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Ana-Maria Drobeniuc Date

In and Out: Predictors of 1-year Recidivism and Locus of Care among Persons Living with HIV released from Jail

By

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Epidemiology

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Abstract

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By Ana-Maria Drobeniuc

Background: Disproportionate levels of HIV infection among incarcerated persons make correctional facilities (CFs) a critical site for interventions to facilitate transition of care into the community. Stable community care transitions are often challenging due to substantial risk for recidivism in this population. Sustained, Unbroken Connection to Care, Entry Services and Suppression (SUCCESS), is a strengths-based case management (CM) intervention to increase linkage and retention in care upon release. We investigate factors associated with recidivism, examine changes in behavior/attitude, and describe correctional versus community locations of HIV care over 1 year following the intervention.

Methods: In this non-randomized feasibility study, we enrolled 56 intervention group participants and 52 individuals in a comparison group from Fulton County Jail in Atlanta, GA. Recidivism data on 44 intervention and 45 comparison participants were collected over 1 year using database searches from three local area jails. We examined bivariate associations with recidivism using Chi square and Fisher's exact tests, and determined a multivariable logistic regression model. Responses to baseline and 12-month surveys among 28 participants were examined for changes in self-efficacy, social support, HIV stigma, access to care, medication adherence, and housing. We also examined the proportion of participants who received care at community sites versus correctional sites using state electronic HIV/AIDS reporting system (eHARS) data.

Results: Intervention group participants were marginally less likely to return to jail within one year following release versus the comparison group (50% versus 62%, $P = 0.24$). Among intervention participants, risky drug use, baseline viral load $\leq$ 200 copies HIV-1 RNA/mL, and younger age were associated with increased odds of recidivism (aOR 8.63, 95% CI [1.55, 48.07]; aOR 11.2, 95% CI [1.09, 114.50]; aOR 2.06, 95% CI [0.44, 9.67]). Those who completed at least four of six CM sessions reported better access to care at follow-up ($P = 0.02$). Intervention group members connected to community care at a higher rate versus comparators (68% vs. 58%), and 20% fewer obtained HIV care at a Georgia CF.

Conclusion: Substance use treatment and socio-structural support are needed to reduce recidivism concurrently with facilitating community care transitions among persons living with HIV.

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Table of Contents

Chapter I

Literature Review

Incarceration in the United States

At yearend 2015, over 6.7 million U.S. adults, about 1 in 37 or 2.7% of the general population, were under some form of correctional supervision, including incarceration in jail or prison, and community supervision such as probation or parole. Of these, 2.2 million were incarcerated in jail or prison. The total correctional population decreased by 1.7% during 2015 due to decreases in both the number of persons under community supervision and those incarcerated. The 2015 total population represents a decline from a 2007 peak of 7.3 million total persons under supervision, 2.3 million of whom were in jail or prison (1). Despite recent declines in overall incarceration, racial and ethnic disparities remain significant in the criminal justice system. People of color represented 64% of all US prisoners in 2015, despite only representing about 20% of the total U.S. population (2). Black and Hispanic/Latino men are the most disproportionately affected, with 1 in 3 and 1 in 6, respectively, expected to go to prison in their lifetimes if current incarceration rates remain constant, compared to 1 in 17 among their white counterparts (3-5).

National policies, including the war on drugs and mandatory minimum sentencing for minor drug offenses, led to increased policing and disproportionate incarceration of urban, impoverished populations, and communities of color (6). As a result, substance use is more common than not in criminal justice settings, affecting 83% of adults behind bars, nearly two-thirds of whom meet medical criteria for a drug or alcohol use disorder or addiction (7). The National Center on Addiction and Substance Abuse at Columbia University reports that only 11% of inmates with substance use disorders receive any type of treatment during their stay in a correctional facility, despite overwhelming

evidence that substance use disorders are treatable and treatment is cost-saving and feasible in criminal justice settings (7). Substance use disorders additionally increase risk for infectious diseases such as HIV, which has an estimated prevalence four to eight times higher among correctional populations than in the general population (8-10).

HIV in Incarcerated Populations

In 2006, the prevalence of HIV among men and women in prison was 1.6% and 2.4%, respectively, compared with the United States national prevalence of 0.45% among adults and adolescents (11, 12). In a study of HIV among inmates and releasees in 2006, Spaulding et al. estimated that one in seven of all persons living with HIV in the U.S. had passed through a correctional facility that year. Black and Hispanic men, for whom incarceration rates are substantially higher, had a rate of one in five(13).

Known HIV risk behaviors such as injection drug use, multiple sex partners, and unprotected sex is also high among populations that have passed through correctional systems or are under criminal justice supervision. A study of health behaviors among 1,198 inmates at Hampden County Correctional Center conducted by University of Massachusetts revealed 24% of women and 11% of men had ever shared needles, and one third of women reported having been in the sex trade or exchanging sex for food, money, or drugs (14). A study focused on identifying sexual risk behaviors prior to incarceration was conducted among 550 young men (aged 18 to 29) recruited from state prisons in Rhode Island, Mississippi, California, and Wisconsin. Researchers found three quarters of men reported multiple sex partners, and two thirds reported having a partner they perceived as risky. Further, men who reported having a risky sex partner were more likely to report unprotected sex with multiple partners (OR 3.9, 95% CI [2.60,

5.85])(15). Identification of HIV transmission risk factors is key among incarcerated populations, as most persons return to their communities and re-enter prior social networks. Correctional settings thus provide a logical site for treatment, prevention, and risk reduction counseling.

Correctional facilities are constitutionally obligated to provide medical care, including antiretroviral treatment and primary care for HIV, and as a de facto temporary residence for many individuals living with HIV, play an important role in engaging HIV-positive persons in care(13, 16, 17). A systematic review of the HIV care cascade before, during, and after incarceration conducted by Iroh et al. found that linkage to care was 56% upon entry to jail or prison, increased to 76% during incarceration, and dropped to only 36% after release back to the community. Similarly, retention in HIV care was 40% upon entry, 76% during incarceration, and only 30% upon release(18). Further, in a cross-sectional study of 205 HIV-infected prisoners eligible for ART across four Connecticut prisons, Altice et al. found three quarters commenced treatment while in prison(19). During incarceration, rates of virologic suppression average 51%, and range from 25% to 80%(18). These data indicate that correctional settings are pivotal for engaging traditionally marginalized populations, and often serve as an initial locus of care for individuals who may not have access to care in their communities.

