used data from Project DISRUPT (Disruption of Intimate Stable Relationships Unique to the Prison Term), a cohort study conducted to evaluate the degree to which support from a committed partner may buffer against the effects of stress, drug use, and HIV sex risk during re-entry [37]. Using baseline data collected during incarceration, we sought to describe the levels of pre-incarceration perceived support from three sources (significant others, family, and friends) and the relationship with socio-demographic background factors (e.g., age and poverty); describe the association between perceived support and mental disorder and substance use factors that may mediate the relationship between social support and sex risk; and compare associations between each source of support and HIV-related sexual risk behavior and sex with high-risk partners. Since there is limited understanding about which aspects of these relationships offer greatest perception of support, an additional study aim was to describe the characteristics of relationships that offer the greatest levels of perceived support. Because existing literature has suggested that social support protects against behavioral risk by improving mental health and socioeconomic status, we sought to also describe the association between perceived social support and indicators of well-being, including socio-demographics, mental disorder symptoms, and substance use. We hypothesized that low social support would be associated with poverty, mental disorders, and substance use, and that low support from a significant other would be a particularly strong correlate of sex risk.

Methods

Study Design

We recruited DISRUPT participants from the North Carolina Department of Public Safety (NCDPS) from September 2011 to January 2014 and surveyed participants in prison just before release [37]. Eligible individuals were African American men, at least 18 years of age, anticipating release within 2 months, had been incarcerated less

than 3 years, HIV-negative when incarcerated, and had a female intimate partner at the time of prison entry (participants with more than one committed partner were eligible if able to identify one partner that was most important). The baseline survey utilized audio-computer-assisted self-interview surveys with trained research assistants. This study was approved by the Institutional Review Boards of the University of North Carolina at Chapel Hill, University of Florida, New York University School of Medicine, and NCDPS.

Exposure Variable: Social Support

Social support in the 6 months before incarceration was assessed in the survey using the Multidimensional Scale of Perceived Social Support (MSPSS). MSPSS measures significant other, family, and friend support using three, four-item subscales which ask participants to rate the degree to which they agree with statements of positive support (e.g., “There is a special person who is around when I am in need,” “My family really tries to help me,” “I can count on my friends when things go wrong”) from strongly disagree (1) to strongly agree (5) [38]. Potential scores from each social support subscale (family, friend, significant other) ranged from 4 to 20, with increasing scores indicating higher levels of support. The indicator of overall social support, a summation of the scores of each of the three scales, ranged from 12 to 60. Because the relationship with the support score was not found to be linear in the log odds of multiple sex risk outcomes, this suggests inclusion of continuous support indicators would violate logistic regression model assumption. Hence, the individual and composite summed scales were dichotomized at the median, as has been done in prior studies validating the MSPSS [39, 40]. Participants scoring below the median were classified as having “low” levels of support from that source. Two participants did not provide responses to all questions for the social support scales and were excluded from analyses.

Outcome Variables: Sexual Risk Behavior and Sex with High-Risk Partners

The following dichotomous sexual risk behaviors in the 6 months before incarceration were measured in the baseline interview: multiple partnerships, defined as having two or more sexual partnerships; concurrent sexual partnerships, defined as having sex with one partner during an overlapping time period the participant was having sex with

someone else; sex trade involvement, defined as buying or selling sex to a woman for money, drugs, or housing; anal sex with a female partner; and sex with a partner who ever “definitely” or “probably” had a STI or HIV.

Socio-demographics, Mental Disorder Symptoms, and Binge Drinking in the 6 Months Before Incarceration

The *Stress-Buffering Effect of Social Ties and Health Model* indicates that social support may protect health by providing material/economic support which in turn can protect mental health and in turn physical health. Hence, to describe the social and economic context of those with low levels versus high levels of social support, we examined the associations between social support and age; indicators of poverty in the 6 months before incarceration including concern that the inmate or his family did not have enough money to pay housing/utility bills, homelessness, and concern about having enough food; and mental health and binge drinking, which was commonly reported in the sample [37]. We measured depression using a modified five-item version of the Center for Epidemiological Studies Depression Scale (CES-D) [41]. The modified version, with scores ranging from 0 to 15, considered scores ≥ 4 to indicate depression, which was the calibrated equivalent to the original scale cutoff [42]. In a subsample of participants, anxiety was assessed using the Trait section of the State-Trait Anxiety Inventory, [43] with scores ≥ 40 indicative of clinical anxiety risk [44]. Stress was evaluated using a seven-question scale, where participants rated their stress level related to aspects of health, housing, and general living in the community on a scale of 1 to 10. Scores were summed (range 7–70) and dichotomized at the 75th percentile (scores ≥ 35), with higher scores indicating high stress.

