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Childhood Adversities and Substance Misuse Among the Incarcerated: Implications for Treatment and Practice in Correctional Settings

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Abstract

Background—Incarcerated populations have high rates of childhood adversities and substance use problems. Moreover, childhood adversities are well-documented predictors of substance misuse.

Objective—To investigate the impact of childhood sexual and physical abuse, caregiver abuse of drugs or alcohol, and time spent in foster care on several substance misuse outcomes.

Methods—Data comes from a sample of 16,043 incarcerated men and women in the United States Survey of Inmates in State and Federal Facilities. Bivariate analyses revealed differences by sex in childhood adversities and socioeconomic characteristics. Logistic regression analyses assessed the data for a link between childhood adversities and substance misuse after adjusting for other variables. Analyses were stratified by sex to show differences in predictors of substance misuse between men and women.

Results—Childhood adversities increased the risk of many substance misuse outcomes. The prevalence of physical abuse, sexual abuse, foster care, and caretaker abuse of drugs or alcohol were greatest for inmates who reported injecting and sharing drugs. Growing up with a caregiver that used drugs or alcohol was a consistent predictor of increased risk of substance misuse for men and women. However, childhood sexual abuse increased risk for only women.

Conclusions—Inmates who experience physical abuse, sexual abuse, foster care involvement and caretakers who use drugs and alcohol are at an increased risk of substance misuse, injecting drug use and syringe sharing. Implications suggest correctional HIV prevention and substance misuse programs must address unresolved trauma and important gender differences.

Keywords

Substance misuse; injection drug use; corrections; inmates; women

Numerous studies document high rates of adverse childhood experiences including sexual and physical abuse, caregiver use of substances and experiencing time in foster care among

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Declaration of interest

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incarcerated populations (Bowles et al., 2012; Friestad, Åse-Bente, & Kjelsberg, 2014; Johnson et al., 2006; Maeve, 2000; Sharp et al., 2012; Weeks & Widom, 1998; Wolff, Shi, & Siegel, 2009). Moreover, childhood adversities are well-documented predictors of substance misuse outcomes. Additionally, elevated rates of substance misuse are found in incarcerated settings (Mumola & Karberg, 2006). Emerging awareness of the disproportionate number of persons incarcerated who misuse substances has prompted increased attention to research and data that can inform the design of innovative evidence-based substance abuse prevention and treatment programs in correctional settings. This article uses self-report, cross-sectional data to examine the impact of childhood adversities on substance use disorders, alcohol dependence, types of substances used and injection drug use within a nationally representative sample of 16,043 male and female inmates in the United States. Implications for treatment and correctional substance use programming, assessment techniques, health policy, inmate management practices, and HIV prevention programs are discussed.

Literature review

Background

Investigation into the relationship between child adversities and substance use problems in adulthood among incarcerated populations is an important area of empirical inquiry for several reasons. First the number of incarcerated persons with substance use problems has grown precipitously over the past four decades. From 1980 to 2014, the number of persons in prisons and jails who were incarcerated for drug offenses increased from approximately 40,900 to 488,400 (Carson, 2014; Glaze & Herberman, 2013; Mauer & King, 2007). When examined by differences in sex, women in the United States are disproportionately incarcerated for drug crimes accounting for 24% of all females in state prisons compared to 15% of males (Carson, 2014). A global systematic review of studies by Fazel, Bains, and Doll (2006) identified prevalence estimates of drug abuse or dependence that ranged from 30–60% among female prisoners and 10–48% among male prisoners and alcohol abuse disorders that ranged between 10–24% among female prisoners and 18–30% among male prisoners. These alarming statistics indicate a public health epidemic of substance use disorders within criminal justice settings particularly among female inmates.

Second, adverse childhood experiences are highly prevalent among incarcerated men and women (Asberg & Renk, 2012; Mullings, Hartley, & Marquart, 2004; Weeks & Widom, 1998). A study by Wolff and Shi (2010) used a sample of approximately 4,100 men and found that 44.7% experienced physical trauma and 4.50% experienced sexual abuse during childhood. For women, Messina and Grella (2006) examined a sample of 491 incarcerated women in California and found rates of physical abuse of 30.60% and rates of 45.10% for sexual abuse. In multivariate analyses, Wolff and Shi (2010) identified increased risk of substance misuse for incarcerated men who reported a history of childhood physical and sexual victimization after adjusting for sociodemographic and other covariates.

In addition to childhood sexual and physical abuse, primary caregiver influences are noted in studies as robust predictors of adult substance misuse (Kaminer, 2013; Li, Pentz & Chou, 2002; Teichman & Kefir, 2000). For instance, studies by Ewing et al. (2015) with adolescents and Mullings et al. (2004) with incarcerated men found that growing up with

parents who were heavy drinkers increased the risk of alcohol abuse. Parental substance misuse can interrupt valuable time spent monitoring and modeling important coping skills that serve an adaptive function during adulthood thereby heightening risk of substance misuse (Kaynak et al., 2013; Steinberg, Fletcher, & Darling, 1994; Teichman & Kefir, 2000).

Research into the association between foster care involvement and substance misuse outcomes has found mixed results. Some studies suggest that foster care involvement interrupts processes of healthy attachment formation and is associated with increased risk of developing substance misuse (Taussig, Clyman, & Landsverk, 2001) and mental health problems (Clausen et al., 1998). Conversely, Pilowsky, Keyes, and Hasin (2009) did not find a significant association between foster care involvement and lifetime alcohol dependence in data from the National Epidemiologic Survey on Alcohol and Related Conditions. There is lack of consensus surrounding what is qualitatively harmful about foster care. Informed by principles of attachment theories, interruption of healthy bonding pathways through foster care might influence substance misuse. Another explanation is that spending time in foster care institutions and homes might expose youth to substance using peers or caregivers and influence substance misuse through social learning pathways. In both of these instances, foster care involvement can function as a childhood adversity by virtue of negative consequences to the social environment.

Third, a growing number of studies point to childhood adversities as drivers of injection drug use (Kerr et al., 2009; Ompad et al., 2005) and syringe sharing (Strathdee et al., 1997). For instance, Braitstein et al. (2003) found 33% of women and 13% of men reported a history of childhood sexual abuse. Additionally in multivariate analyses Debeck et al. (2013) found that childhood physical abuse predicted progression into regular injecting after adjusting for age of first injecting and other covariates.

Fourth, childhood adversities may influence treatment outcomes for persons receiving interventions for substance use disorders and mental health problems (Cohen & Hien, 2006; Nanni, Uher, & Danese, 2014). Sacks, McKendrick, and Banks (2008) found that women exposed to childhood abuse did not reach the same level of treatment gains as their non-abused peers on measures of substance misuse, or psychological functioning. Delivery of effective treatments for substance misuse is particularly important given empirical evidence suggesting correctional and community-based substance misuse treatment reduces rates of recidivism among substance users (Lipsey & Cullen, 2007). Therefore, identifying individuals with histories of childhood adversities for specialized substance misuse treatment may address unmet needs of a high-risk subgroup of the overall incarcerated population.

Differences by sex in exposure to childhood adversities and substance use outcomes

Differences in rates of exposure to childhood adversities, stress appraisal, and coping styles may shape gendered pathways to a number of different substance misuse outcomes. Overall, prevalence estimates of childhood sexual victimization reported by women generally exceed rates reported by men (Brecht, O'Brien, von Mayrhauser, & Anglin, 2004). For instance, Simpson and Miller (2002) identified rates of childhood sexual abuse among women with substance misuse problems that were nearly twice the rates of childhood sexual abuse found

among women in the community. Additionally, mounting empirical studies suggest that women are more likely than men to develop more severe substance misuse and co-occurring psychiatric problems following adverse experiences (Grella & Joshi, 1999; Messina, Grella, Cartier, & Torres, 2010; Messina & Grella, 2006; Zlotnick et al., 2008). In a sample of youth, Ahmad and Mazlan (2014) identified an association between childhood traumatic experiences and substance misuse only for incarcerated girls but not boys. This trend persists in studies that measure severity of substance misuse pathology. Messina et al. (2010) found that caregiver substance misuse predicted the severity of methamphetamine dependence for women. For men, caregiver use of substances predicted only the onset of methamphetamine use.

Gaps in research

Although a growth has occurred in empirical research into the link between childhood adversity and health problems, several gaps remain. First, most studies in incarcerated settings focus on a single adversity (physical or sexual abuse) among unisex samples of men or women. Substance misuse research in incarcerated settings has focused primarily on physical and sexual abuse despite many studies identifying a link between caregiver use of substances and foster care as salient predictors of other health and psychosocial problems. Fewer studies have examined sex differences in the link between multiple childhood adversities and substance misuse for incarcerated populations. Second, research has traditionally oversimplified the measurement of substance misuse by aggregating all types of drugs or alcohol into a single dichotomized clinical indicator of abuse or dependence. Third, few studies have looked at the impact of childhood adversities on predicting injection drug practices and syringe sharing. Finally, no study to date has used a nationally representative sample of incarcerated men and women to examine the association between childhood adversities and the development of substance misuse.