Stability in residence is key regarding HIV outcomes, and various challenges are posed in delivery of HIV care in prison versus jail settings. Prisons house individuals legally convicted of a crime and detained for periods longer than one year(20). Except for potential brief interruptions due to facility transfer or processing, prisons are a generally stable location where individuals can reliably access medications for a

prolonged period. In contrast, jails house individuals awaiting trial or with detention periods shorter than one year. As a result, turnover rates between jails and the community are much higher, and individuals cycle through substantially more frequently than in prisons. Shorter stays offer fewer opportunities for stabilization of viral load, and present challenges in implementation of prevention or treatment-based interventions. Nonetheless, the high number of HIV positive individuals who cycle through jails present a demand for effective strategies for managing HIV care across correctional and community residential transitions.

Medication Adherence and Self-Efficacy

Adherence to antiretroviral therapy is key to maintaining virologic suppression, which has important public health value. As evidenced by multiple clinical trials, PLWH who achieve viral suppression due to successful adherence to ART are less likely to transmit HIV infection to their sexual partners and persons with whom they inject drugs(21, 22). Decreases in infectivity observed concurrently with viral suppression have led to the development of treatment as prevention (TasP) efforts in HIV(23).

Correctional settings can be a critical site for TasP efforts, as regular access to medications during incarceration makes adherence inside correctional facilities feasible. In fact, stable access to medications has resulted in findings that most HIV-infected inmates commence treatment while in prison, and up to 60% exit with suppressed viral loads(19, 24, 25). In the previously mentioned cross-sectional survey by Altice et al., results showed that 64% of participants had only been offered ART in a prison setting. A substantial correlate of medication adherence was experience of side effects ($p = 0.004$).

Further, trust in physicians, medical institutions, and HIV medications were associated with differences in adherence ($p = 0.001$, $p = 0.03$, $p = 0.002$, respectively)(19).

Self-efficacy, or one's belief in one's ability to succeed in specific situations, is critical to medication adherence. A recent study among non-incarcerated HIV-positive individuals living in St. Petersburg, Russia demonstrated that those with less than 90% medication adherence had statistically significantly lower medication-taking self-efficacy than those with greater than or equal to 90% medication adherence ($p = 0.003$)(26). Similarly, an online survey among PLWH in Australia found that ART non-users were the least self-efficacious as compared with continuous ART users and intermittent ART users ($p = 0.028$)(27).

Medication adherence and self-efficacy have also been studied among both non-incarcerated and incarcerated American PLWH. Project nGAGE, a randomized controlled trial conducted among young black men who have sex with men in Chicago, found that high medication adherence was associated with greater self-efficacy(28). In qualitative interviews with inmates incarcerated in North Carolina prisons, Haley et al. found that prior to release, participants expressed high self-efficacy thru confidence in their ability to adhere to treatment regimens and manage their HIV. Unfortunately, challenges with substance use following release often led to periods of non-adherence(29). While medication adherence is a critical component of TasP efforts, re-entry into the community often poses difficulties in continuity of adherence and viral suppression among PLWH released from correctional settings.

Community Re-entry and Managing HIV

Environmental challenges faced by individuals returning to their communities following confinement are compounded for PLWH, as conflicting demands for basic needs such as food and shelter are juxtaposed with management of HIV. Furthermore, evidence suggests that the period immediately following release from a correctional setting is especially critical, as people re-enter prior social circles and may relapse to risky behaviors. PLWH are vulnerable to interruption of ART following release, which can lead to increased viral load and therefore, increased risk of transmission for any HIV-negative sexual or drug-use partners.

Results from Baillargeon et al. indicate that while nearly 60% of prisoners are released to the community with undetectable viral loads, only 5.4% fill an ART prescription within the recommended 10 days to prevent treatment disruption. Only 17.7% fill their prescription within 30 days, and 30% within 60 days(24). Subsequent studies among recently released prisoners found 20% to 54% of participants enrolled in an HIV clinic within a month following release(30, 31). In turn, release from prison has been consistently associated with loss of viral suppression and decreased engagement in care(25, 32-35).

Factors that facilitate HIV care management and medication adherence include social support through case management and increasing personal motivation(36-38). These findings have been adapted for implementation in criminal justice settings in response to a substantial proportion of consistently poor HIV outcomes following release. Several randomized controlled trials have tested case management or other care support interventions to help individuals transition management of HIV and chronic conditions into the community.

A recent randomized controlled trial (RCT) aimed to engage recently released persons with multiple chronic conditions, with and without HIV, aged 50 or older, in primary care upon return to their communities using Transitions Clinics, a primary-care based care management program with community health workers, versus the expedited primary care standard (N = 200). Results demonstrated lower rates of emergency department utilization, but not increased primary care use among releasees randomized to Transitions Clinics(39). A similar randomized controlled trial, Bridges to Good Health and Treatment (BRIGHT), found a motivational case management intervention approach based on the Strengths Model to be ineffective in significantly increasing linkage to HIV care among recently released prisoners in North Carolina as compared with standard of care. Limitations of the study included small sample size (N = 104) and possible mixing of exposures due to nurse execution of the intervention(30). The imPACT trial, designed to maintain HIV viral suppression among individuals released from North Carolina and Texas prisons, similarly found no difference between treatment and control arms, however this study dropped individuals who were reincarcerated following release from analysis(34).

While these studies did not find statistically significant differences between intervention and control arms with respect to HIV outcomes, they all share a substantial limitation in comparatively robust standard of care conditions. California and North Carolina prison systems have more extensive support for persons exiting their facilities with substantial health issues as compared with Georgia. Nonetheless, these findings garner further evidence that socio-structural barriers following release from incarceration are substantial obstacles to achieving successful HIV management in the community.

Recidivism

Continuity of care is influenced by a multitude of factors, including housing stability, which promotes ability to attend medical appointments and adherence to medications. Both housing stability and incarceration can be highly dynamic events in the lives of marginalized populations, which often cycle through both periods of homelessness and incarceration. A study by Lim et al. posited that frequent transitions between homelessness and incarceration would disrupt engagement in HIV care. Researchers conducted a retrospective cohort study among 1,698 HIV-positive New York City adults that had spent at least one night in both an NYC jail and an NYC single adult homeless shelter between 2001 and 2005 to assess continuity of HIV medical care and HIV viral suppression. Results identified four unique trajectories, including 1) brief, intermittent jail incarceration and shelter stays (which 72% of subjects experienced); 2) extensive, uninterrupted time in jail over the study period (19%); 3) continuing shelter use with little interruption (3.6%); and 4) continuous shelter stays earlier, followed by sporadic, brief jail incarcerations, termed "decreasing shelter use" (5.3%). Those with intermittent jail incarceration and shelter stays had 0.67 times lower prevalence (95% CI [0.50, 0.90]) of viral suppression as compared to those with decreasing shelter use, indicative of more community stability(40). Repeated periods of incarceration are disruptive with respect to life stability, which may be a prerequisite of ability to manage HIV care successfully.

