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## Sex Differences in Risk Factors and Conditions of Incarcerated Violent Offenders

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### Abstract

**Background:** Violence is widely recognized as a major public health problem requiring public policy intervention. Previous studies have not adequately addressed possible sex differences in risk factors and risk conditions of incarcerated violent offenders. Using a large, nationally representative sample of state and federal prisoners, this study tested if sex moderated the association between risk (factors and conditions) and type of adult crime conviction (violent versus non-violent crime).

**Methods:** Using the 2004 Survey of Inmates in State and Federal Correctional Facilities, self-reported socioeconomic and mental health-related risk factors and background factors were obtained for a cross-section of N=16,152 incarcerated adults in stratified sample state and federal prisons located in the United States. The sample was weighted to reflect the population of prisoners.

**Results:** Parental substance abuse, a history of physical abuse or sexual abuse, depression symptoms, and psychosis symptoms all distinguished incarcerated violent offenders from incarcerated non-violent offenders regardless of sex. A history of sexual abuse was particularly high in men compared to women among incarcerated violent offenders but not among non-violent offenders.

**Conclusion:** This study highlights the fact that regardless of sex, childhood background, reports of abuse, and select mental health disorders predicted the type of crime that resulted in incarceration as an adult. Findings support path dependence of type of criminal incarceration of adults. The predictors distinguishing violent and non-violent crime incarceration are almost identical for males and females. The risk factor distinguishing non-violent crime incarceration is adult drug use. The risk factors distinguishing adults incarcerated for violent crime indicate more social and environmental vulnerability as children, increased likelihood of abuse, and greater burden of psychosis and depression. This study supports that the treatment foci for violent and nonviolent prisoners should differ by type of crime but not by sex given type of crime.

**Keywords:** Violence, incarceration, mental health, sexual abuse, substance abuse

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### Introduction

Crime is widely recognized as a major public health problem requiring public policy and service intervention [1-4].

Currently, over two million Americans are incarcerated, based on a one-day point estimate. According to the Federal Bureau of Investigation's Uniform Crime Reporting Program, there were an estimated 1.21 million violent crimes (murder and non-negligent

manslaughter, forcible rape, robbery, or aggravated assault) in the United States in 2012, approximately 38.7 violent crimes per 100,000 individuals, annually. The number of people convicted of non-violent crimes annually (i.e., property, public order, and drug convictions) is currently similar to that of violent crimes in the United States. Combining violent and non-violent inmates, the United States has the highest incarceration rate in the world and includes approximately one-quarter of the world's prisoners

despite comprising less than five percent of the world's population. Moreover, the United States incarcerates one-third of the world's female inmates [5]. Compared to the 1970s, the current rate of incarceration has significantly increased for males and females in the United States, but the relative rate increase of incarceration among women in the United States outpaced the relative rate increase among men. Additionally, one out of twenty women who are incarcerated is pregnant at the time of incarceration [6]. Corrections' spending exceeds \$86 billion annually. However, when adding the cost of crime to victim, perpetrators, and the justice system, the total cost per conviction costs tens of billions more each year. Crime is estimated to cost the United States 2% to 4% of its gross domestic product annually. Men are proportionally more likely to be incarcerated for violent crimes than women, whereas women are proportionally more likely to be incarcerated for non-violent crimes than males (55% and 35%, respectively). Women are also more likely to suffer from at least one mental health disorder than males (75% and 55%, respectively). Males are more likely to be a victim of violence while incarcerated than females. However, women are more likely to be sexually victimized by staff than men, whereas men are more likely to be a violent crime by another inmate. Males comprise 93% of the incarcerated population in the United States [5]. Socioeconomic status (income, education, employment, race, and age) is a key predictor of arrest, incarceration, and sentencing. People with lower socioeconomic status are more likely to be arrested and convicted as well as more likely to receive longer sentences. Between 1980 and 2000 in the United States, the disparity of incarceration rate increased between African-Americans and Caucasians 1,487 per 100,000. Even subtracting out the rate of Caucasian rate, the incarceration rate of African Americans in the United States is three times the rate of Russia, Rwanda, or Cuba. The disparity decreased to 1,252 per 100,000 between 2000 and 2010 as a result of an increase in Caucasian incarceration rate and decrease in African-American incarceration rate [5]. Relative rates of incarceration for violent crimes among African-American decreased since the 1970s. However, the relative rate of incarceration rate for drug-related crimes increased dramatically between 1980 and 1990 (the initiation of the War on Drugs initiative). The absolute rate of arrest of African-Americans remains twice as high today as the 1970s. Compared to Caucasians, the rate of arrest for drug-related crimes remains three times as high for African-Americans, despite similar drug use and distribution rates among Caucasians and African-Americans [5]. Although suicide rates in the United States are slightly lower than other high income countries, homicide rates are seven times higher than other high income countries. Of the 23 high income countries, four out of five firearm-related homicides occur in the United States annually. Almost 9 out of 10 children and women who are victims of homicide by firearm each year are residents of the United States. The suicide rate by firearms is six times higher in the United States, and the rate of homicide by firearms among males in the United States is 22 times higher. Beyond mortality, physical and psychological injury related to violence (e.g., intimate partner violence and child abuse) has lasting social, economic, and health impacts [7]. Given the prevalence of violent crime and its negative social, health, and economic consequences, violence prevention has become a

