

## Homelessness and incarceration among psychiatric patients in Brazil

### Pacientes psiquiátricos em situação de rua e encarceramento no Brasil

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**Abstract** *Psychiatric patients are at increased risk of adverse life events, such as being incarcerated and homelessness in their life course. Using data from a cross-sectional multicenter study of 2,475 patients selected from 26 mental health services in Brazil, we examined the association of socio-demographic, clinical, behavioral, and adverse life characteristics with history of homelessness, incarceration or their co-occurrence during lifetime. Odds ratios were obtained by multinomial logistic regression models. The prevalence of homelessness, incarceration and co-occurrence of these two conditions were 8.6%, 16.4%, and 9.4%, respectively. Lower income, living in unstable condition, intellectual disability, and cigarette smoking were associated with homelessness. Being male, lower schooling, sex under effect of alcohol or drugs, and multiple sex partners were associated with incarceration. Psychiatric hospitalizations, substance use, and history of sexually transmitted diseases, and sexual, physical, or verbal violence were associated with co-occurrence of both conditions. Our findings suggest that incarceration and homelessness are very prevalent and correlated in psychiatric patients in Brazil. Many of the associated factors are potentially modifiable, and may act synergistically requiring integrated care.*

**Key words** *Homeless persons, Mental disorders, Epidemiology, Prisons*

**Resumo** *Os pacientes psiquiátricos estão em risco aumentado de eventos adversos da vida, como ser preso e morar na rua. Investigamos a associação de características sociodemográficas, clínicas, comportamentais e eventos adversos de vida com o histórico de morar na rua, encarceramento e a co-ocorrência dessas duas condições ao longo da vida em um estudo multicêntrico de corte transversal de 2.475 usuários de 26 serviços de saúde mental no Brasil. “Odds ratios” foram obtidos por modelos de regressão logística multinomial. A prevalência de morar na rua, encarceramento e coocorrência dessas condições foi de 8,6%, 16,4% e 9,4%, respectivamente. Menor renda, viver em habitações instáveis, deficiência mental e tabagismo foram associados a morar na rua. Ser do sexo masculino, ter menor escolaridade, histórico de sexo sob efeito de álcool ou drogas e múltiplos parceiros sexuais foram associados ao encarceramento. Internações psiquiátricas, uso de substâncias, histórico de doenças sexualmente transmissíveis e violência sexual, física ou verbal foram associados à coocorrência das duas condições. Encarceramento e morar na rua são eventos muito prevalentes e correlacionados em pacientes psiquiátricos. Muitos dos fatores associados são modificáveis e podem agir sinergicamente exigindo cuidados integrados.*

**Palavras-chave** *Pessoas em situação de rua, Transtornos mentais, Epidemiologia, Prisões*

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## Introduction

Individuals with mental illness are potentially vulnerable to a higher risk of several health conditions and they often live under disadvantage social contexts with increased risk of adverse life events, including being incarcerated and having episodes of homelessness in their life course<sup>1,2</sup>. Prevalence of homelessness among severe mental illness from a large public mental health system in the USA reached 15% in a single year<sup>3</sup>.

A national survey in the USA (N=6,953) reported high prevalence of mental illness, substance abuse, previous arrests, and prior episodes of homelessness among jail inmates<sup>4</sup>. Moreover, various authors indicate that approximately 50%-80% among homeless people have a history of mental illness, suffer from substance use disorders, and have histories of previous incarceration<sup>5-10</sup>.

Homelessness poses an increased risk of incarceration and incarceration in turn precipitates homelessness by disrupting social networks and employment opportunities<sup>11</sup>. For example, Saddichha *et al.*<sup>12</sup> found an unusually high prevalence of incarceration among the homeless (65%) in three cities from Canada, which is higher than the 50%-55% prevalence that has been reported in earlier study from similar populations<sup>5</sup>. Incarceration and homelessness share many factors and this intertwined relationship poses those with history of both conditions at the greatest risk of suffering from mental health issues and substance abuse<sup>12</sup>.