Those who are likely to return to jail are also likely to have co-occurring disorders such as mental illness and substance use (7, 32, 41, 42). In a study of three-year reincarceration among 1,917 PLWH released from the Texas prison system, those with a

major psychiatric disorder were statistically significantly more likely to be reincarcerated than those without a major psychiatric disorder (OR = 1.82, 95% CI [1.41, 2.34]). The previously mentioned report on substance abuse in U.S. prison populations conducted by the National Center on Addiction and Substance Abuse at Columbia University states that although the overall percentage of reincarceration dropped between 1996 and 2006 (50.3% to 48.4%), substance-involved offenders had significantly higher percentages of reincarceration than non-substance-involved offenders in both years (53.4% vs. 38.9% in 1996; 52.2% vs. 31.2% in 2006). Substance use is prevalent among PLWH, and remains a factor that not only increases risk of recidivism, but also prevents individuals from prioritizing engagement in care following release.

Reducing incarceration and reincarceration is an important goal for correctional institutions, and can be facilitated through directed community re-entry programs and active engagement with institutionalized populations. The previously mentioned report from Columbia University indicates that substance-involved inmates are 29% less likely to have completed high school and 20% more likely to be unemployed prior to incarceration(7). A recent meta-analysis, by the RAND Corporation, of over 50 studies relating correctional education and recidivism found that inmates who participated in correctional education programs had, on average, 43% lower odds of recidivating than inmates who did not participate in such programs. Direct costs of providing education to inmates was determined to range from $1,400 to $1,744 per inmate. Further, correctional education was found to be cost-effective, saving on average $8,700 to $9,700 per inmate in three-year reincarceration costs among those who engaged in correctional education programs compared to those who did not(43).

A growing body of literatures supports an approach of comprehensive care for PLWH to address basic needs that may serve as barriers to HIV management. Helping individuals to meet subsistence needs such as housing, food, employment, and transportation, and addressing challenges such as substance use may allow PLWH released from correctional settings to prioritize medication adherence. In a nationally representative survey of 2,864 non-incarcerated persons receiving HIV care, over a third of participants went without or postponed care because they 1) needed the money for food, clothing, or housing, 2) did not have transportation, 3) could not get out of work, or 4) were too sick(44). Freudenberg's review of the interactions between correctional systems and urban community health further supports a focus on community reintegration efforts to make progress toward more beneficial partnerships between correctional institutions, persons who pass through them, and the communities surrounding them(6).

Linkage to care among PLWH and prevention of recidivism are entangled in recent literature that aims to investigate medical interventions for HIV-related outcomes. As a factor that is inextricably linked to social constructs such as policies and policing, recidivism is unlikely to be affected by medical case management interventions. Nonetheless, further understanding factors that lead to increased recidivism among PLWH released from correctional settings merits further research, and is described in a small cohort in the following manuscript.

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Chapter II

Manuscript

ABSTRACT

Background: Disproportionate levels of HIV infection among incarcerated persons make correctional facilities (CFs) a critical site for interventions to facilitate transition of care into the community. Stable community care transitions are often challenging due to substantial risk for recidivism in this population. Sustained, Unbroken Connection to Care, Entry Services and Suppression (SUCCESS), is a strengths-based case management (CM) intervention to increase linkage and retention in care upon release. We investigate factors associated with recidivism, examine changes in behavior/attitude, and describe correctional versus community locations of HIV care over 1 year following the intervention.

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Results: Intervention group participants were marginally less likely to return to jail within one year following release versus the comparison group (50% versus 62%, $P = 0.24$). Among intervention participants, risky drug use, baseline viral load $\leq$ 200 copies HIV-1 RNA/mL, and younger age were associated with increased odds of recidivism (aOR 8.63, 95% CI [1.55, 48.07]; aOR 11.2, 95% CI [1.09, 114.50]; aOR 2.06, 95% CI [0.44, 9.67]). Those who completed at least four of six CM sessions reported better access to care at follow-up ($P = 0.02$). Intervention group members connected to community care at a higher rate versus comparators (68% vs. 58%), and 20% fewer obtained HIV care at a Georgia CF.

Conclusion: Substance use treatment and socio-structural support are needed to reduce recidivism concurrently with facilitating community care transitions among persons living with HIV.

INTRODUCTION

Faced with the world's highest overall incarceration rate at one in one hundred, a substantial proportion of HIV-infected adults in the United States experience incarceration over the course of their lives(1-5). HIV seroprevalence among persons in correctional facilities is between three and five times higher than that of the general population, and one in seven persons living with HIV/AIDS (PLWHA) has passed through a correctional facility in the past year(6-8). Correctional health care systems are legally obligated to provide care, and play an important role in engaging or re-engaging individuals who may not have access to care or have fallen out of HIV care in the community(2, 7, 9). HIV-infected individuals have stable access to antiretroviral therapy (ART) and medical care while incarcerated, with 75% of inmates commencing treatment while in prison, and nearly 60% exiting with suppressed viral loads(10-12). Upon release, however, disruption in care is common. High levels of engagement in care observed while incarcerated drop precipitously upon re-entry into the community(11, 13-15). Baillargeon et al. found only 5.4% of 2,115 released persons filled an ART prescription within 10 days of release, 17.7% within 30 days, and 30% within 60 days(10).

Engagement in medical care may not be high priority for releasees returning to poverty, unstable housing, few job opportunities, poor access to medical care, and system-level factors that often lead to reincarceration(16-20). Nonetheless, bridging the gap in care between correctional facilities and the community is essential to public health efforts to prevent HIV transmission, given that nearly all individuals who pass through correctional facilities will re-enter their communities at some point(2, 4, 21). Most

recently released individuals report use of emergency departments (ED) as a primary source of care, with only 15% to 25% reporting visiting a non-emergency department physician in the year following release(22, 23). Investigators often have a restricted set of healthcare facilities at which they track linkage to care among participants, and overall do not describe the proportion of care received upon returns to jail or prison following a period of incarceration.