major priority of the U.S. Centers for Disease Control and Prevention (CDC) and state and local health departments [1-4]. Non-violent crimes, such as those drug- and property-related, also have high costs to the justice system. Since the 1980s and the enforcement of War on Drugs priorities, the healthcare, productivity, and criminal costs of illicit drugs in the United States have increased [5,8,9]. Both violent and nonviolent crimes have negative consequences for perpetrators and victims. Despite growing incarceration rates and the related increased sentencing and conviction rates, knowledge of risk factors or risk conditions that predict individual's propensity to engage in violent versus nonviolent criminal acts remains limited. Risk factors are those behaviors that are considered lifestyle choices (e.g., alcohol consumption, illicit drug use, or smoking), whereas risk conditions are the structures and circumstances that impact outcomes and choices (e.g., sex, race, poverty, housing, early development, education, and health conditions) [10-13]. Risk conditions are also referred to as living conditions or social determinants of health. The social gradient, or a person's status based on sociodemographic characteristics, predicts incarceration, conviction, and length of sentence [14-16]. Beyond risk factors and conditions (i.e., variables that negatively influences an outcome regardless of the presence of interactive adversity), potential vulnerability (i.e., a variable that increases the likelihood of a poor outcome under adversity) or protective factors (i.e., a variable that decreases the likelihood of a negative outcome under interactive adversity) should be investigated. Given that the United States' daily prison population resembles the total population of countries such as Qatar, Namibia, or Slovenia, it is important to gain a better understanding of predictors with the incarcerated population of the United States, not only the risk factors and conditions that predict becoming incarcerated. Comparing those who have been incarcerated to those who have not been incarcerated, research supports that experiencing childhood risk factors and conditions (e.g., poverty, abuse, and parental drug use) is more likely among those incarcerated. Recent research has explored sex as a possible moderator of risk factors and conditions of depression among incarcerated people, due to gender-based variation of experience of predictors and outcomes of depression. To better understand sex disparities in the likelihood of arrest and conviction for a violent crime [17-21], studies have examined gender difference in risk factors for violent crimes have focused on mental illness and substance abuse as risk factors for violence. Previous studies suggest that the gender gap in violence between men and women is smaller among individuals with a mental illness [22-25] and that mental illness is a greater risk factor for violent crime in women. However, the narrowed gender gap found among individuals with a mental illness has not been observed in all studies [26-28]. The results of studies that have examined the relationship between the propensity to commit violence and alcohol and drug abuse are also mixed. While marijuana use has been found to be a greater risk factor for girls [28,29], as well as more general drug abuse for women [24], another study found drug abuse to be a more significant risk factor for men [27] and other studies found no difference by sex [30,31]. With respect to alcohol abuse, the results of two studies indicated that alcohol abuse was a more significant predictor of violent crime in women compared to men

[24,30], while several studies found the opposite or no difference between sex with respect to alcohol abuse [29,31]. One study even found that alcohol abuse actually suppressed the rate of violent behavior among girls but had no effect on the likelihood of boys behaving in a violent manner [28]. Other types of risk factors and conditions have been examined besides mental illness and substance abuse. For example, several studies explored the negative effects of physical and sexual abuse. One study found that girls who were physically abused were more likely to commit violent crimes than boys who were physically abused [32]. In contrast, another study found that childhood physical and sexual abuse had more criminogenic effects on adult men than women with respect to violent crime [33]. A study of juveniles found that psychological factors, such as low self-esteem, was a greater risk factor for girls, while boys were more vulnerable to repeated moves that involved risk conditions, such as attending different elementary schools and access to drugs [2]. Another study found that being poorly educated, chronically unemployed and lacking social network support were greater risk factors for men [27]. These inconsistent and sometimes contradictory results are in part due to the wide variation in the measures, methods, and data sources used. Inconsistencies in prior results may also be due to limitations of the studies. First, the gender differences in risk factors for violence are often not formally tested, hindering the ability to reach firm conclusions with respect to the gender gap. Rather conclusions are often based on comparisons of effect sizes or p values associated with risk predictors for males and females' likelihood of having committed a violent offense [34-36]. Past studies are also often based on small convenience samples of incarcerated individuals or small area samples, rather than large national surveys [25,37,38]. Irrespective of these limitations, this primarily public health literature does make an important contribution to our knowledge with respect to gender differences in the environmental and individual factors that foster violence, and contrasts with criminology studies, many, if not most of which, focus exclusively on males [2,39,40]. The current study includes three aims: 1) explore the correlates of type of crime conviction (violent versus non-violent) among incarcerated adults in the United States; 2) test the likelihood of type of conviction stratified by gender, based on risk factors and conditions beyond socioeconomic predictors; and 3) analyze sex as a potential moderator of associations between predictors (risk factors and conditions) and type of crime conviction. Two research questions guided the study. Controlling for socioeconomic correlates, do childhood and adult risk factors and conditions predict the type of criminal conviction resulting in incarceration among men and women? This research question focuses on testing risk factors and risk conditions within sex. There are three potential conclusions. First, childhood and adult risk factors and conditions do not predict the type of criminal conviction among men and/or women who are incarcerated. Second, childhood and adult risk factors and conditions consistently increase the likelihood of one type of criminal conviction. Third, childhood and adult risk factors and conditions differentially increase the likelihood of the type of criminal conviction. The second and third findings support path dependence for type of criminal conviction based on childhood or adult risk factors or conditions. The second research question explores the sex as a moderator of the relationship among

predictors and outcomes. Whereas the first research question explores main effects within sex, the second research question tests the significance of interactions by sex. Controlling for socioeconomic correlates, does sex moderate the association of childhood and adult risk factors and conditions and the type of criminal conviction resulting in incarceration? A significant interaction by sex indicates that the predictor and outcome association follows a different process by sex. A significant interaction supports a variation of path to type of incarceration by sex. Sex could act as a protective or vulnerability moderator for type of incarceration.

## Methods

### Sample

The data were derived from the 2004 Survey of Inmates in State and Federal Correctional Facilities carried out by the Bureau of the Census, for the Bureau of Justice Statistics of the U.S. Department of Justice described in greater detail elsewhere [41]. They provide nationally representative data on U.S. state and federal prison inmates (ASFPIS) [41] based on inmate self-reports. The survey interviews were conducted between October 2003 and May 2004. Since these data are in a public access dataset with all identifying information removed, it was not necessary to obtain informed consent from participants. The VA Connecticut Human Studies Subcommittee (the VA Connecticut Institutional Review Board) approved an exemption from the requirement of obtaining informed consent. The sample design for the survey was a stratified two-stage selection with prisons selected first and then inmates within selected prisons selected second. The first stage of selection for both state and federal prisons involved a combination of random and non-random sampling with the largest facilities sampled with certainty and smaller facilities randomly selected using a stratified random sampling algorithm. First, for the 1,758 state prisons in the 2000 Census of State and Federal Correctional Facilities, the 14 largest prisons for men and the 7 largest prisons for women were selected. A complete list of the remaining state prisons was then stratified by census region and size. Using selection based on probability proportional to size, 211 additional male prisons and 58 women prisons were selected. A further 7 state prisons (6 for men; 1 for women) were randomly selected using the same stratification procedure from a file containing data on 36 facilities opened between completion of the 2000 Census of State and Federal Correctional Facilities and April 1, 2003. Federal prisons were chosen using a similar algorithm but with different stratification variables. The largest female prison and the 2 largest male prisons were selected to be in the sample. The remaining prisons were stratified by security level, ordered within a stratum by population size, and then 40 additional federal prisons were randomly selected [41]. Of the 1,947 prisons, 327 (287 state and 40 federal) prisons participated in the study.