Prison and jail stays as well as homelessness also increase the risks of unsafe sexual behavior, HIV infection, drug use, and physical and sexual violence<sup>11,13</sup>. Furthermore, high mortality rates are associated with homelessness<sup>14</sup> and incarceration, as compared to the general population<sup>11</sup>.

Hawthorne *et al.*<sup>7</sup>, studying incarcerated population among adults who are in the Public Mental Health System in the USA, found that risk factors for incarceration included prior incarcerations, co-occurring substance-related diagnoses, homelessness, schizophrenia, bipolar, or other psychotic disorder diagnoses, male gender, no Medicaid insurance, and being African-American<sup>7</sup>. Seventy-eight percent of the homeless inmates with a severe mental disorder had co-occurring substance-related disorders<sup>15,16</sup>. Homeless patients in the public mental health system were more likely to be reincarcerated than their housed counterparts.

We should note, however, that most studies have focused on mental illness and substance use

among those with history of homelessness and incarceration, as opposed to the study of these factors among psychiatric patients. Furthermore, to our knowledge there are no studies in Brazil with a national representative sample. We anticipate common factors with either one but a higher magnitude of potential determinants when patients had a history of both conditions. In this study we examined the association of sociodemographic, clinical, behavioral, and adverse life characteristics with history of homelessness, incarceration or their co-occurrence among psychiatric patients in a multicenter study in Brazil.

## Methods

### Design and study population

This study used data from a cross-sectional multicenter study (PESSOAS Project) conducted in 2006 among users of mental health services in Brazil<sup>17</sup>. The study was designed to assess risk behavior and the seroprevalence of HIV and others STDs among patients with mental illness. In summary a two-stage probability sample was chosen, proportional to the type of care (hospital or outpatient, known as Public Mental Health Outpatient Clinics - CAPS) and the national distribution of reported AIDS cases by region, yielding a total of 2,475 participants. CAPS which only treated substance abuse disorders (CAPS-AD) were also excluded from the study. Only adults (18+ years old) and individuals able to provide written informed consent as determined by a mental health professional were eligible for study. A semi-structured person-to-person interview was conducted to obtain sociodemographic, clinical and behavioral data, and psychiatric diagnoses were obtained from medical records. More details about the study design, selection criteria and recruitment methods have been previously published<sup>17,18</sup>. The study was approved by the participating services, by the UFMG Ethical Research committee and by the National Ethical Research Council.

### Exposure and outcome measurements

#### Outcomes

We constructed three different outcomes: 1) history of homelessness only; 2) history of incarceration only; and, 3) co-occurrence of history of homelessness and incarceration. History of homelessness and incarceration were evaluated

by these two questions: *Have you ever been homeless?* and *Have you ever been arrested?* We also asked about reasons and place of arrest. Participants exposed to each of these three outcomes were compared to those with no history of either homelessness or incarceration.

### Explanatory variables

The explanatory variables were divided in three domains as specified below. *Sociodemographic characteristics*: gender, age (18-39 and  $\geq$  40 years old), skin color (white and non-white), family income in the last month ( $\geq$  1 minimum wage and  $<$  1 minimum wage), schooling ( $<$  5 and  $\geq$  5 years), marital status (married/in union and single/divorced/widower), and current place of residence defined as unstable (living in shelters, hostels, streets, rooms) and stable (living in houses or apartments); *Clinical conditions*: number of psychiatric diagnoses ( $\leq$  1 and  $>$  1), main psychiatric diagnoses (ICD-10), previous psychiatric hospitalization (never hospitalized, history of hospitalization and current hospitalized), age of first hospitalization or treatment in CAPS ( $<$  26 and  $\geq$  26 years old), none or some degree of intellectual disability, self-reported medical comorbidity, and lifetime history of sexually transmitted disease (STD); and, *Behavioral and adverse life characteristics*: violence exposure, sex under the influence of drugs and/or alcohol, lifetime unsafe sex, lifetime number of partner (abstinent or only one and  $>$  one), age of first sexual intercourse (abstinent or  $\geq$  18 or  $<$  18 years old), history of exchange of sex for money, HIV/AIDS knowledge, HIV risk perception, previous HIV testing, lifetime cigarette smoking and substance use exposure. For psychiatric diagnoses, data were abstracted from medical records as registered by a psychiatrist and classified according to the International Classification of Diseases, 10<sup>th</sup> revision (ICD-10)<sup>19</sup>. Up to three main psychiatric diagnoses were recorded, and hierarchically categorized according to severity as follows: (1) psychotic disorders and depression with psychotic symptoms; (2) bipolar disorder; (3) depression; (4) anxiety; (5) substance use disorders; (6) others. For this analysis, this variable was categorized as: (1) severe mental illness (psychotic disorders, depression with psychotic symptoms, and bipolar disorder), (2) substance use disorders, and (3) others. Violence exposure was categorized in three categories: “none or verbal violence” (defined as having not suffered any type of violence or having ever suffered some type of verbal ag-