This paper addresses these gaps by investigating the association between exposure to caretaker substance misuse, childhood physical abuse, childhood sexual abuse, spending time in foster care and substance misuse in a nationally representative sample of inmates in federal and state prisons in the United States. The primary aims of this study are to: (1) investigate the association between four childhood adversities and substance misuse; (2) to examine sex differences in the effects of childhood adversities on substance misuse; (3) to discuss implications of these findings for correctional treatment, assessment techniques, health policy, and management of inmates who use drugs in the United States' prison system.

The substance misuse outcomes investigated in this study include: (a) substance use disorder; (b) alcohol dependence; (c) daily use of substances (marijuana, heroin, other opiates, methamphetamine, other amphetamines cocaine and crack); (d) types of drugs injected (heroin, methamphetamine and cocaine); and (e) syringe sharing. For the purposes of this study, the term *substance misuse* is defined as the "the use of a substance for a purpose not consistent with legal or medical guidelines as in the nonmedical use of prescription medications"(WHO, 2015). This term is widely regarded in the substance

misuse research community as the least judgmental way of referring to people who use drugs or alcohol (WHO, 2015).

Methods

Study design and sample

In the pursuit of addressing the aims set forth in this study, data are used from the nationally representative 2004 Survey of Inmates in State and Federal Facilities in the United States (SISFF). This study used the most recent available data from the SISCF to examine the relationship between childhood adversities and substance misuse outcomes among the national inmate population in the United States. Collection of data involved computer-assisted interviews that gleaned information from respondents on prior criminal history, demographic characteristics, gun possession, participation in delinquent activities while growing up, crime incident characteristics, prior substance misuse, mental health, and other criminological and well-being variables. It is worth noting that although the survey was conducted with inmates, all of the variables measured substance misuse among inmates prior to arrest and admission to their current period of incarceration.

The study design utilized to recruit inmates involved a stratified two-stage systematic sampling strategy. From a total universe of 1549 state and federal prisons and a secondary file of 36 prisons that opened between 2000 and 2003, the first stage drew a random frame of 287 and 29 federal facilities. Facilities were divided into geographic strata and a weighted sample was selected to produce a nationally representative sample of state and federal inmates. The weighting methodology involved a base weight attributed to each inmate and three adjustment factors. The second stage involved randomly selecting 14,999 state and 3,686 federal inmates. Surveys were administered in face-to-face interviews with computer assisted personal interviewing. Participants were not compensated for providing an interview. Excluding participants based on missing data rendered a final sample size of 16,042 state and federal inmates. A total of 2,642 inmates were excluded from the total sample of 18,685 federal and state inmates due to missing data resulting in a final sample size of 16,043 inmates.

Measures

Childhood adversities—*Sexual abuse* was measured by asking inmates if anyone had ever pressured or forced him or her to have any sexual contact against his or her will, that is: touching of male genitals, or oral or anal sex; or if female, touching of breasts or buttocks, or oral, anal, or vaginal sex. *Physical abuse* was measured by asking inmates if he or she had ever been physically abused, pushed, grabbed, kicked, slapped, bit or shoved, hit with a fist, beaten up, choked, and attacked with a weapon (gun, knife, rock, or other hard object). Inmates who indicated yes to sexual or physical abuse were asked if these events occurred before the age of 18, after the age of 18, or both. Using these variables, two dichotomous indicators were created categorizing inmates who reported experiencing: (1) sexual or (2) physical abuse before the age of 18. *Foster care involvement* included inmates who indicated that there was ever a time while growing up that he or she lived in a foster home, agency,

institution or both. *Caregiver abuse of drugs or alcohol* was measured by asking respondents if while growing up any of his or her parents or guardians abused alcohol or drugs.

Substance abuse or dependence in the year prior to arrest was assessed using 16 questions mirroring the diagnostic criteria utilized in the *Diagnostic and Statistical Manual of Mental Disorders, Version 4* (DSM-IV).¹ A dichotomous variable was created measuring abuse or dependence if one or more items were endorsed on the *substance abuse* subset of questions or three or more items were endorsed on the *substance dependence* subset.

Alcohol dependence in the year prior to arrest was measured using 14 questions mirroring clinical criteria set forth by the DSM-IV.² Selection of three or more questions classified inmates, in a dichotomized variable, as having alcohol dependence.

Types and frequency of substances used were measured by dichotomous question items asking if the inmate consumed heroin, other opiates, methamphetamine, other amphetamines, methaqualone, barbiturates, tranquilizers, crack, powder cocaine, PCP, ecstasy, LSD, Marijuana or Hashish, and any other drugs, less than once a week, at least once a week, almost daily, daily, or other (specify number of days) near daily or daily during the month prior to arrest. Due to small sample sizes it was not possible to include other opiates, other amphetamines, methaqualone, barbiturates, tranquilizers, PCP, ecstasy, and LSD. Dichotomous variables were created measuring daily or near daily use of marijuana, heroin, other opiates, amphetamines, other amphetamines, powder cocaine, and crack.

Injection drug use assessed respondents with separate questions if, in their lifetime, they had injected (1) methamphetamines, (2) heroin, (3) cocaine, and (4) if they had ever used a syringe to inject any drug that they suspected had been used by someone else. Five dichotomous outcome variables were created measuring any life-time injection drug use and lifetime injection drug use of methamphetamines, heroin, cocaine and syringe sharing.

Socioeconomic covariates included race (black, white, Hispanic and other) unemployment at arrest (part-time, occasional work and no work), a dichotomized variable indicating less than a high school degree at arrest, and the inmate's primary caregiver while growing up (mother, father, both parents, grandparents or other). In addition, dichotomous variables measuring if the inmate grew up in public housing and with a caregiver that received welfare were included to adjust for household economic hardship during childhood.

¹Questions included: (1) getting into situations while using drugs that increased the chances of getting hurt; (2) having arguments under the influence of drugs; (3) losing a job because of drug use; (4) having job/school trouble because of drug use; (5) getting arrested or held at a police station because of drug use; (6) getting into a physical fight while using drugs; (7) using drugs in larger amounts for longer periods of time than intended; (8) wanting or trying to cut down on drug use but could not; (9) spending a lot of time getting and using drugs; (10) having trouble doing important activities; (11) giving up activities in favor of using drugs; (12) using drugs even though it caused emotional problems; (13) using drugs even though it caused personal problems; (14) finding that the usual amount of drugs had less of effect; (15) experiencing withdrawal; and (16) using drugs to deal with bad after-effects.

²Question items included: (1) getting into situations while drinking that increased the likelihood of getting hurt; (2) having arguments while drinking; (3) losing a job because of drinking; (4) having trouble in school or job because of drinking; (5) getting arrested or held at a police station because of drinking; (6) getting into a physical fight while drinking; (7) drink for longer time periods than intended; (8) drinking keep you from going to school or caring for children; (9) continuing to drink even though it was causing problems with family friends or work; (10) continuing to drink even though it was causing physical problems; (11) continuing to drink even though it was causing emotional problems; (12) having to drink more to get the desired effect; (13) experiencing alcohol withdrawal (14) self-medicating to deal with bad after-effects of drinking.

Analyses—All analyses were performed using STATA (version 14). Design-adjusted weights were applied to descriptive and parameter estimates to correct for effects introduced by the sampling design of the study. Descriptive statistics were presented for frequencies of childhood adversities across all of the substance misuse outcomes (aim 1). To examine the relationship between childhood adversities and substance misuse outcomes, logistic regression models, their standard errors and respective p-values were calculated after adjusting for covariates of sex, race, education, primary caregiver and economic hardship while growing up (aim1). Further, bivariate analyses used Wald tests of significance to identify differences between men and women within each category of substance misuse outcomes (aim2). To investigate sex differences in the effects of childhood adversities on substance misuse outcomes among inmates, adjusted parameter estimates were computed and stratified by sex (aim 2). All of the descriptive frequencies, bivariate F-test results and logistic regressions estimates are adjusted for the design of the study using weights contained within the dataset. Results are shown for analytic variables, sex and race only.³

Results

Characteristics of the sample

Table 1 presents overall descriptive statistics and differences by sex in the sample for childhood adversities, race, and sex. Of the entire analytic sample of 16,043 participants, 93.08 % (12518) were male and 6.92% (3525) were female. Of all inmates, 6.72% (1530) reported sexual abuse; 34.59% (5248) reported childhood physical abuse; 32.68% (5266) reported growing up with a caregiver that abused drugs or alcohol; and 11.73% (1798) reported spending any time in foster care.