Several recent randomized controlled trials aimed at engaging recently released persons in care following release have found no significant differences between intervention and control arms. Wang et al. reported that Transitions Clinics to engage persons with multiple chronic conditions, with and without HIV, in primary care were comparable to the expedited primary care standard in San Francisco, CA(24). Wohl et al. found Bridging Case Management, a Strengths Model intervention, to be no more effective than standard discharge planning for PLWHA in North Carolina prisons(25). In a subsequent study designed to maintain HIV viral suppression following release, an STTR-based multi-dimensional intervention also did not find a difference between treatment and control arms(26). These studies all have similar and substantial limitations, including: 1) strong "standard of care" – discharge planning for HIV-positive inmates in California and North Carolina is markedly more comprehensive than in Georgia, and 2) small sample size – Wang et al was the largest study, with 200 participants. Furthermore, the Wohl et al. imPACT trial excluded participants who returned to jail or prison from further follow-up.

Despite no set objectives aimed at reducing reincarceration, studies of medical interventions among incarcerated persons persistently assess this largely socio-structural

outcome with expectations of success. Linkage to care and prevention of recidivism are entangled with respect to assessment, however, substantial gaps in the literature exist regarding predictors of recidivism among HIV-infected persons.

Sustained, Unbroken, Connection to Care, Entry Services, and Suppression (SUCCESS) is a non-randomized feasibility study aimed at estimating the potential effect of Strengths-Based Case Management (SBCM) on linkage and retention in HIV care following incarceration at Fulton County Jail (Atlanta, GA). Herein, we investigate factors associated with recidivism and effective study engagement during follow-up, present changes in behavior, attitudes, and housing following the intervention, and describe the distribution of community versus correctional HIV care settings in the intervention versus comparison groups over 1 year following index incarceration.

METHODS

Recruitment and Enrollment

SUCCESS (Sustained, Unbroken Connection to Care, Entry Services and Suppression) is a non-randomized feasibility study with intervention and comparison groups. Participants were recruited from Fulton County Jail (FCJ) in Atlanta, Georgia. The HIV-population prevalence in FCJ is 5%(27). Eligible participants were HIV-infected, aged over 18 years, and likely to leave jail within 6 weeks and settle in the Atlanta area. Participants in the intervention group also needed to be English-speaking, willing to use a cell phone for text messaging during the study, and able to demonstrate literacy via a Rapid Estimate of Adult Literacy in Medicine (REALM) test assessing ability to read common medical words(28). Jail health care staff referred individuals for recruitment at a pace of 14 per month in alternating months from August 2014 to

February 2015, yielding a total of 56 enrollees. Recruitment of individuals for the comparison group took place in interchanging months between participant recruitment, and yielded 52 enrollees.

Intervention

Those eligible for the intervention underwent the informed consent process, and enrollees were informed that the discharge planning and case management process would be stopped if they subsequently started a long-term sentence. Participants signed individual releases of information from each site of future care that they identified. The investigative team provided cell phones to those lacking them at discharge. Eight participants and 5 individuals in the comparison group were subsequently excluded due to long-term jail stays or transfer to a prison facility. Four participants and 2 individuals in the comparison group were dropped from the study due to settlement outside of the Atlanta area. Following exclusions, study participants consisted of 44 individuals in the intervention group, and 45 in the comparison group. The SUCCESS intervention consisted of up to six sessions of face-to-face strengths-based case management, delivered beginning in jail and followed up in the community following release from incarceration. Further details regarding the development and implementation of the SUCCESS intervention are detailed in a manuscript currently under review in PLOS One.

Human Subjects Protection

The Emory University Institutional Review Board approved the SUCCESS intervention study (IRB00064852). It was registered in clinicaltrials.gov (NCT02185742).

Data Collection

Due to limited resources for in this non-randomized feasibility study, data collection was more detailed for intervention recipients. Baseline data for the comparison group was limited to demographic information on age, gender, and race, and was collected via the jail's custody database. Demographic data on age, sex, race, sexual orientation, housing, health insurance status, and previous jail stays were collected at baseline via an Audio Computer-Assisted Survey Instrument (ACASI) for the intervention group. Information on new diagnosis status, HIV medication prescription and adherence, as well as HIV risk behavior and sex of sexual partners was also collected via survey. Information on substance use and mental health data were collected using the Texas Christian University Drug Screen (TCUDS)(29), WHO Alcohol Use Disorders Identification Test (AUDIT)(30, 31), and Center for Epidemiology Studies Depression Scale (CES-D)(32, 33). Baseline laboratory data on HIV viral loads and CD4 cell counts were abstracted from jail medical records for study participants in both intervention and comparison groups.

For this analysis, follow-up laboratory data on community versus correctional facility healthcare utilization rates were collected in aggregate among both the intervention and comparison groups from the state electronic HIV/AIDS reporting system (eHARS). Self-reported follow-up data were collected only from the intervention recipients, via ACASI at 3 months and 12 months following release. Data on reincarceration were verified by multiple team members who conducted searches of the state electronic databases. Searches were conducted through Fulton and DeKalb County Jail inmate searches, and Georgia Department of Corrections inmate searches.

Data Analysis

Baseline characteristics of the intervention and comparison groups were examined using Chi square and Fisher's exact test for categorical variables, and Student t-test for continuous variables. Unadjusted analyses were conducted using Chi square tests to assess associations between recidivism and the following variables among all study participants: age, sex, baseline viral load, length of initial stay, and number of case management sessions attended. Additional unadjusted bivariate analyses were conducted among the intervention group only, using Chi square and Fisher's exact tests. In this subset, we assessed factors from the baseline survey for associations with recidivism and successful study follow-up engagement, as indicated by completion of either 3-month or 12-month follow-up surveys. Variables for age, baseline self-efficacy score, number of case management sessions completed were dichotomized at the mean for analysis. Variables for depression, alcohol use, and drug use were dichotomized according to scoring recommendations for considerable risky behavior. Any texting with the case manager, and baseline variables for self-reported homelessness or housing instability, viral load suppression status, CD4 cell count, and employment status were also assessed dichotomously for associations with survey completion and recidivism.

Variables found to be associated with recidivism at p-values less than 0.25 in unadjusted analyses were further considered for inclusion in multivariable logistic regression models. Collinearity was assessed by bivariate association, and examination of condition indices and variance decomposition proportions. We used a backwards elimination approach to fit the models among all participants, and among the intervention group only. Due to small sample size, we allowed for one predictor per 5-10 outcome events in the final models. We determined final models using characteristics of

parsimony, Akaike's information criteria (AIC), and the Hosmer-Lemeshow goodness-of-fit test.