gression, i.e., threat, humiliation, name calling, offense or embarrassment); “at least physical violence” (defined as experience any kind of physical aggression, including being hit, spanked, or beaten in their lifetime); and “at least sexual violence” (defined as having been forced to have unwanted sexual relation or having suffered any kind of abuse of sexual nature against their will). Lifetime unsafe sex was defined as not always using condoms in all practices. HIV/AIDS knowledge was assessed based on a mean score of 10 questions rated on a 0 to 10 scale by Item Response Theory<sup>20</sup>. HIV risk perception was defined as participants’ belief that they were at high risk or low risk of becoming HIV infected. Lifetime cigarette smoking was defined as those who reported smoking at least one regular or hand-rolled cigarette per day during their lifetime. Lifetime substance use exposure was categorized as injecting drug use (IDU), any illicit drug except injecting drugs (such as marijuana, cocaine, crack, hallucinogens, amphetamines, opiates, solvents), only alcohol use, or none.

### Statistical analysis

We generated descriptive characteristics of the sample and the proportion of homelessness, incarceration, the co-occurrence of homelessness and incarceration, and each explanatory variable was reported. For the univariate analysis, differences in proportion were assessed by Pearson chi-square test, and the magnitude of the associations was estimated by the Odds Ratio (OR) with 95% confidence interval. Participants with a lifetime history of homelessness, incarceration or both were compared, separately, to those without any history of either condition using multinomial logistic regression models. Variables with  $p$ -value  $\leq$  0.20 in the univariate analysis were used to start intermediate modeling, separately for each domain (i.e., sociodemographics, clinical, and behavioral/adverse life characteristics). The independent effect of potential explanatory variables was assessed by multivariate analysis using multinomial logistic regression. Only variables with  $p$ -value  $\leq$  0.10 remained in each intermediate model and these were modeled together in order to obtain the final adjusted model. A backward deletion strategy was applied and those variables with  $p$ -values equal to or less than 0.05 were maintained in each final logistic regression model. Fit of the final model was evaluated using the Hosmer-Lemeshow Test. SAS version 9.4 was used to analyze the data.

## Results

Descriptive characteristics of the 2,475 participants of the study are presented in Table 1. Most participants were female, age 40 years old or over, reported white skin color, had low education, received treatment at outpatient centers, had a severe mental illness, suffered physical or sexual violence, and 25% reported use of illicit drugs.

Two hundred and twelve (8.6%) participants had a history of homelessness only; 405 (16.4%) of incarceration only, and the co-occurrence of homelessness and incarceration were reported by 232 (9.4%) participants. The univariate analyses between explanatory variables and each of these three outcomes are presented in Table 2. We highlight that the likelihood of both conditions (homelessness and incarceration) was higher ( $p < 0.05$ ) among nonwhite men, with a low education level, low family income, and current unstable housing. Both conditions were also positively associated with a more severe mental illness or a substance use disorder, more than one psychiatric diagnosis, history of STD, and current (OR = 4.57) or previous (OR = 10.38) psychiatric hospitalization. Receiving treatment at a psychiatric hospital at the time of the interview and having been treated for the first time (hospital or CAPS) before 26 years old were also positively associated with both conditions. Physical or sexual violence, sex under the influence of drugs or alcohol, unsafe sex, more than one lifetime sexual partner, and history of exchanging money or drugs for sex were associated with history of homelessness and incarceration. The prevalence of both conditions was also higher among participants who reported poor HIV/AIDS knowledge, low HIV/AIDS risk perception, previous HIV testing, and lifetime use of tobacco (cigarette smoking), alcohol, illicit, and injecting drugs (Table 2).