Sex differences—Significantly more women (27.32%; 924) reported childhood sexual abuse compared to men (5.19%; 606, $p < .001$). Conversely, more men (34.82%; 4187) reported histories of childhood physical abuse than women (31.49%; 1061, $p < .001$). The prevalence of growing up with a caregiver who used drugs or alcohol was greater among women (40.90%; 1369, $p < .001$) compared to men (32.07%; 3897, $p < .001$).

Bivariate findings

Substance use disorders—Over half of the sample met the criteria for substance abuse or dependence in the year prior to arrest (53.02%; 8362) and over a quarter of the total sample met the criteria for alcohol dependence (25.64%; 3861).

Sex differences—Overall, significantly more women (58.52; 1932) than men (52.61; 6430) met the criteria for a substance use disorder. Rates of alcohol dependence were comparable between men (25.01; 3094) and women (23.26; 767).

Types of substances used—Table 2 presents descriptive statistics and bivariate analyses of differences in frequencies by sex across substance use of marijuana, methamphetamines, amphetamines crack, cocaine, heroin, and other opiates during the

³Results for other control variables are available upon request.

month prior to arrest. Out of the total sample, marijuana was the most commonly reported drug (26.91%; 4317) followed by crack (8.41%; 1476), cocaine (1317; 8.10%), methamphetamines (7.62%; 1284), heroin (4.83%; 797), other amphetamines (2.82%; 458), and other opiates (1.93%; 341). Prevalence estimates were greatest among inmates who used methamphetamine for all of the childhood adversities for men and three out of the four adversities for women (caregiver use of substances, childhood physical abuse and foster care involvement).

Injection drug use

Table 3 presents descriptive statistics and bivariate tests of significant differences in frequencies by sex for any life-time injection drug use, injecting specific types of drugs (methamphetamines, cocaine and heroin) and sharing syringes. Overall, inmates most commonly reported ever having injected heroin (10.93%; 1747), and cocaine (10.16%; 1648) followed by methamphetamine (7.85%; 1285) and sharing syringes (7.54%; 1250). Out of all the substance use outcomes, inmates reporting injection drug use behaviors had the highest prevalence of childhood sexual abuse. Moreover, the prevalence of sexual abuse exceeded 40 percent for female inmates reporting having ever injected methamphetamines, cocaine and having shared needles. The prevalence of growing up with a caregiver that abused substances or alcohol exceeded 50 percent for women and 40 percent of men in all of the injection drug categories.

Differences in childhood adversities by race, ethnicity, and sex

Stratification by sex revealed patterns in the racial characteristics of men and women in each substance misuse category. For white inmates, more women than men engaged in each of the drug use outcomes. The opposite occurred for black inmates in each of the drug outcome categories in which significantly more men reported substance use disorders, alcohol dependence, crack cocaine use, powder cocaine use, injecting any drug, injecting cocaine and sharing needles.

Multivariate findings

Parameter estimates for control variables are available upon request. The effects of sex and race are shown in the main tables.

Substance use disorders

Overall associations—Table 4 presents design-adjusted logistic regressions predicting substance use disorders and alcohol dependence after adjusting for race, education, employment, and economic hardship while growing up (public housing and welfare). Growing up with a caregiver that used drugs or alcohol was associated with higher odds of having a substance use disorder (1.78, $p < .001$) and alcohol dependence (2.01, $p < .001$) after adjusting for other potential confounders and three other childhood adversity variables. For the entire sample, childhood physical abuse was associated with higher risk of substance use disorders (1.67, $p < .001$) and alcohol dependence (1.31, $p < .001$). Having spent any time in foster care predicted higher risk of substance use disorder (1.16, $p < .05$),

Sex differences—In the overall models, women were at a greater risk than men of developing substance use disorders (1.18, $p > .05$). When stratified by sex, the most consistent differences between men and women pertained to childhood sexual abuse in which men were less likely to report substance use disorders (.82, $p < .05$), while women were at increased risk of substance use disorders (1.24, $p < .05$). For women, childhood sexual abuse was associated with increased risk of alcohol dependence (1.31, $p < .05$) but not for men.

Types of drugs

Overall associations—Design-adjusted parameter estimates logistic regressions predicting types of drugs used are reported in Table 5. Caretaker use of drugs or alcohol predicted increased odds of using marijuana (1.28, $p < .001$), cocaine (1.45, $p < .001$), crack (1.47, $p < .001$), heroin (1.21, $p < .05$), methamphetamines (1.30, $p < .001$) and other amphetamines (1.81, $p < .05$). For the entire sample, childhood physical abuse was associated with marijuana (1.69, $p < .001$), heroin (1.23, $p < .05$), other opiates (1.48, $p < .001$), methamphetamine (1.19, $p < .05$) and other amphetamines (1.59, $p < .001$). Having spent time in foster care predicted increased odds of marijuana (1.38, $p < .001$) cocaine (1.28, $p < .05$), methamphetamine (1.37, $p < .05$), and other amphetamine use (1.39, $p < .05$).

Sex differences—After adjusting for potential confounders, in the overall models, women were more likely to report daily use of crack (2.62, $p < .001$), heroin, (1.60, $p < .001$), and methamphetamines (1.35, $p < .001$). Sex-stratified logistic regression models revealed several differences between men and women in the effects of childhood adversities on substance use disorders. For women, childhood sexual abuse was associated with increased risk of cocaine use (1.33, $p < .05$), and crack use (1.39, $p < .01$). Men reporting prior sexual abuse were less likely to use marijuana (.81, $p < .05$) but the relationship was insignificant for women.

Injection drug use

Overall associations—Design-adjusted logistic regressions predicting ever injecting any drug, heroin, methamphetamine, or cocaine as well as ever sharing needles are reported in Table 6. For the total sample, growing up in a household with a caregiver that abused alcohol or drugs predicted ever injecting any drug (1.49, $p < .001$), injecting heroin (1.28, $p < .001$), injecting meth (1.40, $p < .001$), injecting cocaine (1.55, $p < .001$) and sharing needles (1.52, $p < .001$). Having spent any time in foster care increased the risk of injecting any drug (1.26, $p < .01$), heroin (1.32, $p < .01$), meth (1.45, $p < .001$), or cocaine (1.25, $p < .001$). Childhood physical abuse was significantly associated with all of the injection drug use outcomes including ever injecting drugs (1.39, $p < .001$), heroin (1.50, $p < .001$) methamphetamines (1.56, $p < .001$), cocaine (1.46, $p < .001$), and sharing needles, (1.55, $p < .001$). Overall, childhood sexual assault increased risk of substance use disorder (1.31, $p < .001$), having ever injected cocaine (1.34, $p < .01$), and sharing needles (1.28, $p < .01$).

Sex differences—Across all of the overall models, women were more likely to report injection drug use than men. When stratified by sex, several differences emerged. Childhood

sexual abuse predicting increased risk for injecting any drug (1.44, $p < .001$), injecting methamphetamine (1.55, $p < .001$), cocaine (1.76, $p < .001$), and sharing needles 1.44 ($p < .01$) for women. For men, childhood physical abuse increased risk for ever injecting any drug (1.43, $p < .001$), heroin (1.54, $p < .001$), cocaine (1.50, $p < .001$), and sharing needles (1.60, $p < .001$). Foster care increased risk of injecting heroin (1.34, $p < .01$) and cocaine (1.26, $p < .01$) for men. Finally, growing up with a caregiver that abused substances increased risk of methamphetamine use only for men (1.42, $p < .001$).

Control variables—Control variables chosen for inclusion in the summary tables include gender and race to show additional differences across the substance misuse outcomes. Inmates who identified as white were at a greater risk of all the substance misuse outcomes with the exception of crack use among blacks (1.63, $p < .001$) and heroin use among Hispanics (2.32, $p < .001$). These trends persisted in sex-stratified logistic regressions.

Discussion

This study investigated the relationship between childhood adversities and substance misuse outcomes among incarcerated men and women in the United States. Findings suggest significant differences in the prevalence of childhood adversities between incarcerated men and women. Women were at increased risk of reporting substance use disorders, injecting drugs and sharing syringes while men were at increased risk of reporting alcohol dependence. In sex-stratified logistic regression models, differential associations were identified between types of adversities and substance misuse by sex suggesting different degrees of vulnerability to adverse events during childhood. For women, sexual abuse predicted increased risk for most of the measures of substance misuse. For men, physical abuse was a consistent predictor of increased risk for substance misuse and injecting drugs. The persistent effects of growing up with a caregiver who used illicit substances or alcohol on substance misuse outcomes converges with extant literature pointing to robust effects of parental substance misuse on health and psychosocial outcomes in adolescence and later in adulthood. The association between foster care and substance misuse was mixed and did not differ significantly between men and women.