Limited follow-up in the comparison group precluded our ability to collect information on self-reported variables such as self-efficacy, HIV stigma, access to care, social support, and medication adherence. Therefore, changes in these variables from baseline to follow-up measures were assessed only in the intervention group. Intervention group responses to self-efficacy, HIV stigma, access to care, and social support questions were assessed using Likert scale measures, and assigned index score values(34, 35). Medication adherence was self-reported as a percentage. Intervention group members who participated in at least one follow-up survey were assessed for changes in these variables from baseline to 12-month follow-up. If responses from 12-month follow-up surveys were not available, we used responses from the 3-month survey. Changes between baseline and follow-up measures of self-efficacy, HIV stigma, access to medical care, social support, and self-reported medication adherence were assessed using Wilcoxon signed rank test to account for repeat measures.

Locus of HIV care among all study participants was examined using eHARS data on laboratory tests of viral load and CD4 cell counts, and categorized as correctional facility versus community care, including Atlanta-area hospitals, clinics, and health departments. Differences were assessed using Chi square tests. All analyses were performed using SAS 9.4 software (Cary NC).

RESULTS

Selected characteristics of intervention and comparison group study participants are shown in **Table 1**. Demographic and publicly available data were collected on both

intervention and comparison groups. Study participants in both groups were majority Black and male. Individuals in the intervention and comparison groups did not differ considerably with regard to most demographic and medical characteristics. However, individuals in the intervention group were approximately 3 years younger, on average, than those in the comparison group. Individuals in the intervention group had, on average, a 3-week shorter length of index incarceration, as compared with the non-intervention group. Baseline HIV viral suppression ($\leq$ 200 HIV-1 RNA copies/mL) was approximately 10% less frequent among those in the intervention group than among non-intervention participants.

More extensive data were collected via ACASI survey among those in the intervention group. Notably, three quarters identified as non-heterosexual, and 84% reported homelessness or housing instability at baseline. Furthermore, 43% reported relatively severe drug problems, according to TCUDS score (**Table 1**).

Study Engagement

An unadjusted analysis of factors associated with successful study engagement (i.e., those who completed at least one follow-up survey, at either 3 months or 12 months post-intervention) showed individuals with successful follow-up engagement were 7.7 times more likely to have completed 4 or more case management sessions, and approximately 4 times more likely to have texted with a case manager during the intervention, findings that were stastically significant ($p = 0.003$, $p = 0.03$, respectively). Notably, all individuals who did not have indications of depression completed some follow-up ($p = 0.03$). Successful follow-up engagement was additionally associated with

suppression of HIV viral load at baseline, although this finding was not statistically significant.

Recidivism

Recidivism was high overall in both study arms: intervention group participants were marginally less likely to return to jail within one year following release versus the comparison group (50% versus 62% of participants), though this difference was not statistically significant. Further, intervention group participants spent an average of 15.6% (SD 26.1) of the follow-up year in jail, compared with 14.0% (SD 20.8) in the comparison group. Unadjusted associations between baseline characteristics and recidivism, summarized in **Table 2**, showed that among intervention group participants, risky drug use was statistically significantly associated with 3.8 times greater odds of recidivism (95% confidence interval 1.09, 13.66; *P = 0.03*). Additionally, younger age and having an unsuppressed viral load at baseline were associated with 3.2 and 4.7 times greater odds of returning to jail within the year, respectively, although these findings were not statistically significant (95% CI [0.91, 11.27], *P* = 0.06*;* 95% CI [0.85, 25.75], *P* = 0.13). The same unadjusted analysis among all study participants (n = 89) found no associations were statistically significant at an alpha level of 0.05. Nonetheless, unsuppressed baseline viral load, younger age, and being in the comparison group were associated with increased odds of recidivism, with p-values less than 0.25, and were considered for inclusion in the multiple logistic regression models **(Table 2)**.

Table 3 summarizes multiple logistic regression models among all study participants (Model 1), and among the intervention group (Model 2). Multivariable models including all study participants were not statistically significant, however no

evidence of poor fit was detected by Hosmer-Lemeshow tests. Younger age and unsuppressed viral load were both associated with increased odds of recidivism (aOR 1.82, 95% CI [0.74, 4.49], $P = 0.19$; aOR 1.99, 95% CI [0.73, 5.46], $P = 0.18$), but were not statistically significant at the alpha = 0.05 level. Multivariable models among the intervention group (n = 44) allowed us to additionally examine data from self-report surveys. Participants who recidivated had increased odds of unsuppressed viral load at baseline and reported risky drug use (aOR 11.2, 95% CI [1.09, 114.50], $P = 0.04$; aOR 8.63, 95% CI [1.55, 48.07], $P = 0.01$), findings that were statistically significant. Models were adjusted for the number of case management sessions completed.

Changes in Behavior, Attitude, and Housing

Table 4 demonstrates changes in behaviors and attitudes from baseline measure to follow-up among 28 intervention group participants that completed either a 3-month or 12-month follow-up survey. Results are stratified by number of case management sessions completed, dichotomized at the intervention group mean of 4 sessions. Perceived lack of access to medical care was statistically significantly lower upon follow-up measures among participants who completed at least 4 case management sessions ($p = 0.02$). Observed changes in self-efficacy and social support were not statistically significant. HIV stigma appeared to be lower at baseline than upon follow-up, although this change was not statistically significant. Furthermore, self-reported medication adherence appeared to be approximately 20% higher upon follow-up among both groups, although this change also was not statistically significant. (**Table 4**).

Approximately half (13/28; 46%) of individuals reported no recent homelessness at both baseline and follow-up. The remaining 15 were either consistently homeless (n =

6) or experienced periods of homelessness. Only 3/28 reported owning or renting an apartment, throughout the study period. 19/28 had unstable housing at both baseline and follow-up, and the remaining 6 fluctuated between stable and unstable housing.

Locus of HIV Care

We also examined HIV care at community-based versus correctional facility locations among intervention and comparison group participants in the year following initial release from Fulton County Jail (**Figure 1**). More individuals in the intervention group than in the comparison group connected with community healthcare locations, such as community clinics, health departments, and hospitals, however, these differences were not statistically significant (68.2% vs. 57.8%, OR 1.57, 95% CI [0.65, 3.78]). Notably, approximately 20% fewer individuals in the intervention group obtained HIV care in a Georgia jail or prison, versus the comparison group (OR 0.46, 95% CI [0.19, 1.08]).