We examined binge drinking, defined as drinking ≥ 5 standard drinks on a typical day, a highly common form of substance use that we observed to be strongly linked to HIV-related sex risk [37]. According to the model, these mental health and substance use indicators are hypothesized to mediate the relationship between social support and reduced sex risk. While the model also indicates that material support may protect economic well-being and hence the poverty indicators also may mediate the relationship between support and sex risk, given current poverty also is highly correlated with lifetime experience of poverty, poverty indicators also are potentially

important confounding factors of the relationship between support and sex risk.

Relationship Characteristics

To examine which characteristics may characterize relationships with high significant other support, we measured the length of participant’s relationship with their committed partner, whether they had raised a child together, whether they had a biological child together and the number of children they shared, whether they kept in touch during incarceration, and if they were married. Participants were also asked if, in the 6 months prior to incarceration, they had lived with their partner and had either given to or received help from their committed partner to pay for needs (food, housing, or clothing). Participants rated their degree of happiness in the relationship with their partner, which was then dichotomized to “extremely unhappy,” “fairly unhappy,” “a little unhappy,” or “happy” versus “very happy,” “extremely happy,” or “perfect.”

Having ever experiencing intimate partner violence from their committed partner, defined as being hit, slapped, kicked, dragged, pushed, shoved, choked, had something thrown, or had a weapon used or threatened against them, was dichotomized as “ever” versus “never.” Respondents reporting that his partner was “definitely” or “probably” having sex with other people during the same time she was in a sexual relationship with him were considered to have a non-monogamous committed partner, compared to those responding “maybe,” “probably not,” “definitely not,” or “don’t know.”

Statistical Analyses

SAS 9.3 (SAS Institute Inc., Cary, NC) was used to conduct the analyses. To describe the social and economic context of those with low versus high levels of support, we conducted bivariate analyses to assess associations between overall social support and socio-demographics, mental health characteristics, and binge drinking. We evaluated bivariate and multivariate associations between a significant other, family, friend, and overall support and the sex risk outcomes. We adjusted for age and poverty as indicated by concern about paying bills, the highest prevalence poverty indicator that also was strongly linked to social support. We did not adjust for mental health and substance use factors. The conceptual model on which we base our analyses, the *Stress-Buffering Effect of Social*

Ties and Health Model, suggests social support influences mental health and in turn substance use. These factors hence may serve as mediators of the relationship between social support and sexual risk behavior and should not be treated as confounding factors. To better understand characteristics of supportive significant other relationships, we measured the association between relationship characteristics with a committed partner and high perceived significant other support.

Results

Out of 1426 incarcerated men identified through pre-screening as possible participants, 477 (33.5% of 1426) were eligible. Of those eligible, a total of 207 men (43.4% of 477) agreed to participate in the study [37]. However, the analytical sample was reduced to 189 participants due to data corruption and subsequent loss of baseline surveys. Participants and eligible non-participants did not differ on socio-demographic characteristics. Approximately, 90% of both participants and non-participants reported having one committed partner versus more than one (participants 90%, non-participants 86%; $p = 0.21$); participants with more than one committed partner were asked to identify the most important partner on whom to report over the course of the study.

Overall, 49.2% of the analytic sample reported having “low” social support; approximately 41.8% of participants were defined as having low significant other support, 39.7% had low family support, 43.9% had low friendship support, and 17.4% were considered to have low levels of all three support sources.

The median age in the sample was 32 years. In the 6 months before incarceration, approximately 30% were concerned about paying bills, 18% had been homeless, and over one-fifth reported concern about food security. Nearly 40% had symptoms indicative of major depressive disorder based on the modified CES-D and one-third reported symptoms indicative of anxiety. Surprisingly, most participants scored low on the perceived stress scale that assessed stress while in the community (mean score 27 on a scale from 7 to 70).

Associations between Low Social Support and Socio-demographics and Mental Health

Participants with the lowest levels of overall support had over four times the odds of being homeless (OR 4.15,

95% CI 1.76–9.77) and nearly twice the odds of being concerned about ability to pay bills (OR 1.90, 95% CI 1.00–3.59) in the 6 months before incarceration compared to those with high levels of support (Table 1). Low support also was strongly associated with depressive symptoms (OR 3.15, 95% CI 1.70–5.81), elevated stress levels (OR 2.01, 95% CI 1.03–3.90), and anxiety (OR 2.37, 95% CI 1.18–4.74). Low overall support was associated with increased odds of binge drinking on a typical day in the 6 months before incarceration (OR 2.23, 95% CI 1.05–4.73).

Social Support and Sexual Risk

Many participants reported sexual risk-taking in the 6 months prior to incarceration, with 41.8% reporting multiple partnerships and 32.8% with concurrent partnerships (Table 2). Approximately 11% reported sex trade involvement. In addition, 19% of the men reported anal sex with a woman.