In the second stage of sample selection, state prison inmates were selected from a complete list of inmates provided by each prison using simple random sampling. The same sampling fraction was used for each state prison to determine the total number of participating inmates resulting in a sample of 16,152

inmates (13,098 males and 3,054 females). The number of state inmates actually interviewed was 14,499 (11,569 males, and 2,930 females). For federal prisons, an oversample of inmates was first randomly selected from a central list using a random start and a predetermined sample interval so that nondrug offenders would be included in the sample in large enough numbers. Next, from these inmates, all non-drug offenders and 1 in every 3 drug offenders were selected, resulting in a total sample size of 4,253 inmates (3,244 male and 1,009 female). The number of federal inmates actually interviewed was 3,686 (2,728 males, and 958 females). All interviews were an hour long and used computer-assisted personal interviewing techniques. Inmates were assured confidentiality and all surveys were anonymous and de-identified. The survey was weighted to account for the sampling design and non-responses and to assure that the sum of all sample weights equaled the total number of inmates the survey was supposed to represent (i.e., the number of inmates imprisoned in a particular type of facility). Thus, the sum of all sample weights for the survey of state prisoners was 1,226,171—the total number of inmates in the custody of state correctional facilities at the end of 2003; while the total sample weight for the survey of federal inmates was 129,299—the number of inmates in federally owned and operated facilities on January 3, 2004. The samples were proportionally down-weighted so that the statistical tests would not be overly sensitive to the large estimated population. A new weight measure was created for each sample by dividing the existing final weight by the average number of inmates represented by each case (i.e.,  $1,226,171/14,499=84.6$  for state inmates, and  $129,299/3,686=35.2$  for federal inmates). The 2004 state and federal inmate samples were then combined. The combined sample was restricted to individuals of age seventeen and over. After combining the data files, removing juveniles, and down-weighting, 18,166 cases were in the analytic sample. The analytic sample was further reduced to 17,926 due to data missing with respect to our criterion variable.

## Measures

The primary variable of interest in this study was a binary variable representing the type of criminal incarceration (i.e., one if the inmate was incarcerated for a violent crime for their current offense and, zero if not). Inmates who had been arrested for a violent crime in the past but were currently incarcerated for a non-violent offense were coded as zero. Inmates who were first time violent offenders were not distinguished from inmates who were recidivistic violent offenders. Crimes that were considered violent offenses included homicide or manslaughter, any type of sexual or physical assault, and any type of robbery that involved confrontation of the victim [42].

## Demographic Characteristics

A series of dichotomous measures were created to represent gender, marital status, whether the prisoner had worked in the month prior to arrest, and had earnings of greater than \$1,000 per month prior to incarceration. Two dichotomous measures were used to represent education: at least a high school degree or GED and any college education. Additional dichotomous indicators represented age in four categories (18 to 24, 25 to 34,

35 to 44, and above 45) along with race and ethnicity (African American, Caucasian, Other, Latino). Childhood Risk Factors. Childhood risk factors were meant to represent environmental factors, substance abuse, and other delinquent activities that occurred before the respondent was 16 years of age. This category of measures was comprised of five variables, all of which were bivariate self-reported items: alcohol use, drug use, engaged in illegal activities, arrested, and placed on juvenile probation before age 16. Also examined were the following aspects of the respondent's childhood environment, which were also bivariate self-reported items: ever in foster care, lived in public housing while growing up, parents received welfare, and parents abused alcohol or drugs.

## Childhood or Adult Abuse

Two lifetime dichotomous measures of abuse were also considered, self-reported measures of physical abuse and sexual abuse.

## Adult Risk Factors

Six dichotomous measures of adult risk factors were constructed: current difficulty with drug abuse or dependence, current difficulty with alcohol abuse or dependency, ever homeless in the past year, mania symptoms, depression symptoms, and psychosis symptoms. **Table 1** provides details of the algorithms used to construct the substance abuse and mental health measures. The symptom items that make up each of the substance abuse and mental health measures came from a modified structured clinical interview for the DSM-IV that is included in the Department of Justice surveys. The algorithms were developed by the Department of Justice to approximate DSM IV diagnoses [43]. With respect to the variable "ever homeless in the past year", a dichotomous measure was constructed that had a value of zero if the inmate was never homeless (i.e., living on the street or in a homeless shelter) during the year prior to arrest, and a value of one if the inmate reported a period of homelessness in the year prior to arrest.

## Analyses

Analysis proceeded in several steps. First, for descriptive purposes, the percentages for all measures by offender type (violent vs. non-violent) and gender were calculated. Next, a series of bivariate chi-square tests were performed to examine whether significant relationships existed between being a violent offender and sociodemographic characteristics, childhood and adult risk factors, and abuse. These analyses were stratified by gender. In the third and final analytic stage, multivariate logistic regression was used to identify the correlates of violent offenses while testing for significant gender interactions among those risk factors. For each independent variable of interest, a model was created that included measures of age, race, gender, marital status, education, income, work status, and an interaction term representing whether the prisoner was a violent offender and gender. The bivariate chi-square tests were used to examine the strength of the relationship between each inmate characteristic and being a violent offender regardless of other factors. The multivariate logistic regression analyses in contrast is used to examine the

**Table 1** Measures

<sup>1</sup>Scales are based on a Bureau of Justices Statistics special report (James and Glaze 2006).