DISCUSSION

In this feasibility study, we found that recidivism was common among both individuals receiving intensive case management and those with standard jail discharge. Statistically significant predictors of recidivism were younger age, unsuppressed viral load, and risky drug use. In a subset of intervention group participants, those who completed at least four out of six case management sessions reported access to care improved from baseline to follow-up measures. Further, we found that a higher percentage of intervention group participants accessed care in a community healthcare setting, and a lower percentage accessed care in a correctional setting over 1 year following initial release from jail, as compared with comparison group members.

Our results support previous findings that HIV case management, aimed at facilitating linkage to care and viral suppression following release from a correctional facility, is unlikely to reduce recidivism(25, 26). Substance use was a strong predictor of recidivism in our study, and remains among the main factors associated with poor clinical outcomes such as poor viral control and non-adherence following release(36-38). Our findings support evidence that those who are likely to return to jail within a year are also likely to have co-occurring disorders such as substance use, and negative HIV outcomes following release from a correctional setting (39).

In qualitative interviews, formerly incarcerated HIV-infected persons cite both personal and structural barriers to smooth re-entry into the community upon release. Often, individuals face difficulties in obtaining employment and expunging a criminal record that prevents receipt of benefits such as housing and food stamps(40, 41). Social instability, societal stigma regarding both serostatus and incarceration history, and reconnecting with negative peer groups and former social networks can lead to relapse of substance use and disruption of care. A recent study among HIV-infected released persons with opioid-dependence found buprenorphine/naloxone treatment was significantly associated with maximum viral suppression at 24 weeks(42). Nearly half of individuals in our intervention group reported substantial history of substance use, and would have likely benefitted from such treatment programs for substance use. Programs to integrate substance use treatment and HIV care among formerly incarcerated persons may help both to reduce recidivism and to achieve desirable HIV outcomes.

Access to healthcare following incarceration among individuals living with HIV is particularly important with respect to public health. Expeditious connection to care

reduces potential time living in the community without ART, and lessens the likelihood of transmission upon release. Pre-release responses indicated that perceived lack of access to care among our intervention group was high, and subsequently significantly reduced among those who engaged in at least four out of six case management sessions. We posit that active engagement with a case manager reduced perceived barriers to care, and allowed individuals to feel more confident in accessing their providers in the community. Within 12 months, 68% of intervention group participants connected with a community care site, compared with 57% in the comparison group. Notably, however, fewer individuals in the intervention group returned to jail or prison than in the comparison group.

Correctional settings are an unfortunate but reliable locus of care among persons living with HIV with previous criminal justice involvement. HIV diagnosis, prescription of ART, and adherence to treatment are, in recent years, persistently high in correctional facilities(13, 43). Further, incarcerated persons are disproportionately affected by challenges such as substance use and housing instability, and correctional settings are a stable location for individuals to access care and medication, and achieve viral suppression(44). For individuals facing this multitude of multi-level challenges, alternatives to correctional settings are needed to prevent recidivism, facilitate stability, and ensure treatment of both HIV and possible comorbidities.

While the results of this study shed light on important parallels between risk factors for recidivism and those for loss of viral suppression and poor retention in care among PLWH released from jail, interpretation of these findings should be made with care. Limitations of this study include small sample size and non-randomized design.

Results presented are from a small cohort, and the study was not powered to detect statistically significant differences. Further, subsets of participants limited follow-up findings to 28 intervention group participants only. Given the feasibility design, no survey data at baseline or follow-up were collected from comparison group participants. Comparisons thus cannot be made across groups with respect to follow-up changes in self-efficacy, access to care, stigma and other variables. As such, analyses were limited to a pre-post assessment. Despite these limitations, the reported findings contribute to a greater understanding of challenges faced by persons living with HIV regarding recidivism, access to care, and locus of care following release from a correctional setting.

CONCLUSION

Overall, we found that factors associated with increased recidivism among persons living with HIV are similar to factors that predict poorer HIV health outcomes following release from correctional settings. Our findings also indicate that engagement in intensive case management might increase perceived access to care and enable individuals to link to community care following release. Further, we find that correctional settings account for a substantial proportion of care received by PLWH following release. Further research is needed to determine the benefits of integrating substance use treatment and HIV care to reduce the number of individuals suffering from this comorbidity housed in jails and prisons, and facilitate successful community transition following incarceration.

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TABLES

Table 1. Selected baseline characteristics of SUCCESS Study Participants: Individuals Released from Fulton County Jail, Atlanta, GA, 2014 to 2016 (N=89)

Characteristic[a]	Intervention Group (n = 44)	Comparison Group (n = 45)	*P-value*[b]
Demographic			
Age, years	36.9 (8.1)	40.5 (9.7)	0.06
Men, n (%)	38 (86.4)	41 (91.1)	1.00
Black or Black and Other, n (%)	41 (93.2)	40 (88.9)	0.71
Heterosexual[c], n (%)	11 (25.0)	-	-
Unemployed/Disabled, n (%)	38 (84.4)	-	-
Less than high school graduate/No GED, n (%)	12 (27.3)	-	-
Housing		-	
Own or Rent an Apartment, n (%)	7 (15.9)	-	
Staying at home of family member or friends, n (%)	18 (40.9)	-	
Staying in a rooming, boarding, halfway house, or shelter, n (%)	11 (25.0)	-	
Living on the streets, n (%)	7 (15.9)	-	
Self-Reported Homeless, n (%)	18 (40.9)	-	-
Unstably Housed[d], n (%)	37 (84.1)	-	
Psychosocial			
Depressed, by CES-D 10 Score, n (%)	36 (81.8)	-	-
Risky alcohol use, by AUDIT Score, n (%)	13 (30.0)	-	-
Relatively severe drug problems, by TCUDS Score, n (%)	19 (43.2)	-	-
Self-efficacy Score	87.3 (37.9)	-	-
Social Determinants			
Mean length of index incarceration, days	55.5 (58.6)	77.2 (119.3)	0.28
HIV Status			
Suppressed ($\leq$ 200 copies HIV-1 RNA/mL), n (%)	9 (20.4)	13 (28.9)	0.46
$\geq$ 500 CD4 cells/mm^3, n (%)	13 (29.5)	14 (31.1)	1.00
$\leq$ 200 CD4 cells/mm^3, n (%)	7 (15.9)	11 (24.4)	0.32
First diagnosis of HIV on index incarceration, n (%)	4 (8.9)	1 (2.2)	0.16
Self-reported HIV medication adherence < 50%[f], n (%)	16 (36.4)	-	-

Abbreviations: SUCCESS – Sustained, Unbroken Connection to Care, Entry Services, and Suppression; GED – General Education Diploma; CES-D Scale – Center for Epidemiologic Studies Depression Scale; AUDIT – Alcohol Use Disorders Identification Test; TCUDS – Texas Christian University Drug Screen.