Low family support was not associated with concurrent partnerships, sex trade, sex with an STI/HIV-infected partner, or anal sex. In unadjusted models, low family support was associated with increased odds of multiple partnerships (OR 1.91, 95% CI 1.04–3.52). However, when adjusting for socio-demographics, significant other, and friend support, this relationship was no longer significant (fully adjusted OR 1.40, 95% CI 0.65–3.00). Attenuation was likely due to the strong correlations between family and significant other support.

Unadjusted and adjusted analyses suggested that low friendship support in the 6 months before incarceration was not associated with any of the sexual risk indicators.

Low significant other support was strongly associated with increased odds of multiple partnerships when controlling for socio-demographics (adjusted OR 3.01, 95% CI 1.53–5.92). When controlling for the effects of family and friend support in the fully adjusted model, the relationship between significant other support and multiple partnerships was slightly attenuated, yet remained significant (fully adjusted OR 2.64, 95% CI 1.29–5.42). Those with low levels of significant other support had over three times the odds of sex trade involvement than those with high levels of support in both unadjusted and models adjusted for socio-demographics (adjusted OR 3.51, 95% CI 1.25–9.85). However, the relationship lost significance after additional adjustment for other forms of social support (fully adjusted OR 2.81, 95% CI 0.92–8.55).

Table 1 Respondent characteristics and perceived overall social support among 189 incarcerated African American males aged 19 to 60 years in North Carolina

	No. ^a	Percent (%) ^a	Percent with low overall social support (%)	Unadjusted odds ratio of low overall social support (95% confidence interval)
Socio-demographic characteristics				
Age				
19–25	40	21.3	47.5	1 (reference)
26–30	37	19.7	46.0	0.94 (0.38, 2.30)
31–45	82	43.6	52.5	1.22 (0.57, 2.61)
>45	29	15.4	48.3	1.03 (0.40, 2.69)
Concerned that you and/or your family may not have enough to pay bills ^b				
No	119	63.3	44.5	1 (reference)
Yes	58	30.9	60.3	1.90 (1.00, 3.59)
Ever a time that you considered yourself to be homeless ^b				
No	148	78.7	43.0	1 (reference)
Yes	34	18.0	76.5	4.15 (1.76, 9.77)
Concerned about having enough food for you and/or your family ^b				
No	138	73.4	47.1	1 (reference)
Yes	43	22.9	60.5	1.72 (0.86, 3.45)
Mental health				
Symptoms indicative of major depression disorder (per CES-D Scale) ^b				
No	113	60.1	38.4	1 (reference)
Yes	74	39.4	66.2	3.15 (1.70, 5.81)
Perceived stress ^b				
Low	137	72.9	44.9	1 (reference)
High	50	26.6	62.0	2.01 (1.03, 3.90)
Anxiety ^b				
Low	77	41.0	41.6	1 (reference)
High	59	31.4	62.7	2.37 (1.18, 4.74)
Substance use				
Binge drinking on a typical day ^b				
No	135	71.8	46.3	1 (reference)
Yes	38	20.2	65.8	2.23 (1.05, 4.73)

Overall, 49.2% of the analytic sample reported having “low” collective social support

^a Totals may not sum to 100% due to missing values

^b Within 6 months prior to incarceration

Characteristics of Supportive Significant Other Relationships

Specific relationship characteristics were associated with high perceived significant other support (Table 3). Being married (OR 2.92, 95% CI 1.25–6.83), raising a child together (OR 1.92, 95% CI 1.02–3.62), being together 3 years or more (OR 2.31, 95% CI 1.01–5.28), cohabiting (OR 1.94, 95% CI 1.02–3.70), and

being very happy (OR 1.92, 95% CI 1.01–3.63) in the 6 months prior to incarceration were more prevalent among those reporting high significant other support. Keeping in touch with a committed partner during incarceration was strongly associated with perceived significant other support (OR 4.63, 95% CI 1.21–17.72). Conversely, reporting non-monogamy of the respondent’s committed partner (OR 0.32, 95% CI 0.12–0.84) and intimate partner violence inflicted by the

Table 2 Odds ratios (ORs) and 95% confidence intervals (CIs) for the associations between perceived level of social support from family, friends, and a significant other and HIV sexual risk behaviors among African American incarcerated men aged 19 to 60 years in North Carolina ($n = 189$)