<sup>2</sup>For the drug dependence and abuse scale italics indicates multiple items were used to address a symptom.

<sup>3</sup>Alcohol dependence and abuse scale parallels the drug dependence and abuse scale.

Scale	Items
Mania	Persistent anger or irritability (Lost your temper easily, have been angry more often, hurt or broken things on purpose because angry)
	...or all of the following symptoms,
	(1) Diminished ability to concentrate or think
	(2) Psychomotor agitation or retardation or increased or decreased pleasure in activities (Periods when felt talked or moved more slowly than usual or periods when could not sit still or a change in activity level or change in sex drive )
Depression	(3) Changes in time spent sleeping
	Feelings of emptiness/numbness
	...or...
	Change in activity levels
	<b>...along with 3 of the following 8 additional symptoms,</b>
	(1) Feeling of emptiness/numbness
	(2) Change in activity levels
	(3) Changes in time spent sleeping,
	(4) Change in appetite
	(5) Psychomotor agitation or retardation (Periods when felt talked or moved more slowly than usual or periods when could not sit still)
	(6) Feelings of worthlessness (Given up hope in last year for your life or future or experience periods in which you felt like no one cared about you)
(7) Diminished ability to concentrate or think	
Psychoses	(8) Attempted suicide
	<b>One of the following,</b>
	(1) Delusions (Felt that others were able to control brain/thoughts, felt that others could read mind, or felt that others (besides the corrections staff have been spying or plotting against them).
Drug Dependence or Abuse <sup>3</sup>	(2) Hallucinations (Seen things others deny seeing or heard things others deny hearing)
	<b>In year before admission one of the first 4 listed symptoms or three or more of the 7 following, symptoms...</b>
	(1) Got into situations while using drugs that increased chances of getting hurt
	(2) Drugs created interpersonal problems as indicated by one of the following three symptoms <sup>2</sup> , a. Had arguments under the influence of drugs, b. Had physical fights while using drugs, c. Used drugs even though causing problems with family, friends, or work
	(3) Drugs causing performance failure as indicated by one of the following three symptoms, a. Lost a job because of drug use, b. Have trouble at school or job because of drug use, c. Drug use prevented from attending important activities (childcare, school, or work),
	(4) Drug use caused arrest or being held at a police station
	(5) Had to take more of a drug to get the same effect
	(6) Problems with withdrawal as indicated by either a) Experienced such withdrawal effects as shaking, nausea, sweating, restlessness, etc. or b) Kept using drugs to get over any of the bad after-effects of drug use
	(7) Gave up activities interested in or important to you to use drugs
	(8) Drugs caused either a) emotional problems or b) physical problems
	(9) Spent a lot of time getting drugs, using them, and getting over bad after-effects
(10) More than once wanted to cut down on drug use but found could not	
(11) Used drugs for longer periods or larger amounts than intended.	

importance of each inmate characteristic independent of other predictor variables, i.e., the unique relationship of each variable to being a violent offender over and above the association with other variables. All analyses were weighted to adjust for sampling design and non-response using weights provided in the restricted use version of the survey data. Additionally, all statistical analyses were conducted with the procedures PROC FREQ and PROC LOGISTIC of the SAS® software system [44] version 9.0.

## Results

### Bivariate Results

Altogether, 93.2% of the down-weighted samples of 17,926 U.S. ASFPI were men. **Table 2** presents non-weighted counts and down-weighted percentages by gender and type of offense for each sample characteristic examined. The table also presents unadjusted bivariate analyses comparing inmates with violent charges to inmates with non-violent charges stratified by gender. Age, race, and marital status were all significantly associated with violent offenses in both men and women. Additionally, incarcerated men with an income greater than \$1000 per month prior to arrest and with greater education had a significantly

lower likelihood of having committed a violent offense. Working in the month prior to arrest was not found to be associated with violent offenses among men or women. **Table 3** presents results equivalent to those presented in **Table 2** for measures of childhood and adult risk factors as well as abuse. For men, all the childhood risk factors, both those related to behavior and the environment, were associated with offender type in the expected direction. In contrast, for women the only childhood risk factors that were associated with increased likelihood of being a violent offender were ever having been in foster care ( $p=0.30$ ) or having parents that abused alcohol or drugs ( $p=0.02$ ). Both sexual and physical abuse were significantly associated with greater likelihood of having been incarcerated for a violent crime as opposed to a non-violent crime among men ( $p<0.0001$ ;  $p<0.0001$ ) and women ( $p=0.0013$ ;  $p<0.0001$ ). Two of the six adult risk factors were found to be associated with greater likelihood of being a violent offender. Specifically, for incarcerated men and women, both depression and psychosis were significantly associated with a greater likelihood of violence among men ( $p=0.0009$ ;  $p<0.0001$ ) and women ( $p=0.003$ ;  $p=0.003$ ). Additionally, a current drug problem was significantly associated with a decreased likelihood of being incarcerated for a violent crime for both men ( $p<0.0001$ ) and women ( $p=0.0005$ ).