[a] Continuous variables presented as Mean (SD), categorical variables presented as n (%).

[b] By Fisher's exact test for categorical variables and Student t-test for continuous variables.

[c] 1 missing, refused to respond.

[d] Unstably housed defined by analyst as not owning or renting a home in the 30 days prior to index jail stay.

[e] Six self-reported new diagnoses, 2 had previous HIV test results in our records, 4 confirmed as new.

[f] Fourteen subjects self-reported no previous prescription for HIV medications.

Table 2. Baseline factors associated with 1-year recidivism among SUCCESS Study Participants: Individuals Released from Fulton County Jail, Atlanta, GA, 2014 to 2016

Variable	All Study Participants (n = 89)		Intervention Group Only (n = 44)	
	Unadjusted OR (95% CI)	*P-value**	Unadjusted OR (95% CI)	*P-value**
Unsuppressed baseline viral load (≤ 200 copies HIV-1 RNA/mL) †	2.27 (0.85, 6.25)	0.10	4.67 (0.85, 25.75)	0.13
Sex (Male vs. Female/MTF)	1.32 (0.35, 4.94)	0.68	0.45 (0.07, 2.76)	0.66
Race (Black vs. Non-Black)	1.69 (0.42, 6.77)	0.46	1.00 (0.13, 7.81)	1.00
Age < 36.9 years †	2.08 (0.86, 5.00)	0.10	3.2 (0.91, 11.27)	0.06
Length of Initial Stay ≥ 30 days	1.18 (0.51, 2.75)	0.69	1.2 (0.37, 3.92)	0.76
CD4 ≤ 200 CD4 cells/mm^3	0.73 (0.36, 2.06)	0.55	0.34 (0.06, 1.98)	0.41
Group (Intervention vs. Comparison)	0.61 (0.26, 1.41)	0.24	---	---
≥ 4 Case Management sessions	0.76 (0.31, 1.87)	0.55	1.22 (0.35, 4.27)	0.75
Any 2-way texting	---	---	0.57 (0.17, 1.90)	0.36
Any follow-up survey engagement	---	---	1.00 (0.29, 3.42)	1.00
Homeless or unstable housing ‡	---	---	1.41 (0.27, 7.18)	1.00
Employment	---	---	2.22 (0.36, 13.62)	0.66
Self-efficacy	---	---	0.54 (0.15, 1.92)	0.34
Depression	---	---	0.27 (0.05, 1.50)	0.24
Risky Alcohol Use	---	---	0.80 (0.22, 2.94)	0.74
Risky Drug Use †	---	---	3.85 (1.09, 13.66)	0.03

Abbreviations: SUCCESS – Sustained, Unbroken Connection to Care, Entry Services, and Suppression; CM – Case Management

* All variables dichotomized at mean or scale-appropriate cut-offs, and assessed using Chi Square and Fisher's exact testing.

‡ Unstable housing defined by analyst as not owning or renting a home.

† Statistically significant or borderline statistically significant at $p < 0.05$

Table 3. Multiple logistic regression models for 1-year recidivism after release from jail. SUCCESS Study, Atlanta, GA, 2014 to 2016.

	Model 1 All Study Participants (n = 89)		Model 2 Intervention Group Only (n = 44)	
Variable	**aOR* (95% CI)**	***P-value***	**aOR* (95% CI)**	***P-value***
Age < 36.9 years	1.82 (0.74, 4.49)	0.19	2.06 (0.44, 9.67)	0.36
Unsuppressed baseline viral load (≤ 200 copies HIV-1 RNA/mL) †	1.99 (0.73, 5.46)	0.18	11.19 (1.09, 114.5)	0.04
Risky Drug Use †	---	---	8.63 (1.55, 48.07)	0.01

Abbreviations: SUCCESS – Sustained, Unbroken Connection to Care, Entry Services, and Suppression; aOR – Adjusted Odds Radio

* Models adjusted for number of case management sessions completed

† Statistically significant at $p < 0.05$ in Model 2

Table 4. Behavior and Attitude Changes from Baseline to 12-month Follow-up in SUCCESS Study Intervention Group Participants subset: Individuals Released from Fulton County Jail, Atlanta, GA, 2014 to 2016 (n = 28)

Variable	< 4 Case Management Sessions (n = 5)			≥ 4 Case Management Sessions (n = 23)		
	Baseline Mean (SD)	Follow-Up Mean (SD)	*P-value**	Baseline Mean (SD)	Follow-Up Mean (SD)	*P-value**
Self-Efficacy Score	68.0 (48.8)	57.6 (46.9)	0.06	95.3 (23.8)	98.1 (23.6)	0.91
HIV Stigma Score	25.0 (5.2)	27.6 (4.4)	0.37	24.4 (7.3)	31.5 (23.3)	0.74
Lack of Access to Care†	18.8 (2.9)	19.0 (2.5)	1.00	15.6 (5.7)	12.7 (5.2)	0.02
Social Support	12.0 (3.7)	10.8 (5.6)	0.62	11.4 (4.6)	11.1 (5.3)	0.80
Medication Adherence‡	45.3 (45.0)	66.7 (57.7)	0.75	57.1 (38.7)	76.5 (33.9)	0.19

Abbreviations: SUCCESS – Sustained, Unbroken Connection to Care, Entry Services, and Suppression