	Percent (%) with HIV risk behavior ^a	Unadjusted	Adjusted ^c	Fully adjusted ^d
≥2 sexual partners^b				
Family support				
High ($N = 112$)	38.3	Ref	Ref	Ref
Low ($N = 75$)	54.3	1.91 (1.04, 3.52)	1.98 (1.05, 3.76)	1.40 (0.65, 3.00)
Friendship support				
High ($N = 104$)	41.0	Ref	Ref	Ref
Low ($N = 83$)	49.4	1.40 (0.77, 2.55)	1.49 (0.80, 2.78)	1.06 (0.52, 2.19)
Significant other support				
High ($N = 108$)	34.9	Ref	Ref	Ref
Low ($N = 79$)	59.2	2.70 (1.45, 5.02)	3.01 (1.53, 5.92)	2.64 (1.29, 5.42)
Composite social support				
High ($N = 94$)	38.5	Ref	Ref	–
Low ($N = 93$)	51.2	1.68 (0.92, 3.05)	1.77 (0.94, 3.34)	
Concurrent sexual partners^b				
Family support				
High ($N = 112$)	33.0	Ref	Ref	Ref
Low ($N = 75$)	36.1	1.15 (0.61, 2.14)	1.30 (0.67, 2.50)	0.91 (0.42, 1.97)
Friendship support				
High ($N = 104$)	29.4	Ref	Ref	Ref
Low ($N = 83$)	40.5	1.63 (0.88, 3.03)	1.71 (0.89, 3.28)	1.66 (0.80, 3.44)
Significant other support				
High ($N = 108$)	32.1	Ref	Ref	Ref
Low ($N = 79$)	37.3	1.26 (0.68, 2.35)	1.56 (0.80, 3.04)	1.45 (0.71, 2.96)
Composite social support				
High ($N = 94$)	33.0	Ref	Ref	–
Low ($N = 93$)	35.6	1.12 (0.61, 2.07)	1.39 (0.73, 2.68)	
Sex trade involvement^b				
Family support				
High ($N = 112$)	7.2	Ref	Ref	Ref
Low ($N = 75$)	16.2	2.49 (0.97, 6.43)	2.43 (0.92, 6.44)	1.22 (0.38, 3.92)
Friendship support				
High ($N = 104$)	6.8	Ref	Ref	Ref
Low ($N = 83$)	15.9	2.58 (0.98, 6.81)	2.61 (0.97, 7.04)	1.89 (0.61, 5.85)
Significant other support				
High ($N = 108$)	5.6	Ref	Ref	Ref
Low ($N = 79$)	18.0	3.68 (1.35, 10.07)	3.51 (1.25, 9.85)	2.81 (0.92, 8.55)
Composite social support				
High ($N = 94$)	6.5	Ref	Ref	–
Low ($N = 93$)	15.2	2.60 (0.95, 7.10)	2.41 (0.86, 6.72)	
Anal sex^b				
Family support				
High ($N = 112$)	23.2	Ref	Ref	Ref
Low ($N = 75$)	14.9	0.58 (0.28, 1.26)	0.55 (0.25, 1.21)	0.43 (0.17, 1.08)

Table 2 (continued)

	Percent (%) with HIV risk behavior ^a	Unadjusted	Adjusted ^c	Fully adjusted ^d
Friendship support				
High (<i>N</i> = 104)	20.2	Ref	Ref	Ref
Low (<i>N</i> = 83)	19.5	0.96 (0.46, 1.98)	0.94 (0.45, 1.96)	1.24 (0.54, 2.82)
Significant other support				
High (<i>N</i> = 108)	19.4	Ref	Ref	Ref
Low (<i>N</i> = 79)	20.5	1.07 (0.52, 2.21)	1.17 (0.55, 2.47)	1.50 (0.67, 3.39)
Composite social support				
High (<i>N</i> = 94)	20.2	Ref	Ref	–
Low (<i>N</i> = 93)	19.6	0.96 (0.47, 1.97)	0.95 (0.45, 1.98)	
Sex with an STI/HIV-infected partner ^b				
Family support				
High (<i>N</i> = 112)	12.2	Ref	Ref	Ref
Low (<i>N</i> = 75)	16.4	1.42 (0.61, 3.32)	1.35 (0.56, 3.26)	0.95 (0.34, 2.67)
Friendship support				
High (<i>N</i> = 104)	11.0	Ref	Ref	Ref
Low (<i>N</i> = 83)	17.5	1.71 (0.73, 4.02)	1.61 (0.67, 3.85)	1.48 (0.56, 3.92)
Significant other support				
High (<i>N</i> = 108)	11.4	Ref	Ref	Ref
Low (<i>N</i> = 79)	17.3	1.63 (0.70, 3.79)	1.77 (0.73, 4.32)	1.65 (0.63, 4.30)
Composite social support				
High (<i>N</i> = 94)	11.1	Ref	Ref	–
Low (<i>N</i> = 93)	16.7	1.60 (0.68, 3.78)	1.61 (0.66, 3.91)	

^a Overall, 41.8% reported multiple partnerships, 32.8% concurrent partnerships, 10.6% sex trade, and 19.0% anal sex in the 6 months before incarceration. Totals of risk behavior by support status may not sum to 100% due to missing values

^b Within 6 months prior to incarceration

^c Adjusted for age and poverty

^d Adjusted for age, poverty, and the other sources of social support

committed partner toward the respondent (OR 0.50, 95% CI 0.27–0.92) were significantly associated with decreased odds of high significant other support.