This study enriches a gap in existing literature by looking at the relationship between childhood adversities and injection drug use. Inmates with extensive histories of childhood adversity may chose to inject drugs as it is the most potent method of drug delivery and could provide avoidance from negative affect produced by prior traumas. Inmates are disproportionately affected by the HIV epidemic with research suggesting heightened risk of HIV infection for formerly incarcerated persons entering the community following imprisonment (Springer & Altice, 2007). Prison settings function as a nexus for multiple intersecting HIV risk factors including substance abuse, prior traumas, risky sexual behaviors, mental health problems and economic hardship (Braithwaite & Arriola, 2003; Braithwaite, Hammett, & Mayberry, 1996). Results from this study suggest that childhood adversities are robust drivers of HIV-related risk behaviors among incarcerated populations for both men and women. Sharing syringes contribute considerably to the incidence of new cases of HIV and identifying pathways to risk are critical to attenuating the current spread of HIV among populations involved in the criminal justice system.

Implications for assessment, treatment, and management approaches to inmates with substance misuse problems

There are several implications from this study that inform the evidence base of correctional treatment programming and policies for incarcerated populations in the United States. This study contributes insights into several areas worthy of change in policy and practice. Specifically, findings from this study generate implications in the following five domains: (1) treatment approaches and correctional programming; (2) assessment techniques; (3) health policy; (4) correctional management, and (5) HIV prevention.

- (1) *Treatment approaches and correctional substance misuse programming.* Findings from this study suggest that changes are in order to existing correctional substance misuse treatment to incorporate trauma informed practices into existing models. The association between childhood adversities and substance use problems reinforce a growing movement among correctional treatment practitioners and researchers to incorporate trauma-informed principles and practices into models of substance misuse treatment for both incarcerated and non-incarcerated populations (Briere & Scott, 2014; Covington, 2008; Gatz et al., 2007). Trauma informed interventions acknowledge the impact of unresolved trauma on inhibiting the delivery of effective substance misuse treatment (Amaro, Chernoff, Brown, Arévalo, & Gatz, 2007; Amaro, Dai, et al., 2007; Amaro, Larson, et al., 2007; Gatz et al., 2007). Amaro, Dai, et al. (2007) found that integrating trauma-informed practices into substance misuse treatment increased retention among women with co-occurring disorders and who experienced traumatic events as children. Inmates with histories of childhood adversities and substance use problems may benefit from specialized treatment programs that incorporate principles of healthy coping skills and stress response theories.
- (2) *Assessment techniques.* Changes to actuarial assessment instruments administered to inmates at intake and discharge from correctional facilities involve including a thorough history of childhood adversities to render recommendations for appropriate treatment and services. When inmates enter into a facility for a spell of incarceration, assessment should consider prior trauma in making recommendations for correctional treatment programming. Without proper assessment, inmates with substance use disorders and histories of trauma may go undetected and receive inadequate services. In addition to correctional treatment staff, parole and probation officers must receive training in trauma-informed assessment techniques to ensure appropriate continuity of care, retention in treatment and prevention of recidivism.
- (3) *Health care policy.* At the point of transition from prisons to the community, integrating trauma-informed practices into the purview of ACA's mandatory essential health provisions (which now include mental health and substance abuse treatment) may address significant gaps in care, retain formerly incarcerated in treatment, and reduce recidivism (Cuellar & Cheema, 2012; Espinosa & Regenstein, 2014; Phillips, 2012). Incarcerated persons with

substance use problems have significant unmet treatment needs. Among prisoners meeting the criteria for drug dependence or abuse, only 40% of state and 49% of federal prisoners received any type of drug treatment prior to entering into a correctional institution (Mumola & Karberg, 2006). Many of these inmates who entered prison with unmet substance misuse needs will re-enter the community and face increased risk for lapses in service utilization, relapse and injection drug use behaviors. Half of the approximately 700,000 inmates who are released annually from jails will receive health insurance under the provisions of the Affordable Care Act (Cuellar & Cheema, 2012). A greater effort is necessary to incorporate newly insured inmates with substance use problems into evidence-based trauma informed treatments. Enveloping trauma-informed psychotherapy within the ACA's expanded services may yield substantial gains in addressing unmet clinical needs, preventing lapses in care, reducing relapse and diminishing the number of uninsured in the United States.

In addition, recidivism of drug offenders contributes significantly to the burgeoning incarcerated population in the United States. Correctional treatment providers, probation officers and other criminal justice practitioners must consider expanding trauma-informed practices as a potential method of addressing a known risk factor of recidivism among the formerly incarcerated. Addressing the link between childhood adversity and substance misuse is not only a matter of providing effective substance misuse treatment but also is imperative to public safety and reducing the number of incarcerated persons in the United States.

- (4) *Organizational management.* Reforms to the physical and social correctional environment are promising avenues that could enhance offender responsivity to evidence-based cognitive programs for substance misuse (Miller & Najavits, 2012). Research suggests many antitherapeutic factors such as forced detoxification, an omnipresent authoritative presence, as well as numerous environmental and sensory trauma triggers characterize the prison environment (Miller & Najavits, 2012). These obstacles inhibit the effective delivery of substance misuse treatment services. At the social level, additional training for correctional staff including line officers, correctional treatment practitioners and medical providers in the etiology, symptoms and progression of trauma pathology could produce a milieu within correctional settings that promote rehabilitation and recovery for persons with substance use problems.
- (5) *HIV prevention.* Trauma-informed treatment for persons who inject drugs could provide an effective risk-reduction intervention for a population that is disproportionately impacted by HIV. Results fit within a growing recognition of the importance of substance misuse treatment as HIV prevention, continuity of care, and structural risk factors. Correctional institutions are opportune venues for situating drug treatment to address multiple intersecting public health challenges of substance misuse, recidivism and HIV risk behaviors. Finally, discharge from prison embodies a particularly vulnerable period for increased drug-related risk behaviors (i.e. injection drug use) and sexual risk behaviors (Draine et al., 2011; Springer et al., 2011). Additional research is in order to

determine if integration of trauma-informed practices into HIV risk reduction programs at discharge for people who use drugs could attenuate the heightened risk of HIV infection that accompanies release from prison.

- (6) *Prevention of childhood adversities.* Findings from this study emphasize the need to strengthen strategies that address the causes of childhood adversities as a potentially effective method of substance abuse prevention. Increasing funding for interventions that promote child development and strengthening the resources available for caretakers to raise healthy and well-adjusted children could reduce the number of incarcerated by virtue of preventing drug possession and other crimes related to addiction. Additionally substance misuse treatment for caregivers could interrupt cycles of addiction. Finally community level interventions to educate parents and caregivers about warm parenting techniques as well as public health communication campaigns that encourage the reporting of physical and sexual abuse of children could prevent substance misuse in adulthood. Additional longitudinal research is in order that examines the impact of interventions to prevent childhood adversities on risk of substance misuse during adulthood.

Limitations

This study has several limitations. Due to small cell sizes, there were too few inmates reporting daily or near daily use of methaqualone, barbiturates, tranquilizers, PCP, ecstasy, and LSD. In addition to types of substances, small cell sizes prevented exploration of severity, characteristics of the perpetrator, or number of times of sexual or physical abuse. Another limitation pertains to measurement sexual and physical abuse variables. Inmates were asked several questions pertaining to their relationship to the physical assailant, injuries incurred because of the assault, and circumstances surrounding the physical abuse. Similarly for sexual abuse, inmates were asked if sexual contact occurred more than once, if the person was an adult, the relationship to the perpetrator, if the assault was an attempted or completed rape, and if the incident occurred while incarcerated. Unfortunately, for inmates who reported abuse (physical or sexual) before *and* after 18 years of age, the survey did not ask the inmate to connect the characteristics of the incident or the perpetrator to occurring in either childhood or adulthood. This precludes a more nuanced descriptive and multivariate assessment of the characteristics of the assault and the relationship to the perpetrator.

In addition to other childhood adversities, the survey did not measure the quantity, route of administration and frequency of consumption of illicit substances used by caretakers. Similarly, the type of substances used by the caretaker beyond alcohol or drug misuse was not inquired by the study questionnaire and due to small cell sizes a single variable was used to measure growing up with a caregiver that abused drugs. Similar considerations persisted for foster care in which a single variable measured whether the inmate spent time in a foster care institution, home or both. This offers a relatively simplified assessment of childhood adversities. Given the gap of literature on childhood adversities and substance misuse among the incarcerated, this preliminary analysis should be viewed as exploratory.