**Table 2** Sociodemographic Characteristics of a Sample of Inmates in State and Federal Prisons.

Variable	Men--n(%)				Women--n(%)			
	Non-violent offender N=9,644*	Violent offender N=7,059	Chi-Square	P Value	Non-violent offender N=917	Violent offender N=306	Chi-Square	P Value
<b>Age</b>								
18-24	1,264 (15.7)	989 (16.0)	42.6	<0.0001	322 (11.6)	167 (16.8)	8.1	0.0436
25-34	2,763 (35.9)	2,037 (32.6)			879 (30.9)	327 (32.6)		
35-44	2,364 (30.0)	1,821 (29.2)			1085 (38.6)	314 (31.6)		
45+	1,445 (18.5)	1,397 (22.2)			559 (18.9)	186 (19.0)		
<b>Race/Ethnicity</b>								
Caucasian	2,617 (32.2)	2,059 (33.1)	65.6	<0.0001	1,172 (42.1)	398 (41.9)	10.6	0.014
African American	3,163 (41.4)	2,651 (41.9)			920 (31.7)	373 (36.8)		
Latino	1,631 (21.2)	1,059 (17.5)			554 (19.1)	122 (11.8)		
Other	414 (5.2)	467 (7.6)			198 (7.2)	101 (9.6)		
<b>Marital Status</b>								
Married/cohabitating	1,505 (19.5)	1,013 (16.4)	57.9	<0.0001	639 (21.6)	157 (15.3)	17.7	0.0005
Divorced/separated	1,874 (24.0)	1,557 (25.0)			932 (33.2)	278 (27.8)		
Never married	4,355 (55.4)	3,521 (56.4)			1,162 (41.6)	483 (49.3)		
Widowed	89 (1.1)	136 (2.2)			108 (3.7)	75 (7.6)		
<b>Education</b>								
Did not complete high school	4,905 (62.8)	4,126 (66.7)	28.5	<0.0001	1,629 (59.1)	559 (57.0)	0.65	0.72
High school	1,707 (22.7)	1,301 (21.1)			601 (21.7)	231 (23.9)		
Any college or greater	1,150 (15.5)	764 (12.3)			592 (19.2)	197 (19.2)		
<b>Work in month prior to arrest</b>								
No	2,018 (27.0)	1,584 (26.1)	1.4	0.24	1,121 (41.2)	383 (39.5)	0.27	0.604
Yes	5,558 (73.0)	4,447 (73.9)			1,668 (58.8)	586 (60.5)		
<b>Income in month prior to arrest</b>								
Missing	563 (7.5)	439 (6.9)	101.4	<0.0001	174 (6.5)	68 (7.1)	2.81	0.24
0-999	2,915 (36.9)	2,779 (44.6)			1,440 (52.0)	562 (56.9)		
1000+	4,358 (55.6)	3,026 (48.5)			1,231 (41.5)	364 (36.0)		

\* The N values in this row, the percentages below, the chi square and P values, and the following missing counts are all based on weighted data. The numbers missing for each variable, gender (0), whether controlling offence was violent (239), age (0), race/ethnicity (25), marital status (42), education (171), and employment (612).

**Table 3** Correlates of Violent Crime in a Sample of Inmates in State and Federal Prisons.

Variable	Men- N (%)				Women-N (%)			
	Non-violent offender N=9,644*	Violent offender N=7,059	Chi-Square	P Value	Non-violent offender N=917	Violent offender N=306	Chi-Square	P Value
<b>Childhood Risk Factors and Conditions</b>								
<b>Alcohol use before age 16</b>								
No	4,823 (63.2)	3,576 (58.3)	39.7	<0.0001	1,907 (67.5)	629 (63.9)	1.4	0.23
Yes	2,850 (36.8)	2,545 (41.7)			888 (32.5)	350 (36.2)		
<b>Drug use before age 16</b>								
No	4,499 (58.9)	3,384 (55.2)	21.6	<0.0001	1,886 (65.9)	636 (65.0)	0.08	0.77
Yes	3,168 (41.2)	2,732 (44.8)			904 (34.1)	345 (35.0)		
<b>Engaged in illegal activities before age 16</b>								
No	4,550 (59.7)	3,322 (54.4)	45.7	<0.0001	1,997 (69.7)	672 (68.7)	0.1	0.76
Yes	3,123 (40.4)	2,785 (45.6)			806 (30.3)	310 (31.3)		
<b>Arrested before age 16</b>								
No	5,659 (74.4)	4,189 (68.3)	74.01	<0.0001	2,494 (88.7)	829 (84.8)	3.12	0.08
Yes	2,019 (25.6)	1,935 (31.7)			308 (11.3)	149 (15.2)		
<b>Placed on juvenile probation before age 16</b>								
No	6,220 (81.3)	4,766 (77.5)	36.6	<0.0001	2,582 (91.5)	868 (88.2)	2.9	0.09
Yes	1,478 (18.7)	1,377 (22.6)			231 (8.5)	114 (11.8)		
<b>Ever in foster care</b>								
No	6,818 (88.3)	5,279 (85.0)	37.6	<0.0001	2,455 (86.9)	810 (81.8)	4.7	0.03
Yes	938 (11.7)	916 (15.0)			362 (13.1)	173 (18.2)		
<b>Lived in public housing growing up</b>								
No	6,362 (82.8)	4,914 (80.7)	11.9	0.0005	2,344 (83.5)	806 (82.1)	0.34	0.56
Yes	1,303 (17.2)	1,186 (19.4)			451 (16.5)	172 (17.9)		
<b>Parents were welfare recipients</b>								
No	5,033 (66.8)	3,648 (60.8)	61.73	<0.0001	1,848 (66.1)	579 (60.0)	3.64	0.06
Yes	2,501 (33.2)	2,355 (39.2)			891 (33.9)	378 (40.0)		
<b>Parents or guardians abused drugs or alcohol</b>								
No	5,386 (70.1)	4,127 (67.0)	17.4	<0.0001	1,761 (62.1)	542 (54.5)	5.4	0.02
Yes	2,317 (29.9)	2,021 (33.0)			1,045 (37.9)	436 (45.5)		
<b>Abuse</b>								
<b>Ever physically abused</b>								
No	4,311 (56.2)	2,902 (46.8)	144.2	<0.0001	1,208 (41.0)	308 (30.7)	10.3	0.0013
Yes	3,430 (43.8)	3,277 (53.2)			1,600 (59.0)	675 (69.3)		
<b>Ever sexually abused</b>								
No	7,445 (96.7)	5,650 (91.7)	189.9	<0.0001	1,818 (63.8)	512 (51.0)	15.6	<0.0001
Yes	273 (3.4)	505 (8.3)			981 (36.2)	470 (49.0)		
<b>Adult Risk Factors and Conditions</b>								
<b>Current alcohol problem</b>								
No	4,484 (57.9)	3,495 (56.8)	1.72	0.19	1,903 (65.7)	597 (60.1)	3	0.08
Yes	3,273 (42.2)	2,648 (43.2)			925 (34.4)	386 (39.9)		
<b>Current drug problem</b>								
No	3,514 (45.0)	3,364 (54.4)	143.3	<0.0001	1,230 (41.3)	527 (52.7)	12	0.0005
Yes	4,239 (55.0)	2,795 (45.6)			1,577 (58.7)	456 (47.3)		
<b>Ever homeless in past year</b>								