Discussion

In this sample of African American men involved in the criminal justice system, low social support was strongly linked to reduced well-being and increased HIV-related sex risk behavior prior to incarceration. Participants with low levels of support were vulnerable to poverty, mental disorder symptoms, and binge drinking, as well as to multiple partnerships and sex trade prior to the incarceration. This study is among the first to directly compare the impact of different sources of social support on

sexual risk behaviors. The findings suggest that support from a significant other—versus from family more broadly defined and/or from friends—may play an important role in protecting against sexual risk behavior. Specifically, low significant other support was associated with over twice the odds of multiple partnerships, after adjusting for age, poverty, and family and friend support. Our results suggest that pre-release interventions focused on maintaining and strengthening social ties to loved ones in the community, particularly ties to significant others, during incarceration may help reduce HIV sexual risk behaviors during community re-entry.

Our findings expand those of previous studies to delineate the independent effects of different sources of support on sexual risk-taking [7, 12, 18, 19] and support extant studies highlighting the importance of

significant others in protecting against HIV risk-taking behaviors, such as multiple partnerships and sex trade involvement [23, 24, 45, 46]. By directly comparing distinct sources of support, the current study has been able to underscore the salience of significant other support in reduced HIV risk. We also observed that certain characteristics of committed partnerships were associated with higher levels of perceived significant other support. Specifically, raising a child, marriage, cohabitation, and happiness with a committed partner were elevated among those with greater perceived support from their significant other, while partner's non-monogamy and partner-inflicted violence were strongly linked to lower levels of support. The heterogeneity of inmates' relationships should be considered when developing programs to support and strengthen support networks during incarceration. For example, we currently are piloting a couple-level intervention for inmates and community partners that was developed in part based on DISRUPT findings in which we aim to strengthen skills in anger management and emotion regulation by training inmates and partners in mindfulness-based activities that can be used in stressful, emotionally taxing situations. Some couples—such as those affected by intimate partnership violence—may need to strengthen skills in emotion regulation more than others to improve distress intolerance and increase partnership stability, happiness, and support. We need to consider the range of challenges that different couples face to best support the broad range of inmates' partnerships, some of which are highly supportive at baseline, and others of which have strong potential to serve as an important source of support for both partners.

Low family support also was linked to heightened sex risk. It was associated with nearly twice the odds of multiple partnerships when adjusting for age and poverty, though the association did not remain after adjustment for other sources of support. As reported in previous studies, our results illustrate that family support can be helpful to community reintegration and may offer protection against sexual risk, as well as anxiety and depression, known HIV risk factors [19–22, 32, 47]. There was a strong relationship between significant other support and family support; those with high significant other support had 5.05 times the odds (95% CI 2.68–9.52) of high family support. The association between family support and sex risk would therefore be attenuated when adjusting for significant other support given the relationship between significant other support

and reduced sex risk. There is need to further clarify the influence of support from other family members (e.g., parents and sibling) versus from significant others on HIV risk-taking behavior.

Support from friends was not significantly associated with HIV sex risk outcomes. Current literature on peer influence has shown both positive and negative effects on sexual risk behavior in adolescent populations, and similarly conflicting findings also have been observed among adults [11, 34, 35]. For example, Seal et al. indicated among former male inmates that having extensive networks of relationships during re-entry, including friendships, was linked to higher levels of unprotected vaginal and anal intercourse [19]. We did not find evidence to suggest being well-connected to peer networks was associated with elevations in risk. Additional studies with larger samples may be powered to detect more modest effects of friendship support on reduced HIV risk.

Our results suggest that measurement of overall support, without differentiating between sources of support, may result in masked protective effects of support from certain sources. For example, even though low significant other support was associated with over three times the odds of multiple partnerships and sex trade in analyses adjusting for age and poverty, overall support was not significantly associated with these outcomes. The results underscore the need to include nuanced social support measures that differentiate between support sources.

In the past decades, numerous individual-level HIV prevention interventions have been implemented to address sex risk among incarcerated populations. Such interventions have incorporated individual risk reduction delivered through case management, peer education, and/or motivational interviewing models and many have seen success in prevention of HIV risk [48–51]. However, the persistently high levels of infection among inmates suggest alternative intervention strategies would strengthen risk reduction efforts during community re-entry. Our findings indicate that involving intimate partners or family with individual prevention or risk reduction plans may aid in reducing HIV among incarcerated men. We found keeping in touch with an intimate partner during incarceration was associated with increased perceived significant other support. Thus, jail and prison-based programs should reduce barriers to maintaining healthy ties to reduce sexual risk behaviors.