Finally, assessment of prior foster care involvement did not examine the duration of institutionalization, size of the institution, number of foster care placements and reasons for placement. Additionally, the survey questionnaire failed to measure characteristics of foster care involvement that could shed insight into more qualitative explanations for why foster care might be harmful for youth. Both explanations suggest that foster care involvement is likely mediated by features of the social environment that occur as a result of foster care involvement such as bonding to caregivers and changes to peer groups. Also it is likely that the negative effects of foster care on substance misuse differ qualitatively depending on the developmental stage, gender and race of the individual. A fruitful avenue of future research would parse out these influences through path analysis or other structural equation modeling techniques. Future research that collects nuanced data on characteristics of negative experiences could illuminate the specific aspects of childhood adversities that heighten risk of substance misuse during adulthood among incarcerated populations in the United States.

Another limitation pertains to the injection drug use measure. The question only measures lifetime injection at the expense of including, onset, frequency, quantity, or characteristics of injection drug use practices. This introduces the possibility of conflating persons who injected only once when a teenager with people who are chronic injectors. However it is worth noting that if the study questionnaire captures a disproportionate number of “one-time” injectors then it is likely that this study underestimates the magnitude of the true relationship between childhood adversities and injection drug use behaviors.

Regarding injecting drug use, the study questionnaire only assessed participants on lifetime injection drug use and syringe sharing thus introducing issues in establishing directionality of the effects of adverse childhood experiences and injection drug use. Moreover, the conceptualization of injection drug use as a dichotomous lifetime indicator is a simplified measurement that precludes an understanding of how childhood adversities might increase risk among active or chronic injection drug users. This study did not measure prior childhood temperament variables, or delve deeper into parenting styles (i.e. harsh vs. warm) as potential mediators of the impact of childhood adversities on substance misuse outcomes. The cross-sectional, retrospective nature of the data collection naturally induces some degree of recall bias into the findings of this study. However, given the sensitive nature of self-reported childhood adverse experiences it is likely that underreporting rather than overreporting occurred. In this case, parameter estimates likely underestimate rather than exaggerate the true effects of childhood adversities on substance misuse outcomes.

Finally, this study did not examine the differential effects of childhood adversities on substance misuse by categories of race. A prior study by Roxburgh and MacArthur (2014) used the same dataset as this study and identified differential effects of childhood adversities on depression by race and sex. In the present study, white women were more likely to develop virtually all of the substance misuse outcomes with the exception of crack cocaine and heroin. Unfortunately given small cell sizes for some of the variables across substance use outcomes, it was not possible to explore three way interactions between race, sex and childhood adversities. As a compromise, this study stratified by sex and controlled for the effects of race. The pathways to various substance misuse sequelae are likely conditioned by

both race and sex and additional research is in order that further disentangles these relationships.

Nonetheless, this study has several notable strengths. First, this is the only study to date to use a nationally representative dataset to explore the relationship of childhood adversities and substance use disorders among the incarcerated. Second, different types of substances were explored which are often neglected in current research. Third, the analysis contributed to a previously understudied area, which included the effects of childhood adversities on injection drug use. Finally, this study examined sex differences in the pathways between childhood adversities and substance misuse outcomes.

Conclusion

Data from this study suggest that childhood adversities play a significant role in the development of substance misuse in an inmate population. Stratification by sex provided empirical evidence suggesting differential effects of childhood adversities on substance misuse outcomes. Effective substance misuse treatment is essential to ensuring the overall health of a large segment of the United States population as well as facilitating reductions in the number of imprisoned persons. Given the large size of the incarcerated population in the United States, trauma-informed HIV risk reduction interventions situated within criminal justice settings may be opportune venues to produce large scale gains in reducing substance use problems, relapse, HIV risk behaviors and recidivism in the United States. High rates of childhood adversities among incarcerated populations with substance use problems demands that policy makers rethink current assessment techniques, correctional treatment programs, and inmate management strategies along every contour of the criminal justice system.

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References

- Ahmad A, Mazlan NH. Substance abuse and childhood trauma experiences: Comparison between incarcerated and non-incarcerated youth. *Procedia-Social and Behavioral Sciences*. 2014; 113:161–170.
- Amaro H, Chernoff M, Brown V, Arévalo S, Gatz M. Does integrated trauma-informed substance abuse treatment increase treatment retention? *Journal of Community Psychology*. 2007; 35(7):845–862.
- Amaro H, Dai J, Arévalo S, Acevedo A, Matsumoto A, Nieves R, Prado G. Effects of integrated trauma treatment on outcomes in a racially/ethnically diverse sample of women in urban community-based substance abuse treatment. *Journal of Urban Health*. 2007; 84(4):508–522. [PubMed: 17356904]
- Amaro H, Larson MJ, Zhang A, Acevedo A, Dai J, Matsumoto A. Effects of trauma intervention on HIV sexual risk behaviors among women with co-occurring disorders in substance abuse treatment. *Journal of Community Psychology*. 2007; 35(7):895–908.
- Asberg K, Renk K. Substance use coping as a mediator of the relationship between trauma symptoms and substance use consequences among incarcerated females with childhood sexual abuse histories. *Substance Use & Misuse*. 2012; 47(7):799–808. [PubMed: 22468563]

- Bowles MA, DeHart D, Webb JR. Family influences on female offenders' substance use: The role of adverse childhood events among incarcerated women. *Journal of Family Violence*. 2012; 27(7):681–686.
- Braithwaite RL, Arriola KR. Male prisoners and HIV prevention: A call for action ignored. *American Journal of Public Health*. 2003; 93(5):759–763. [PubMed: 12721138]
- Braithwaite, RL., Hammett, TM., Mayberry, RM. Prisons and AIDS: A public health challenge. San Francisco, CA: Jossey-Bass Publishers; 1996.
- Braitstein P, Li K, Tyndall M, Spittal P, O'Shaughnessy MV, Schilder A, ... Schechter MT. Sexual violence among a cohort of injection drug users. *Social Science & Medicine*. 2003; 57(3):561–569. [PubMed: 12791497]
- Brecht ML, O'Brien A, von Mayrhauser C, Anglin MD. Methamphetamine use behaviors and gender differences. *Addictive Behaviors*. 2004; 29:89–106. [PubMed: 14667423]
- Briere, JN., Scott, C. Principles of trauma therapy: A guide to symptoms, evaluation, and treatment. Thousand Oaks, CA: Sage Publications; 2014.
- Carson, A. Prisoners 2013. Washington, DC: Bureau of Justice Statistics; 2014.
- Clausen JM, Landsverk J, Ganger W, Chadwick D, Litrownik A. Mental health problems of children in foster care. *Journal of Child and Family Studies*. 1998; 7(3):283–296.
- Cohen LR, Hien DA. Treatment outcomes for women with substance abuse and PTSD who have experienced complex trauma. *Psychiatric Services*. 2006; 57(1):100–106. [PubMed: 16399969]
- Covington SS. Women and addiction: A trauma-informed approach. *Journal of Psychoactive Drugs*. 2008; 40(sup5):377–385.
- Cuellar AE, Cheema J. As roughly 700,000 prisoners are released annually, about half will gain health coverage and care under federal laws. *Health Affairs*. 2012; 31(5):931–938. [PubMed: 22566431]
- DeBeck K, Kerr T, Marshall BD, Simo A, Montaner J, Wood E. Risk factors for progression to regular injection drug use among street-involved youth in a Canadian setting. *Drug and Alcohol Dependence*. 2013; 133(2):468–472. [PubMed: 23910434]
- DiClemente RJ, Wingood GM, Crosby R, Sionean C, Cobb BK, Harrington K, ... Oh MK. Parental monitoring: Association with adolescents' risk behaviors. *Pediatrics*. 2001; 107(6):1363–1368. [PubMed: 11389258]
- Draine J, Ahuja D, Altice FL, Arriola KJ, Avery AK, Beckwith CG, ... Ouellet LJ. Strategies to enhance linkages between care for HIV/AIDS in jail and community settings. *AIDS Care*. 2011; 23(3):366–377. [PubMed: 21347900]
- Espinosa JF, Regenstein M. How the affordable care act affects inmates. *Public Health Reports*. 2014; 129:369–373. [PubMed: 24982541]
- Ewing BA, Osilla KC, Pedersen ER, Hunter SB, Miles JN, D'Amico EJ. Longitudinal family effects on substance use among an at-risk adolescent sample. *Addictive Behaviors*. 2015; 41:185–191. [PubMed: 25452064]
- Fazel S, Bains P, Doll H. Substance abuse and dependence in prisoners: A systematic review. *Addiction*. 2006; 101(2):181–191. [PubMed: 16445547]
- Friestad C, Åse-Bente R, Kjelsberg E. Adverse childhood experiences among women prisoners: Relationships to suicide attempts and drug abuse. *International Journal of Social Psychiatry*. 2014; 60:40–46. DOI: 10.1177/0020764012461235 [PubMed: 23045353]
- Gatz M, Brown V, Hennigan K, Rechberger E, O'Keefe M, Rose T, Bjelajac P. Effectiveness of an integrated, trauma-informed approach to treating women with co-occurring disorders and histories of trauma: The Los Angeles site experience. *Journal of Community Psychology*. 2007; 35(7):863–878.
- Glaze, LE., Herberman, EJ. Correctional populations in the United States, 2012. Washington, DC: Bureau of Justice Statistics; 2013.
- Grella CE, Joshi V. Gender differences in drug treatment careers among clients in the national drug abuse treatment outcome study. *The American Journal of Drug and Alcohol Abuse*. 1999; 25(3):385–406. [PubMed: 10473004]
- Johnson RJ, Ross MW, Taylor WC, Williams ML, Carvajal RI, Peters RJ. Prevalence of childhood sexual abuse among incarcerated males in county jail. *Child Abuse & Neglect*. 2006; 30(1):75–86. [PubMed: 16412506]