No	6,875 (91.0)	5,495 (91.1)	0.1	0.78	2,466 (87.7)	830 (85.9)	0.69	0.41
Yes	700 (9.0)	533 (8.9)			323 (12.3)	139 (14.2)		
<b>Symptoms of mania</b>								
No	4,479 (59.6)	3,563 (59.0)	0.59	0.44	1,364 (66.13)	423 (59.99)	3.64	0.056
Yes	<b>3,086 (40.4)</b>	<b>2,450 (41.0)</b>			1,400 (33.87)	541 (40.01)		
<b>Symptoms of depression</b>								
No	6,059 (80.0)	4,711 (77.8)	11	0.0009	1,873 (66.3)	564 (56.7)	8.84	0.003
Yes	1,551 (20.0)	1,333 (22.2)			910 (33.7)	406 (43.2)		
<b>Symptoms of psychosis</b>								
No	6,708 (87.8)	5,131 (84.0)	46.7	<0.0001	2,307 (82.1)	732 (72.3)	8.81	0.003
Yes	947 (12.2)	963 (16.0)			489 (17.9)	242 (25.7)		

\* The N values in this row, the percentages below, the chi square and p values, and the following missing counts are all based on weighted data. The numbers missing for each variable, Alcohol use before age 16 (394), Drug use before age 16 (410), Engaged in illegal activities before age 16 (401), Arrested before age 16 (408), Placed on juvenile probation before age 16 (342). Ever in foster care (189), Lived in public housing growing up (406), Parents were welfare recipients (712), Parents or guardians abused drugs or alcohol (312), Ever physically abused (231), Ever sexually abused (291), Current alcohol problem (229), Current drug problem (219), Ever homeless in past year (617), Symptoms of a mental health disorder (357).

**Table 4** Unconditional Multivariate Logistic Regression Models Comparing Non-violent Criminals to Violent Criminals in a Sample of Inmates in State and Federal Prisons.

Variable	Male Violent Offenders vs. Male Non-violent Offenders	Female Violent Offenders vs. Female Non-Violent Offenders	Interaction	
	Odds Ratio (95%CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	p-value
<b>Childhood Risk Factors and Conditions</b>				
<b>Signs of conduct disorder (age&lt;16)</b>				
Alcohol use	1.20 (1.12-1.28)	1.19 (.90-1.58)	1.01 (0.75-1.35)	0.96
Drug use	1.19 (1.11-1.28)	1.00 (.75-1.34)	1.19 (0.88-1.60)	0.26
Engaged in illegal activities	1.27 (1.19-1.36)	1.02 (.76-1.37)	1.25 (0.92-1.69)	0.15
Arrested	1.34 (1.24-1.44)	1.29 (.87-1.91)	1.04 (0.70-1.55)	0.86
Placed on juvenile probation	1.24 (1.15-1.35)	1.34 (.86-2.07)	0.93 (0.60-1.45)	0.75
<b>Environmental (age&lt;19)</b>				
Ever in foster care	1.30 (1.18-1.43)	1.38 (0.96-1.98)	0.94 (0.65-1.37)	0.76
Lived in public housing growing up	1.16 (1.06-1.26)	0.99 (0.69-1.42)	1.17 (0.80-1.69)	0.42
Parents were welfare recipients	1.28 (1.19-1.37)	1.22 (0.92-1.64)	1.05 (0.78-1.41)	0.78
Parents abused alcohol or drugs	1.23 (1.05-1.21)	1.35 (1.03-1.78)	0.84 (0.63-1.11)	0.21
<b>Childhood or Adult Abuse (Risk Conditions)</b>				
Physically abused ever	1.47 (1.38-1.57)	1.56 (1.17-2.07)	.94 (.71-1.26)	0.69
Sexually abused ever	2.63 (2.28-3.04)	1.78 (1.35-2.34)	1.48 (1.08-2.01)	0.01
<b>Adult Risk Factors and Conditions</b>				
Current alcohol problem	1.01 (0.94-1.07)	1.28 (0.97-1.69)	0.79 (0.59-1.04)	0.09
Current drug problem	0.66 (0.62-0.71)	0.62 (0.47-0.81)	1.08 (0.81-1.43)	0.6
Ever homeless in past year	0.90 (0.81-1.01)	1.16 (0.78-1.71)	0.78 (0.52-1.17)	0.23
Symptoms of mania	1.02 (0.96-1.09)	1.22 (.93-1.61)	0.84 (0.63-1.11)	0.15
Symptoms of depression	1.11 (1.03-1.20)	1.47 (1.12-1.93)	0.78 (0.57-1.01)	0.06
Symptoms of psychosis	1.53 (1.12-2.11)	1.34 (1.22-1.47)	1.14 (.82-1.59)	0.42

<sup>1</sup>Controlling for age, race, marital status, education, income, and work status.

<sup>2</sup>This Odds Ratio represents the ratio of the OR in men compared to the OR in women.

## Multivariate Results

**Table 4** presents the results of multivariate unconditional logistic regression models in which sociodemographic factors were controlled for, the independent variable of interest is whether the respondent was incarcerated for a violent offence, and the dependent variable is the specific respondent characteristic of interest. All of the models contain interaction terms to allow for the evaluation of the interaction between gender and type of offense. For each measure (i.e., respondent characteristic),

logistic regression models were used to calculate the results for men, woman, and the interaction of gender and type of offense. After controlling for sociodemographic factors, all of the childhood risk factors remained positively and significantly associated with the commission of a violent offense among men (Odds Ratio (OR) between 1.16 and 1.34). While the bivariate analyses of these risk factors for women showed only two factors to be significantly associated with greater likelihood of having committed a violent crime, in the multivariate analyses only one childhood risk factor,