Table 3 Associations of respondent characteristics and perceived support from a significant other among 189 incarcerated African American males aged 19 to 60 years in North Carolina

	No. ^a	Percent with high significant other support (%)	Unadjusted odds ratio of high significant other support (95% confidence interval)
Length of the relationship			
Less than 1 year	31	48.4	1 (reference)
1 to 2 years	44	41.9	0.77 (0.30, 1.95)
3 or more years	95	68.4	2.31 (1.01, 5.28)
Cohabiting ^b			
No	57	49.1	1 (reference)
Yes	116	65.2	1.94 (1.02, 3.70)
Financial codependence ^b			
No	15	60.0	1 (reference)
Yes	168	58.9	0.96 (0.33, 2.81)
Raised a child together			
No	59	49.2	1 (reference)
Yes	117	65.0	1.92 (1.02, 3.62)
Number of children together			
None	102	52.9	1 (reference)
1 child	46	60.9	1.35 (0.67, 2.75)
2 or greater children	31	71.0	2.13 (0.89, 5.07)
Has a biological child with committed partner			
No	102	53.5	1 (reference)
Yes	77	64.9	1.61 (0.88, 2.97)
Degree of happiness in relationship ^b			
Unhappy/happy	121	52.9	1 (reference)
Very happy	63	68.3	1.92 (1.01, 3.63)
Married			
No	151	53.6	1 (reference)
Yes	35	77.1	2.92 (1.25, 6.83)
Committed partner's non-monogamy			
No	164	61.0	1 (reference)
Yes	21	33.3	0.32 (0.12, 0.84)
Partner-inflicted intimate partner violence			
Never	85	67.1	1 (reference)
Ever	95	50.5	0.50 (0.27, 0.92)
Partner been in touch during incarceration ^c			
No	12	25.0	1 (reference)
Yes	173	60.7	4.63 (1.21, 17.72)

Overall, 41.8% of the analytic sample reported having “high” significant other support

^aTotals may not sum to 100% due to missing values

^bWithin 6 months prior to incarceration

^cKeeping in touch during incarceration is defined by any form of contact such as letters, phone calls, or visits

This study is limited by several potential measurement concerns. First, the study cross-sectional data structure has limited interpretability and has resulted in the potential for reversed causality. We hypothesize a relationship between low support and increased multiple partnership risk was observed because perceived low levels of support lead a participant to seek additional partners. However, it is

possible in some cases that the participant may have been non-monogamous initially, which in turn may have resulted in his partner providing less support. Another measurement limitation was the potential for recall bias given respondents were asked to report on perceived social support and risk behaviors in the 6 months prior to incarceration. Moreover, given respondents had been incarcerated

for different lengths of time, recall difficulties may have affected participants who were incarcerated for longer sentences. However, by design, we ensured the maximum sentence for enrollment was 3 years as a way to reduce recall bias. As a result, the median sentence length was approximately 4 months, the mean was 7 months, and approximately 85% of participants were incarcerated for less than 1 year. Furthermore, our analyses suggested that sentence length was not associated with significant other, family, or friend support; thus, we anticipated confounding by this factor to be minimal. Another limitation was that the scale used to assess family support did not ask respondents to specify levels of support received from non-significant other family members. Thus, participants may have considered significant others when answering questions concerning family support hence blurring the lines between “family” versus “significant other” support. That said, numerous prior studies have used the scale to assess sources of support. An additional limitation is that, because all variables were assessed at one point in time, we made assumptions about which variables were likely confounders and which variables should be considered as mediating factors and hence should be excluded from models. Specifically, we adjusted for age and a poverty indicator (e.g., ability to pay bills) in multivariate models but did not adjust for other mental health and substance use factors given that prior literature suggests they lie in the pathway between the social support and HIV risk [7, 12, 15, 18]. Additional studies in larger samples should formally evaluate the pathways through which social support may protect against sexual risk-taking.

This study highlights the beneficial role of support from significant others in reducing sexual risk-taking behaviors among incarcerated men and emphasizes the importance of assessing multiple sources of social support, rather than overall support, to effectively tailor post-release efforts. Our findings suggest that interventions that integrate individual prevention efforts with goals to encourage, strengthen, and nurture social ties with significant others may help reduce sex risk behavior in this high-risk population during the vulnerable period after release from incarceration.