- Kaminer, Y. Adolescent substance abuse: A comprehensive guide to theory and practice. Berlin, Germany: Springer Science & Business Media; 2013.
- Kaynak Ö, Meyers K, Caldeira KM, Vincent KB, Winters KC, Arria AM. Relationships among parental monitoring and sensation seeking on the development of substance use disorder among college students. *Addictive Behaviors*. 2013; 38(1):1457–1463. [PubMed: 23017733]
- Kerr T, Stoltz JA, Marshall BD, Lai C, Strathdee SA, Wood E. Childhood trauma and injection drug use among high-risk youth. *Journal of Adolescent Health*. 2009; 45(3):300–302. [PubMed: 19699428]
- Li C, Pentz MA, Chou CP. Parental substance use as a modifier of adolescent substance use risk. *Addiction*. 2002; 97(12):1537–1550. [PubMed: 12472638]
- Lipsey MW, Cullen FT. The effectiveness of correctional rehabilitation: A review of systematic reviews. *Annual Review of Law and Social Science*. 2007; 3:297–320.
- Maeve MK. Speaking unavoidable truths: Understanding early childhood sexual and physical violence among women in prison. *Issues in Mental Health Nursing*. 2000; 21(5):473–498. [PubMed: 11261073]
- Mauer, M., King, RS. *Uneven justice: State rates of incarceration by race and ethnicity*. Washington, DC: Sentencing Project; 2007.
- Messina N, Grella C. Childhood trauma and women's health outcomes in a California prison population. *American Journal of Public Health*. 2006; 96(10):1842–1848. [PubMed: 17008581]
- Messina N, Grella CE, Cartier J, Torres S. A randomized experimental study of gender-responsive substance abuse treatment for women in prison. *Journal of Substance Abuse Treatment*. 2010; 38(2):97–107. [PubMed: 20015605]
- Miller NA, Najavits LM. Creating trauma-informed correctional care: A balance of goals and environment. *European Journal of Psychotraumatology*. 2012;3.
- Mullings JL, Hartley DJ, Marquart JW. Exploring the relationship between alcohol use, childhood maltreatment, and treatment needs among female prisoners. *Substance Use & Misuse*. 2004; 39:277–305. [PubMed: 15061562]
- Mumola, CJ. Bureau of Justice Statistics Special Report. Washington, DC: Department of Justice; 2000. *Incarcerated parents and their children*.
- Mumola, CJ., Karberg, JC. United States Bureau of Justice Statistics, Special Report. Washington, DC: Department of Justice; 2006. *Drug use and dependence, federal prisoners, 2004*.
- Nanni V, Uher R, Danese A. Childhood maltreatment predicts unfavorable course of illness and treatment outcome in depression: A meta-analysis. *American Journal of Psychiatry*. 2014; 169(2): 141–151.
- Ompad DC, Ikeda RM, Shah N, Fuller CM, Bailey S, Morse E, ... Garfein R. Childhood sexual abuse and age at initiation of injection drug use. *American Journal of Public Health*. 2005; 95(4):703–709. [PubMed: 15798133]
- Phillips, S. The Affordable Care Act: Implications for public safety and corrections populations. 2012. Retrieved from <http://www.sentencingproject.org/publications/the-affordable-care-act-implications-for-public-safety-and-corrections-populations/>
- Pilowsky DJ, Keyes KM, Hasin DS. Adverse childhood events and lifetime alcohol dependence. *American Journal of Public Health*. 2009; 99(2):258–263. [PubMed: 19059847]
- Roxburgh S, MacArthur KR. Childhood adversity and adult depression among the incarcerated: differential exposure and vulnerability by race/ethnicity and gender. *Child Abuse & Neglect*. 2014; 38(8):1409–1420. [PubMed: 24703205]
- Sacks JY, McKendrick K, Banks S. The impact of early trauma and abuse on residential substance abuse treatment outcomes for women. *Journal of Substance Abuse Treatment*. 2008; 34(1):90–100. [PubMed: 17574799]
- Sharp SF, Peck BM, Hartsfield J. Childhood adversity and substance use of women prisoners: A general strain theory approach. *Journal of Criminal Justice*. 2012; 40(3):202–211.
- Simpson TL, Miller WR. Concomitance between childhood sexual and physical abuse and substance use problems: A review. *Clinical Psychology Review*. 2002; 22(1):27–77. [PubMed: 11793578]
- Springer, SA., Altice, FL. *Public health behind bars*. New York: Springer. Chicago; 2007. Improving the care for HIV-infected prisoners: an integrated prison-release health model; p. 535-555.

- Springer SA, Spaulding AC, Meyer JP, Altice FL. Public health implications for adequate transitional care for HIV-infected prisoners: five essential components. *Clinical Infectious Diseases*. 2011; 53(5):469–479. [PubMed: 21844030]
- Steinberg L, Fletcher A, Darling N. Parental monitoring and peer influences on adolescent substance use. *Pediatrics*. 1994; 93(6):1060–1064. [PubMed: 8197008]
- Strathdee SA, Patrick DM, Archibald CP, Ofner M, Cornelisse PG, Rekart M, O'Shaughnessy MV. Social determinants predict needle-sharing behaviour among injection drug users in Vancouver, Canada. *Addiction*. 1997; 92(10):1339–1347. [PubMed: 9489050]
- Taussig HN, Clyman RB, Landsverk J. Children who return home from foster care: A 6-source prospective study of behavioral health outcomes in adolescence. *Pediatrics*. 2001; 108(1):e10–e10. [PubMed: 11433089]
- Teichman M, Kefir E. The effects of perceived parental behaviors, attitudes, and substance-use on adolescent attitudes toward and intent to use psychoactive substances. *Journal of Drug Education*. 2000; 30(2):193–204. [PubMed: 10920598]
- Weeks R, Widom CS. Self-reports of early childhood victimization among incarcerated adult male felons. *Journal of Interpersonal Violence*. 1998; 13(3):346–361.
- Wolff, N., Shi, J. Trauma and incarcerated persons. In: Scott, CL., editor. *The handbook of correctional mental health*. 2. Arlington, VA: American Psychiatric Publishing; 2010. p. 277-320.
- Wolff N, Shi J, Siegel JA. Patterns of victimization among male and female inmates: Evidence of an enduring legacy. *Violence and Victims*. 2009; 24(4):469–484. [PubMed: 19694352]
- World Health Organization. Abuse (Drug, alcohol, chemical, substance or psychoactive substance). 2015. Retrieved from http://www.who.int/substance_abuse/terminology/abuse/en/
- Zlotnick C, Clarke JG, Friedmann PD, Roberts MB, Sacks S, Melnick G. Gender differences in comorbid disorders among offenders in prison substance abuse treatment programs. *Behavioral Sciences & the Law*. 2008; 26(4):403–412. [PubMed: 18683199]

Table 1

Design-adjusted descriptive statistics of childhood adversities, substance use or abuse and alcohol dependence in the year prior to arrest ($n = 16043$).