the abuse of drugs or alcohol by the respondent's parents, was found to have a similar association ( $OR=1.35$ ,  $p=0.031$ ). None of the interaction terms for childhood risk factors were significant, suggesting that the childhood risk factors do not have a greater effect on the likelihood of men committing a violent crime in comparison to women. Among both men and women, sexual and physical abuses were significantly and positively associated with the probability of being incarcerated for a violent crime. Men who reported being sexually abused during their lifetime were more than two and a half times more likely to be incarcerated for a violent crime than men who did not report such abuse ( $OR=2.63$ ,  $p<0.0001$ ). The same association was observed for women ( $OR=1.78$ ,  $p<0.0001$ ). However, the results for the interaction term indicated that this association was 50% stronger for men ( $p=0.014$ ). These results suggest that sexual abuse, although a very important risk factor for women was an even more important risk factor for men. Additionally, both men ( $p<0.0001$ ) and women ( $p=0.0023$ ) who were ever physically abused in their lifetime were approximately 50% more likely than other inmates who did not report such abuse to have been incarcerated for a violent crime. While this association was slightly more pronounced in women, the interaction between violence and gender was not significant ( $p=0.69$ ), suggesting that physical abuse is not a greater risk factor for women. Drug abuse was associated with reduced odds of having committed a violent offense for both men and women. Because the odds ratios for men ( $OR=.66$ ,  $p<0.0001$ ) and women ( $OR=0.62$ ,  $p=.0005$ ) were similar, the interaction term was not significant ( $p=0.60$ ). Depression symptoms were also found to be associated with increased likelihood of incarceration for a violent crime in men ( $OR=1.11$ ,  $p=0.10$ ) and women ( $OR=1.47$ ,  $p=.006$ ); as were psychosis symptoms for both men ( $OR=1.53$ ,  $p=0.0080$ ) and women ( $OR=1.34$ ,  $p<0.0001$ ). The interaction terms for these two mental health measures did not have a significant association with violence, although the interaction term for depression was very close to significance ( $OR=0.78$ ,  $p=0.06$ ). In contrast, current alcohol abuse, symptoms of mania, and homelessness prior to arrest were not significantly associated with violent crime in either men or women.

## Discussion

This study examined sex differences in the associations of type of criminal incarceration (violent crime versus non-violent crime) and predictors beyond socioeconomic indicators. Of the 17 associations tested, only one was significantly different across sex. In this case, males who reported sexual abuse were significantly more likely to be incarcerated for a violent crime than females. The largest effect size of incarceration for violent crime in both men and women was sexual abuse, with the odds ratio being significantly higher than other odds ratios among males. Beyond socioeconomic factors, sexual abuse is a strong predictor of violent crime conviction in men. However, this study was not able to separate the pre-incarceration and during incarceration abuse victimization. Incarcerated males and females experience abuse and victimization while incarcerated. As outside of the incarcerated setting, females are more likely to be sexually victimized while incarcerated than males. Although sexual abuse is higher among females regardless of incarceration status than

males, the relative difference of incarcerated and non-incarcerated males in sexual abuse is greater among males. Research also supports that males tend to underestimate or under-report sexual victimization, especially in the incarcerated setting. Future research is necessary to distinguish the timing and potential causative effect of physical and sexual abuse on type of incarceration. The current study does, however, support that reported experiences of physical or sexual abuse as a child or adult predicted a higher likelihood of being incarcerated for a violent crime and that males are potentially more vulnerable to this predictive pathway for sexual abuse compared to females. Sexual abuse was the only moderated effect by gender. It is less clear if the amplified likelihood by sexual abuse is a cause, effect, or both of violent crime. Within sex, associations of risk factors and conditions with type of incarceration were more varied in their pattern of significance than between sexes. Fourteen of 17 associations were statistically significant among males, whereas only six of the 17 were significant among females. The six significant associations among females were also significant among males. However, the eight associations significant among males that were not significant among females were not significantly different between sexes (i.e., the tests of interactions by sex were not statistically significant). Of the six association's common among sexes, five predicted a higher likelihood of violent crime incarceration and one predicted a higher likelihood of non-violent crime incarceration. Additionally, of these associations, five were risk conditions and only one was a risk factor. The one common predictor of increased likelihood of incarceration for a non-violent crime was the behavioral risk factor of drug use (other than alcohol) during adulthood. Risk conditions predicted an increased likelihood of incarceration for a violent crime. Among prisoners in the United States, regardless of sex, the discriminating predictor of nonviolent crime incarceration was drug use during adulthood. This finding supports an increased focus on drug treatment and prevention of drug use to reduce the proportion of people incarcerated for nonviolent crimes. The pathway among the incarcerated to a violent crime conviction is more complex and focuses less on behavioral risk factors. Parental alcohol and drug abuse as well as incarcerated individuals' experiences of physical or sexual abuse and mental health issues predicted an increased likelihood of incarceration for violent crime. Of the 17 potential associations, five were behavioral risk factors (drug and alcohol use as a child or adult and engaging in illegal activities as a child), and the remaining 12 predictors would better be categorized as risk conditions (70.5%). 83.3% of the significant associations across sexes whereas risk conditions made up only 70.5% of the possible associations across sexes. Eleven of the 14 (78.6%) significant predictors among males were risk conditions. It is well documented that risk conditions, such as race, age, sex, income, neighborhood, and education, predict the likelihood of incarceration and type of incarceration. Beyond these supported risk conditions, the current study supports the predictive utility of risk conditions in distinguishing type of incarceration in the United States. From the perspective of effect sizes, the risk conditions and factors in this study were more predictive of the type of incarceration among males than females. However, testing of interaction indicates that defaulting to the findings among males may also benefit females as the processes