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References

1. Khan MR, Epperson MW, Mateu-Gelabert P, Bolyard M, Sandoval M, Friedman SR. Incarceration, sex with an STI- or HIV-infected partner, and infection with an STI or HIV in Bushwick, Brooklyn, NY: a social network perspective. *Am J Public Health*. 2011; 101(6): 1110–7.
2. Khan MR, Doherty IA, Schoenbach VJ, Taylor EM, Epperson MW, Adimora AA. Incarceration and high-risk sex partnerships among men in the United States. *J Urban Health*. 2009; 86(4): 584–601.
3. Epperson M, El-Bassel N, Gilbert L, Orellana ER, Chang M. Increased HIV risk associated with criminal justice involvement among men on methadone. *AIDS Behav*. 2008; 12(1): 51–7.
4. Epperson M, El-Bassel N, Gilbert L, Chang M. Examining the temporal relationship between criminal justice involvement and sexual risk behaviors among drug-involved men. *J Urban Health*. 2010; 87(2): 324–36.
5. Harawa N, A A. Incarceration, African Americans, and HIV: advancing a research agenda. *J Natl Med Assoc*. 2008; 100(1): 57–62.
6. Adams LM, Kendall S, Smith A, Quigley E, Stuewig JB, Tangney JP. HIV risk behaviors of male and female jail inmates prior to incarceration and one year post-release. *AIDS Behav*. 2013; 17: 2685–94.
7. Kawachi I, Berkman LF. Social ties and mental health. *J Urban Health*. 2001; 78(3): 458–67.
8. Grieb SM, Crawford A, Fields J, Smith H, Harris R, Matson P. “The stress will kill you”: prisoner reentry as experienced by family members and the urgent need for support services. *J Health Care Poor Underserved*. 2014; 25(3): 1183–200.
9. Western B, Braga AA, Davis J, Sirois C. Stress and hardship after prison. *AJS*. 2015; 120(5): 1512–47.
10. Anderson RE, Geier TJ, Cahill SP. Epidemiological associations between posttraumatic stress disorder and incarceration in the National Survey of American Life. *Crim Behav Ment Health*. 2016; 26(2): 110–123.
11. Brady SS, Dolcini MM, Harper GW, Pollack LM. Supportive friendships moderate the association between stressful life events and sexual risk taking among African American adolescents. *Health Psychol*. 2009; 28(2): 238–48.
12. Kunitz SJ. Social capital and health. *Br Med Bull*. 2004; 69: 61–73.
13. Visher C, La Vigne NG, Travis J. *Returning Home: Understanding the Challenges of Prisoner Reentry, Maryland Pilot Study: Findings from Baltimore*. Washington, DC: Urban Institute Justice Policy Center; 2004.
14. Ramrakha S, Caspi A, Dickson N, Moffitt TE, Paul C. Psychiatric disorders and risky sexual behaviour in young adulthood: cross sectional study in birth cohort. *BMJ*. 2000; 321(7256): 263–6.
15. Mazzaferro KE, Murray PJ, Ness RB, Bass DC, Tyus N, Cook RL. Depression, stress, and social support as