	Total sample			Substance abuse or dependence criteria met in year prior to arrest			Alcohol dependence criteria met in year prior to arrest		
	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women
Overall	16043	93.08(1518)	6.92(3525)	53.02(8362)	52.61 (6430)	58.52(1932)	25.64(3861)	25.01 (3094)	23.26(767)
Sexual abuse	6.72(1530)	5.19(606)	27.32(924)	7.74(963)	5.71(349)	32.26(614)	8.88(495)	6.95(205)	37.71(290)
Physical abuse	34.59(5248)	34.82(4187)	31.49(1061)	42.17(3388)	42.56(2676)	37.46(712)	43.58(1646)	43.58(1323)	43.57(323)
Caretaker alcohol or drugs	32.68(5266)	32.07(3897)	40.90(1369)	40.89(3472)	40.27(2552)	48.40(920)	46.99(1861)	46.26(1427)	57.95(434)
Foster care	11.73(1798)	11.69(1399)	12.19(399)	14.41(1168)	14.35(889)	15.12(279)	14.63(565)	14.42(432)	17.77(133)
Race									
Black	40.81(6535)	41.29(5164)	34.33(1189)	38.34(3104)	39.00(2524)	30.41(580)	32.47(1243)	32.74(1029)	28.43(214)
Hispanic	17.87(27.90)	18.03(2339)	15.72(624)	16.85(1407)	16.99(1102)	15.14(305)	16.30(644)	16.33(514)	15.97(130)
White	35.54(5746)	34.97(4292)	43.17(1454)	39.30(3363)	38.58(2450)	48.06(913)	44.36(1686)	44.13(1330)	47.85(356)
Other	5.79(981)	5.72(720)	6.78(261)	5.51(488)	5.44(354)	6.39(134)	6.87(288)	6.81(221)	7.75(67)

Boldface indicates a significant bivariate Wald F-test statistic of at least $p < .05$

Table 2

Design-adjusted descriptive statistics for childhood adversities and types of substances used ($n = 16043$).

	Marijuana			Heroin			Other opiates			Crack			Cocaine			Meth			Other amphetamines		
	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women
Overall	26.91(4317)	30.04(3666)	18.67(651)	4.83(797)	4.63(557)	7.42(240)	1.93(341)	1.79(218)	3.74(123)	8.41(1476)	7.65(695)	18.62(581)	8.10(1317)	7.90(966)	10.78(351)	7.62(1284)	7.33(899)	11.46(885)	2.82(458)	4.22(133)	2.71(131)
Sexual abuse	9.96(416)	5.52(190)	34.73(226)	6.35(77)	4.43(24)	22.47(53)	11.22(56)	7.93(17)	32.44(39)	9.91(250)	5.65(51)	33.43(199)	8.48(73)	5.79(53)	34.93(120)	9.29(177)	6.55(54)	32.82(123)	10.39(70)	7.60(24)	34.42(46)
Physical abuse	45.66(1895)	45.85(1634)	41.67(2032)	39.49(295)	40.27(218)	32.90(77)	49.71(157)	51.81(114)	36.14(43)	36.83(527)	37.24(329)	34.58(198)	40.11(498)	40.45(124)	36.79(124)	45.11(532)	45.40(395)	42.59(157)	52.17(220)	53.48(171)	40.88(49)
Caretaker alcohol or drugs	40.64(1763)	40.20(1449)	50.08(314)	38.55(319)	37.61(209)	46.44(110)	42.98(157)	41.33(92)	53.59(65)	41.99(646)	40.83(368)	48.40(278)	42.94(572)	42.46(407)	47.67(165)	44.05(580)	43.05(385)	52.63(195)	46.08(22)	44.66(147)	58.31(75)
Foster care	16.79(705)	16.70(591)	18.63(114)	12.26(100)	12.06(67)	13.89(33)	15.64(51)	13.35(16)	15.99(35)	13.24(202)	12.81(113)	15.63(89)	16.17(200)	16.25(149)	15.33(51)	19.25(235)	19.27(167)	19.07(68)	20.40(85)	20.94(65)	15.71(20)
Race																					
Black	44.52(1931)	44.78(1679)	38.90(252)	30.86(238)	31.42(177)	26.19(61)	9.49(35)	9.61(24)	8.72(11)	53.53(767)	54.77(491)	46.59(276)	40.66(521)	41.27(403)	34.62(118)	2.83(39)	2.67(25)	4.22(14)	7.98(36)	7.69(25)	10.45(11)
Hispanic	14.75(632)	14.81(542)	13.33(90)	34.46(267)	35.03(193)	29.70(74)	10.07(37)	9.99(24)	10.57(13)	11.39(172)	11.26(106)	12.13(66)	18.97(249)	19.29(191)	15.83(58)	17.31(208)	17.39(149)	16.60(59)	14.55(64)	14.53(46)	14.71(18)
White	35.56(1517)	35.39(1255)	41.38(262)	31.30(265)	30.09(168)	41.48(97)	75.38(253)	75.16(156)	76.80(94)	35.58(482)	34.59(325)	45.29(157)	35.58(482)	34.59(325)	45.29(157)	71.02(925)	71.23(650)	69.22(275)	69.51(228)	69.57(96)	
Other	5.17(237)	5.11(190)	6.39(47)	3.38(27)	3.46(19)	2.63(8)	5.06(16)	5.24(11)	3.90(5)	4.07(66)	3.95(36)	4.70(30)	4.79(65)	4.85(47)	4.27(18)	8.84(112)	8.71(75)	9.97(37)	7.97(34)	8.23(26)	5.27(8)

Boldface indicates a significant bivariate Wald F-test statistic of at least $p < .05$

Table 3

Design-adjusted descriptive statistics for childhood adversities and injection drug use ($n = 16043$).

	Injected any drug			Injected meth			Injected cocaine			Injected heroin			Shared needles		
	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women
Overall				7.85 (1285)	7.54(905)	12.01 (380)	10.16 (1648)	9.81 (1173)	14.92(475)	10.93(1747)	10.64 (1273)	14.84(474)	7.54 (1250)	7.17 (853)	12.50(397)
Sexual abuse	11.03 (469)	7.95 (156)	38.24 (313)	13.29(246)	9.57(81)	44.72(165)	12.42(299)	8.92(100)	43.34(199)	10.05(255)	7.36(90)	36.03(165)	12.60(230)	8.95(73)	40.77(157)
Physical abuse	46.02 (1281)	46.65 (951)	40.49 (330)	52.12(634)	53.00(469)	44.72(165)	48.32(761)	48.99(567)	42.37(194)	46.64(780)	47.31(595)	40.19(185)	49.43(587)	50.27 (424)	42.92(163)
Caretaker alcohol or drugs	43.97 (1310)	43.07 (882)	51.90 (428)	47.10(617)	46.22(414)	54.52(203)	46.23(785)	45.31(529)	54.37(256)	41.61(755)	40.46(514)	52.68(241)	46.41(601)	45.20(387)	55.71(214)
Foster care	16.95 (482)	16.93 (341)	17.14 (141)	20.91(262)	20.96(186)	20.49(76)	17.46(275)	17.52(198)	16.92(77)	17.21(288)	17.39(216)	15.48(72)	17.07(211)	16.97(141)	17.82(70)
Race															
Black	18.44 (516)	18.85 (396)	14.83 (120)	4.79(56)	5.01(45)	2.94(11)	21.62(370)	21.98(289)	18.17(81)	21.63(340)	22.15(261)	17.02(79)	19.40(223)	20.27(175)	12.67(48)
Hispanic	17.84 (505)	18.03 (365)	16.19 (140)	10.92(134)	11.03(96)	10.02(38)	23.62(400)	23.99(299)	20.06(101)	14.44(241)	14.34(167)	15.32(74)	19.92(249)	19.78(166)	20.98(83)
White	57.25 (1689)	56.84 (1180)	60.95 (509)	75.67(975)	75.63(688)	75.97(287)	48.88(870)	48.17(608)	55.70(262)	57.66(955)	57.41(673)	59.85(282)	55.00(697)	54.48(464)	58.98(233)
Other	6.46 (205)	6.28 (132)	8.03 (73)	8.62(120)	8.33(76)	11.08(44)	5.88(107)	5.86(77)	6.07(30)	6.27(112)	6.10(72)	7.81(40)	5.69(81)	5.47(48)	7.39(33)

Boldface indicates a significant bivariate Wald F-test statistic of at least $p < .05$

Table 4

Design-adjusted parameter estimates for childhood adversities, types of substances used, substance use disorder, and alcohol dependence ($n = 16043$).