apply similarly across sexes. Depression and psychosis were also strongly associated with the likelihood of having committed a violent crime. However, childhood risk factors related to conduct disorder and all but one childhood environmental characteristic (parental drug abuse) were found to be associated with increased likelihood of being incarcerated for a violent crime among men only. Parental drug abuse was associated with the commission of a violent crime among both men and women. As discussed in the introduction, prior studies have reported that for both men and women, sexual abuse in childhood is a significant correlate of adolescent [45] and adult violence [46,47], particularly for men [33]. While our findings suggest that sexual abuse is a greater risk factor for men, women are more likely to be the victims of sexual abuse. In a recent meta-analysis conducted on childhood sexual abuse, researchers found that 7.9% of men and 19.7% of women were victims of some form of sexual abuse prior to the age of eighteen [48]. This differential in the prevalence of sexual abuse continues into adulthood. For instance, a recent study reporting prevalence estimates of forced sex and unwanted sexual activity in the United States showed that 2.5% of women and .9% of men had had some form of unwanted sexual activity in the 12 months prior to being surveyed [49]. While we found that sexual abuse is a more important risk factor for men, women are sexually victimized at a markedly higher rate. Thus, sexual abuse may be a factor in a similar proportion of men and women's violent crimes and efforts aimed at reducing sexual abuse as well as helping victims of sexual abuse, would be valuable components of a larger public health effort aimed at reducing violence among both men and women. While it is generally understood that there is a positive association between mental illness and risk for violence [50,51], the relationship is not uniform and may be affected by a complex set of co-occurring personal and contextual factors [52] as well as by the nature of illness (i.e., the severity and the specific diagnosis). Therefore, an important contribution of this study is its exploration of the relationship between the risk of violence and specific mental illnesses. Consistent with past research [23,53,54], we found a significant and positive association between symptoms of depression and psychosis with the likelihood of committing a violent crime among both men and women and the lack of a similar relationship with respect to mania. The interaction term was not significant for both of these mental illnesses, although the interaction term was very close to significance for symptoms of depression ( $p=.06$ ). Thus, our results differed from several studies cited in the introduction that reported that not only was mental illness a risk factor for women, but it was associated with a reduction in the violent crime gender gap [21,22,25,38,53]. While the association between mania and violence has not been extensively examined, in contrast to our results, two other studies that examined this relationship did find increased likelihood of violence among individuals with a mania diagnosis [51,55]. Some studies have reported a lack of a significant relationship between mental illness and violence [56]. These findings may be due to methodological factors. For example, how mental illness was measured - such as the use of a generic mental health measure rather than measures of specific illnesses - may have obscured the relationship between mental illness and violence. Additionally, the use of a small convenience sample and the failure to consider the contextual factors could

lead to inconsistent or contradictory results. With respect to the latter, past research has found that the relationship between mental illness and violent crime varied by the presence of comorbid substance abuse [57-60] and other factors such as a history of childhood conduct disorder [61] and medication nonadherence [62]. Further research is needed to fully explore possible explanations of different findings with regard to the relationship between mental illness and violence as well as how gender effects this relationship. In contrast to existing literature that has demonstrated the role of drugs in violent events [63], we found a negative association between drug abuse and the likelihood of violence among men and women. This contrast with past findings is likely explained by the fact that we were analyzing data on incarceration. A high proportion of incarcerated individuals have a drug problem and individuals with a drug problem are more likely to be arrested for a drug offense than a violent offense [64]. That current drug problems puts an individual at greater risk for arrest, particularly for a drug related crime, rather than a violent crime is indicated by the much higher arrest rates for drug offenses as opposed to violent crimes. To provide one statistic, in 2009, there were 1,663,582 arrests for drug offenses compared to 581,765 arrests for violent crime [65]. This study's greatest strength is its large, nationally representative sample of state and federal inmates, which increases both its external validity, making the results generalizable to a national population, and its power to detect a significant difference between men and women. However, this study also had several limitations. The most important of which is the cross-sectional nature of the study design prevented definitive assessment of the causal pathways that lead individuals to commit violent crimes. A retrospective cohort study, which utilizes medical record data, would be better able to address this issue. Another limitation of this study is related to the use of incarceration as a proxy for the commission of crimes. There may be gender differences in whether people are apprehended, arrested, and incarcerated that are also related to our risk factors. These differences may have confounded our results. A third limitation of this study was the possible omission of important covariates from the analyses. These missing covariates could potentially confound the results. For example, no data was collected on a variable describing medication use. Noncompliance with medication has been shown to be a predictor of violence in people with a mental illness [66-69]. Thus, it could be that the inmates in our sample who had a history of mental illness and who were incarcerated for a violent crime were also more likely to be non-compliant with their psychotropic medication. An additional limitation is that because data on strata was not available for the data set, we were unable to use Taylor-series linearization (i.e. SUDAAN) to correct for sample design characteristics. Also, the survey and data base used for this study was conducted 16 years ago in 2004. The study was conducted under these specifications due to the fact that it was the latest data available. There were no recent surveys available. This is recognized as a limitation of the study, but it is pertinent to note that the available data produced significant results that have changed the way we view sex differences in risk factors and conditions of incarcerated violent offenders. Lastly, the measures for all of the risk factors were based on self-report data. As a result, some inmates may have been misclassified with

respect to particular risk groups. Although for most measures it is doubtful that this type of misclassification would result in systematic bias in one direction. For some measures, such as sexual abuse, there may have been underreporting.

Despite the stated limitations of this study, its findings offer important insights into the correlates of violence. In particular, by highlighting the association between childhood sexual and physical abuse and violent crime for both men and women, this study brings greater attention to the need for programs aimed at reducing childhood abuse as well as support programs to assist the victims of abuse. Both types of programs may reduce the commission of violent crime in the long term [70] the former in particular, given the prevalence of childhood sexual abuse [48]. Additionally, similar to other studies [71,72], the results of this study point to the need for better screening and assessment of mental illness, particularly various forms of psychosis and depression, in both men and women to help identify individuals

who may be at risk for committing violence. Early identification and intervention programs for such illnesses could be a critical step in reducing violence, a stated priority of public health organizations [4,73,74]. The focus of this study has been determining which risk factors are most likely to be associated with committing a violent crime, not the prevalence of those risk factors in the general population. For instance, as stated previously, although our results indicated that sexual abuse is a greater risk factor for men, it is much more prevalent in women than in men. Thus, understanding the prevalence of particular factors should also guide policy-makers' efforts in directing resources and attention to the correlates of violent crime, particularly with respect to mental illness and substance abuse given that epidemiological surveys indicate that the rates of specific mental illnesses differ for men and women [75]. The findings presented here also suggest that any preventative measure must address both childhood and adult risk factors, as well as the links among them [76-81].

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