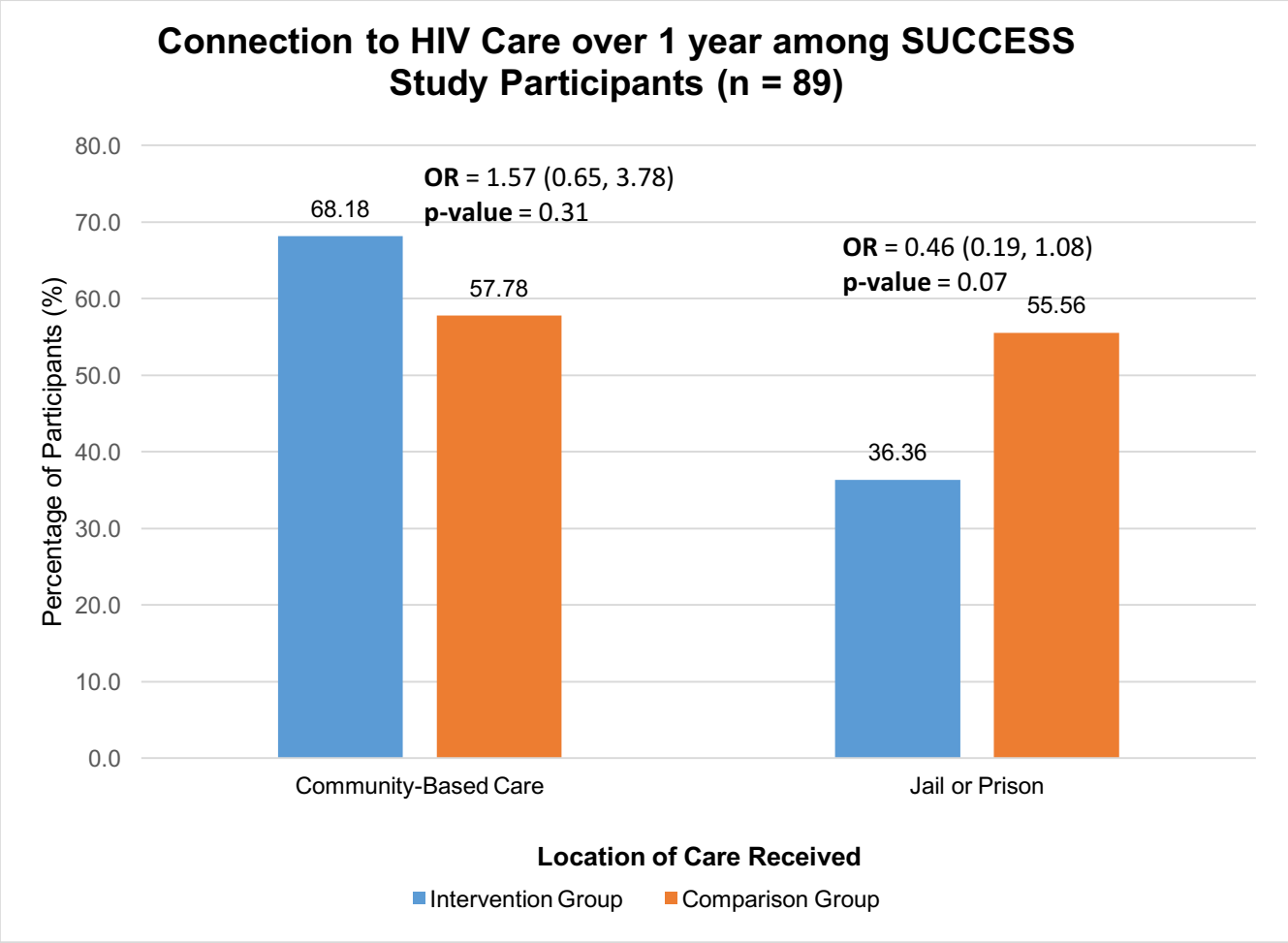
Follow-up data at 12 months available for (n = 21) individuals; 3-month follow-up data used to substitute 12-month data for (n = 7) participants.

* Significance assessed using Wilcoxon Signed Rank test

† Statistically significant at $p < 0.05$ among those with $\geq$ 4 case management sessions

‡ Among (n = 18) who consistently reported being prescribed medication

Figure 1. Connection to HIV Care in Community versus Correctional Settings over 1 year among SUCCESS Study Participants: Individuals Released from Fulton County Jail, Atlanta, GA, 2014 to 2016



*Community-based care defined as hospital, health department, or community clinic

Chapter III

Summary and Public Health Implications

In summary, our findings that recidivism was unchanged as a result of an intensive case management intervention aimed at improving linkage and retention in medical care are consistent with previous studies. Investigation into factors associated with recidivism revealed that drug use and unsuppressed viral load were highly predictive of returns to jail. Furthermore, we found that over half of participants in both groups connected to a community care site at least once following release, and many received HIV care upon a return to a correctional facility over one year following initial release.

The results of this study continue to highlight the multi-level challenges faced by HIV-infected persons as they exit correctional settings and transition into community settings. With a growing body of literature exploring the post-incarceration trajectories of PLWH, parallels between risk factors for recidivism and those for poor retention in care and subsequent loss of viral suppression are increasingly apparent. In this highly vulnerable population, supporting non-medical needs, such as housing and employment, at the time of release is paramount to successful community reintegration. Stable and sustained community transitions would enable PLWH to prioritize care engagement and establish positive HIV-related and incarceration-related outcomes.

While both decreasing recidivism and increasing linkage to care are desirable goals, these outcomes are currently so entangled that researchers and funders alike cannot make progress on either. On the scale of research design in interventions promoting engagement in medical care, investigators would benefit to acknowledge the likelihood of reincarceration among study participants, and make efforts to integrate continuation of the intervention as well as appropriate adjustment for such events in analysis. Likewise, funders must take into account that prevention of recidivism might require an altogether

more comprehensive case management regimen, and that not all challenges can be addressed concurrently by a single low-cost and time-efficient intervention.

Simultaneous prevention of recidivism and facilitation of HIV care management following release in the current criminal regulatory environment will require strategic integration of evidence-based approaches and individual-level support prior to release from a correctional setting. Opportunities for future research include development and testing of a comprehensive and multi-faceted approach for case management that integrates education, substance use treatment, and support for unmet non-medical needs.

Ultimately, social and structural changes in policies and policing practices are required to diminish the burden of poverty, racial inequalities, mental illness, substance use, and infectious disease in today's American correctional systems. Advocacy and policies for diversion of substance-using individuals and persons with mental illness into alternative programs is critical to the progress of the U.S. criminal justice system. Appropriate support for vulnerable populations is vital to the health of the public as individuals cycle between confinement and communities. A rehabilitative perspective, as opposed to a punitive one, would facilitate community reintegration and engage PLWH into safe and successful HIV management.

Altogether, the study of successful community reintegration and medical care engagement among persons living with HIV released from correctional facilities merits an integrated public health and structural perspective. Researchers, funders, and policy makers alike must work together to clarify goals and objectives for research as well as to develop supportive social programs to influence positively both health outcomes and the U.S. criminal justice system as a whole.