- predictors of high-risk sexual behaviors and STIs in young women. *J Adolesc Health*. 2006; 39(4): 601–3.
16. Khan MR, Kaufman JS, Pence BW, et al. Depression, sexually transmitted infection, and sexual risk behavior among young adults in the United States. *Arch Pediatr Adolesc Med*. 2009; 163(7): 644–52.
 17. Santelli JS, Robin L, Brener ND, Lowry R. Timing of alcohol and other drug use and sexual risk behaviors among unmarried adolescents and young adults. *Fam Plann Perspect*. 2001; 33(5): 200–5.
 18. Qiao S, Li X, Stanton B. Social support and HIV-related risk behaviors: a systematic review of the global literature. *AIDS Behav*. 2014; 18: 419–41.
 19. Seal DW, Eldridge GD, Kacanek D, Binson D, Macgowan RJ. A longitudinal, qualitative analysis of the context of substance use and sexual behavior among 18- to 29-year-old men after their release from prison. *Soc Sci Med*. 2007; 65(11): 2394–406.
 20. Johnson JE, Esposito-Smythers C, Miranda R Jr, Rizzo CJ, Justus AN, Clum G. Gender, social support, and depression in criminal justice involved adolescents. *Int J Offender Ther Comp Criminol*. 2011; 55(7): 1096–109.
 21. Munoz-Laboy M, Severson N, Perry A, Guilamo-Ramos V. Differential impact of types of social support in the mental health of formerly incarcerated Latino men. *Am J Mens Health*. 2013.
 22. Feaster DJ, Grinstead Reznick O, Zach B, McCartney K, Gregorich SE, Brincks AM. Health status, sexual and drug risk, and psychosocial factors relevant to postrelease planning for HIV+ prisoners. *J Correct Health Care*. 2013; 19(4): 278–92.
 23. Khan MR, Behrend L, Adimora AA, Weir SS, White BL, Wohl DA. Dissolution of primary intimate relationships during incarceration and implications for post-release HIV transmission. *J Urban Health*. 2011; 88(2): 365–75.
 24. Harman JJ, Smith VE, Egan LC. The impact of incarceration on intimate relationships. *Crim Justice Behav*. 2007; 34: 794–815.
 25. Khan MR, Behrend L, Adimora AA, Weir SS, Tisdale C, Wohl DA. Dissolution of primary intimate relationships during incarceration and associations with post-release STI/HIV risk behavior in a southeastern city. *Sex Transm Dis*. 2011; 38(1): 43–7.
 26. Unger JB, Kipke MD, De Rosa CJ, Hyde J, Ritt-Olson A, Montgomery S. Needle-sharing among young IV drug users and their social network members: the influence of the injection partner's characteristics on HIV risk behavior. *Addict Behav*. 2006; 31(9): 1607–18.
 27. Miller M, Neaigus A. Sex partner support, drug use and sex risk among HIV-negative non-injection heroin users. *AIDS Care*. 2002; 14(6): 801–13.
 28. Adimora AA, Schoenbach VJ, Doherty IA. Concurrent sexual partnerships among men in the United States. *Am J Public Health*. 2007; 97(12): 2230–7.
 29. Adimora AA, Schoenbach VJ, Bonas DM, Martinson FE, Donaldson KH, Stancil TR. Concurrent sexual partnerships among women in the United States. *Epidemiology*. 2002; 13(3): 320–7.
 30. Arditti JA. Families and incarceration: an ecological approach. *Fam Soc*. 2005; 86(2): 251–60.
 31. Perkins-Dock RE. Family interventions with incarcerated youth: a review of the literature. *Int J Offender Ther Comp Criminol*. 2001; 45(5): 606–25.
 32. Crosby RA, DiClemente RJ, Wingood GM, et al. HIV/STD-protective benefits of living with mothers in perceived supportive families: a study of high-risk African American female teens. *Prev Med*. 2001; 33(3): 175–8.
 33. Williams CT, Latkin CA. The role of depressive symptoms in predicting sex with multiple and high-risk partners. *J Acquir Immune Defic Syndr*. 2005; 38(1): 69–73.
 34. Seal DW, Margolis AD, Sosman J, Kacanek D, Binson D, The Project START Study Group. HIV and STD risk behavior among 18- to 25-year-old men released from U.S. prisons: provider perspectives. *AIDS Behav*. 2003;7(2): 131–141.
 35. Carlos JA, Bingham TA, Stueve A, et al. The role of peer support on condom use among black and latino MSM in three urban areas. *AIDS Educ Prev*. 2010; 22(5): 430–44.
 36. U.S. Department of Health and Human Services. *Incarceration and the family: a review of research and promising approaches for serving fathers and families*. 2008. Research Triangle Park, North Carolina.
 37. Khan MR, Golin CE, Friedman SR, et al. STI/HIV sexual risk behavior and prevalent STI among incarcerated African American men in committed partnerships: the significance of poverty, mood disorders, and substance use. *AIDS Behav*. 2015; 19(8): 1478–90.
 38. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. *J Pers Assess*. 1988; 52(1): 30–41.
 39. Pedersen SS, Spinder H, Erdman RAM, Denollet J. Poor perceived social support in implantable cardioverter defibrillator (ICD) patients and their partners: cross-validation of the multidimensional scale of perceived social support. *Psychosomatics*. 2009; 50(5): 461–7.
 40. Wu JR, Frazier SK, Rayens MK, Lennie TA, Chung ML, Moser DK. Medication adherence, social support, and event-free survival in patients with heart failure. *Health Psychol*. 2013; 32(6): 637–46.
 41. Radloff L. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas*. 1977; 1: 385–401.
 42. Coogan PF, Yu J, O'Conner GT, Brown TA, Palmer JR, Rosenberg L. Depressive symptoms and the incidence of adult-onset asthma in African American women. *Ann Allergy Asthma Immunol*. 2014.
 43. Spielberger CD, Gorsuch RL, Lushene RE. *Manual for the State-Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychologists Press; 1970.
 44. Kruyen PM, Emons WHM, Sijtsma K. Shortening the S-STAI: consequences for research and clinical practice. *J Psychosom Res*. 2009; 75: 167–72.
 45. Grewen KM, Girdler SS, Amico J, Light KC. Effects of partner support on resting oxytocin, cortisol, norepinephrine, and blood pressure before and after warm partner contact. *Psychosom Med*. 2005; 67: 531–8.

46. Manzoli L, Villari P, Pirone GM, Boccia A. Marital status and mortality in the elderly: a systematic review and meta-analysis. *Soc Sci Med*. 2007; 64(1): 77–94.
47. Visher CA. Incarcerated fathers: pathways from prison to home. *Crim Justice Policy Rev*. 2013; 24(1): 9–26.
48. Freudenberg N, Ramaswamy M, Daniels J, Crum M, Ompad DC, Vlahov D. Reducing drug use, human immunodeficiency virus risk, and recidivism among young men leaving jail: evaluation of the REAL MEN re-entry program. *J Adolesc Health*. 2010; 47: 448–55.
49. Grinstead OA, Zack B, Faigeles B, Grossman N, Blea L. Reducing postrelease HIV risk among male prison inmates: a peer-led intervention. *Crim Justice Behav*. 1999; 26(4): 453–65.
50. Grinstead O, Zack B, Faigeles B. Reducing postrelease risk behavior among HIV seropositive prison inmates: the health promotion program. *AIDS Educ Prev*. 2001; 13(2): 109–19.
51. Wolitski RJ. Relative efficacy of a multisession sexual risk-reduction intervention for young men released from prisons in 4 states. *Am J Public Health*. 2006; 96(10): 1854–61.