	Substance use disorder			Alcohol dependence		
	Overall	Men	Women	Overall	Men	Women
Sexual abuse	.89(.07)	.82 [*] (.08)	1.24 [*] (.12)	1.13(.09)	1.08(.10)	1.31 [*] (.14)
Physical abuse	1.68 ^{***} (.07)	1.70 ^{***} (.07)	1.42 ^{***} (.13)	1.31 ^{***} (.06)	1.30 ^{***} (.06)	1.40 ^{***} (.15)
Caretaker alcohol or drugs	1.78 ^{***} (.07)	1.80 ^{***} (.08)	1.65 ^{***} (.14)	2.01 ^{***} (.09)	2.01 ^{***} (.10)	2.05 ^{***} (.20)
Foster care	1.16 [*] (.07)	1.15 [*] (.07)	1.37 [*] (.18)	1.01(.07)	.99(.68)	1.29(.17)
Other covariates						
Female	1.18 ^{**} (.05)	n.a	n.a	.77 ^{***} (.04)	n.a	n.a
Black	.66 ^{***} (.03)	.67 ^{***} (.03)	.54 ^{***} (.052)	.58 ^{***} (.03)	.57 ^{***} (.03)	.75 ^{***} (.08)
Hispanic	.73 ^{***} (.04)	.74 ^{***} (.04)	.60(.07)	.67 ^{***} (.04)	.67 ^{***} (.04)	.88(.12)
Other	.64 ^{***} (.05)	.67 ^{***} (.06)	.52(.08)	.91(.08)	.91(.08)	.91(.16)

* $p < .05$,

** $p < .01$,

$p < .001$; after controlling for economic hardship while growing up (lived in public housing, caregiver received welfare), education, employment status, and primary caregiver while growing up.

Table 5

Design-adjusted parameter estimates for childhood adversities and types of substances used ($n = 16043$).

	Marijuana			Heroin			Other Opiates			Cocaine			Meth			Other amphetamines		
	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women
Sexual abuse	.85(.07)	.81 [*] (.08)	1.21(.14)	.73(.12)	.79(.17)	.63(.12)	.90(.18)	1.13(.18)	.92(.21)	1.06(.12)	1.01(.08)	1.33 [*] (.16)	1.17(.12)	.76(.12)	.81(.12)	0.85(.15)	.87(.20)	.94(.22)
Physical abuse	1.69 ^{***} (.07)	1.71 ^{***} (.08)	1.37 [*] (.15)	1.23 [*] (.11)	1.26 [*] (.12)	1.04(.18)	1.48 [*] (.21)	1.58 ^{***} (.25)	.99(.23)	1.12(.08)	1.14(.09)	1.06(.16)	1.02(.07)	1.17(.09)	1.45 ^{***} (.20)	1.59 ^{***} (.19)	1.64 ^{***} (.21)	1.20(.28)
Caretaker alcohol or drugs	1.28 ^{***} (.06)	1.29 ^{***} (.06)	1.21(.13)	1.21 [*] (.11)	1.23 [*] (.13)	1.16(.18)	1.15(.16)	1.13(.18)	1.47(.32)	1.45 ^{***} (.10)	1.50 ^{***} (.12)	1.13(.14)	1.47 ^{***} (.10)	1.29 ^{***} (.11)	1.38 [*] (.18)	1.31 [*] (.16)	1.27(.17)	1.85 ^{***} (.39)
Foster care	1.38 ^{***} (.08)	1.37 ^{***} (.09)	1.40 [*] (.20)	.91(.12)	.89(.13)	.99(.21)	.97(.16)	.96(.20)	.86(.26)	1.28 [*] (.12)	1.30 [*] (.13)	1.08(.19)	1.05(.10)	1.34 ^{***} (.14)	1.56 ^{***} (.27)	1.39 [*] (.20)	1.41 [*] (.22)	1.05(.30)
Other Covariates																		
Female	.51 ^{***} (.03)	n.a	n.a	1.60 ^{***} (.15)	n.a	n.a	1.82 ^{***} (.25)	n.a	n.a	1.32(.10)	n.a	n.a	2.62 ^{***} (.17)	n.a	n.a	1.38 [*]	n.a	n.a
Black	1.03(.05)	1.02(.05)	1.11(.13)	.79 [*] (.09)	.81(.10)	.67 [*]	.10 ^{***} (.03)	.10 ^{***} (.03)	.12 ^{***} (.05)	.99(.16)	1.01(.09)	.86(.12)	1.63 ^{***} (.13)	.03 ^{***} (.01)	.06 ^{***} (.02)	.10 ^{***} (.02)	.09 ^{***} (.02)	.19 ^{***} (.07)
Hisp.	.76 ^{***} (.07)	.75 ^{***} (.08)	.78(.12)	2.32 ^{***} (.24)	2.40 ^{***} (.28)	1.77 ^{***}	.27 ^{***} (.06)	.26 ^{***} (.06)	.32 ^{***}	1.08(.10)	1.11(.11)	.88(.16)	.75 ^{***}	.44 ^{***} (.04)	.61 ^{***} (.10)	.43 ^{***} (.07)	.42 ^{***} (.07)	.55 [*] (.16)
Other	.76 ^{***} (.07)	.76 ^{***} (.08)	.82(.16)	.60 [*] (.14)	.65(.17)	.35 [*] (.15)	.38 ^{***} (.11)	.41 ^{***} (.13)	.28 [*] (.14)	.78(.12)	.81(.14)	.50 [*] (.15)	.76(.12)	.67 ^{***} (.09)	.86(.18)	.68(.14)	.71(.16)	.44 [*] (.18)

^{*} $p < .05$,
^{**} $p < .01$,
^{***} $p > .001$; Models controlled for economic hardship while growing up (lived in public housing, caregiver received welfare), education, employment status, and primary caregiver while growing up.

Table 6

Design-adjusted parameter estimates for childhood adversities, injection drug use and syringe sharing ($n = 16043$).

	Ever inject drugs			Ever inject heroin			Ever inject meth			Ever inject cocaine			Ever shared needles		
	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women	Overall	Men	Women
Sexual abuse	1.31*** (.10)	1.14 (.12)	1.44*** (.15)	1.08 (.06)	1.07 (.13)	1.20 (.16)	1.19 (.13)	1.11 (.15)	1.55*** (.21)	1.34*** (.13)	1.26 (.16)	1.76*** (.22)	1.28*** (.14)	1.24 (.17)	1.44*** (.19)
Physical abuse	1.39*** (.07)	1.43*** (.08)	1.20 (.13)	1.50*** (.09)	1.54*** (.10)	1.19 (.15)	1.56*** (.11)	1.59*** (.13)	1.25 (.17)	1.46*** (.09)	1.50*** (.10)	1.14 (.14)	1.55*** (.11)	1.60*** (.13)	1.21 (.17)
Caretaker alcohol or drugs	1.49*** (.08)	1.48*** (.08)	1.44*** (.14)	1.28*** (.08)	1.28*** (.09)	1.44*** (.17)	1.40*** (.11)	1.42*** (.12)	1.29 (.17)	1.55*** (.10)	1.56*** (.11)	1.47*** (.17)	1.52*** (.11)	1.51*** (.12)	1.55*** (.20)
Foster care	1.26*** (.09)	1.27*** (.10)	1.32*** (.17)	1.32*** (.11)	1.34*** (.12)	1.03 (.16)	1.45*** (.14)	1.45*** (.15)	1.53*** (.26)	1.25*** (.11)	1.26*** (.12)	1.14 (.17)	1.16 (.11)	1.17 (.13)	1.19 (.20)
Other covariates															
Female	1.43*** (.08)	n.a	n.a	1.25*** (.09)	n.a	n.a	1.29*** (.10)	n.a	n.a	1.33*** (.09)	n.a	n.a	1.46*** (.11)	n.a	n.a
Black	.24*** (.02)	.24*** (.02)	.23*** (.03)	.38*** (.03)	.38*** (.33)	.37*** (.06)	.05*** (.01)	.05*** (.01)	.04*** (.01)	.33*** (.03)	.33*** (.03)	.35*** (.05)	.31*** (.03)	.32*** (.03)	.24*** (.05)
Hispanic	.58*** (.04)	.58*** (.04)	.58*** (.07)	1.06 (.08)	1.07 (.09)	.92 (.13)	.27*** (.03)	.27*** (.03)	.29*** (.06)	.50*** (.04)	.49*** (.05)	.65*** (.07)	.77*** (.07)	.76*** (.08)	.91 (.14)
Other	.60*** (.06)	.59*** (.06)	.68*** (.12)	.67*** (.10)	.69*** (.09)	.58***	.64*** (.08)	.62 (.08)	.81 (.16)	.54 (.15)	.61*** (.08)	.71 (.14)	.58*** (.08)	.57*** (.09)	.67 (.15)

* $p < .01$,
** $p < .01$,
*** $p < .001$; after controlling for economic hardship while growing up (lived in public housing, caregiver received welfare), education, employment status, and primary caregiver while growing up.