### Multivariate analysis

Results obtained from the intermediate multivariate models according to each domain (Table 3) indicate markers of poor socioeconomic conditions (lower income, lower schooling, unstable living conditions) associated with either homelessness, incarceration, or both. In addition, nonwhite single/divorced males also were at increased risk of at least one of the conditions analyzed. It should be noted that almost all clinical markers, including number and severity of psychiatric diagnoses, history of STD, previous and early psychiatric hospitalizations, were strongly associated

**Table 1.** Descriptive characteristics among 2,475 psychiatric patients, PESSOAS Project, Brazil, 2006.

Characteristics	n (%) <sup>1</sup>
<b>Sociodemographic</b>	
Gender:	
Women	1277 (51.6)
Men	1198 (48.4)
Age (years old):	
≥ 40	1351 (54.6)
18-39	1124 (45.4)
Skin color:	
White	1275 (51.5)
Non-white	1200 (48.5)
Family income in the last month <sup>2</sup> :	
≥1 minimum wage	1525 (64.8)
<1 minimum wage	827 (35.2)
Schooling (years):	
≥ 5	1253 (50.6)
< 5	1222 (49.4)
Marital status:	
Married/in union	821 (33.2)
Single/Divorced/Widower	1654 (66.8)
Current place of residence:	
Stable	2165 (87.5)
Unstable	310 (12.5)
<b>Clinical</b>	
Number of psychiatric diagnoses:	
≤1	1357 (54.8)
>1	1118 (45.2)
Psychiatric diagnoses (ICD-10):	
Other	945 (38.2)
Severe mental illness	1413 (57.1)
Substance use disorders	117 (4.7)
Hospitalization:	
Never	788 (31.8)
History of hospitalization	789 (31.9)
Current hospitalized	898 (36.3)
Age of first hospitalization or treatment in CAPS (years old):	
≥26	1289 (60.6)
<26	837 (39.4)
Any degree of intellectual disability:	
None	1722 (69.9)
Some	741 (30.1)
Self-reported medical co morbidity:	
No	1342 (54.8)
Yes	1109 (45.2)
Lifetime history of STD <sup>4</sup> :	
No	1873 (76.7)
Yes	568 (23.3)

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**Table 1.** Descriptive characteristics among 2,475 psychiatric patients, PESSOAS Project, Brazil, 2006.

Characteristics	n (%) <sup>1</sup>
Behavior and Adverse life events	
Violence exposure:	
None or verbal violence only	958 (38.7)
At least psychical violence	1029 (41.5)
At least sexual violence	488 (19.7)
Sex under the influence of drugs and/ or alcohol:	
No	1475 (68.4)
Yes	681 (31.6)
Lifetime unsafe sex:	
No	482 (19.7)
Yes	1970 (80.3)
Lifetime number of partner:	
Abstinent or only 1	805 (32.5)
>1	1523 (61.5)
Age of first sexual intercourse (years old):	
Abstinent or ≥18	1282 (51.8)
<18	1193 (48.2)
History of exchange of sex for money:	
No	1811 (73.6)
Yes	648 (26.4)
HIV/Aids Knowledge:	
Good	1354 (55.3)
Poor	1095 (44.7)
HIV risk perception:	
Low	1390 (59.2)
High	957 (40.8)
Previous HIV testing:	
No	1807 (73.0)
Yes	668 (27.0)
Lifetime cigarette smoking:	
No	701 (28.5)
Yes	1762 (71.5)
Lifetime substance use exposure:	
None	805 (32.5)
Only alcohol	1043 (42.1)
Any illicit drug except injecting drugs	555 (22.4)
Injecting drug use	72 (2.9)

<sup>1</sup> n (total) varies according to missing information. <sup>2</sup> Brazilian minimum wage in 2006 = US\$ 200. <sup>3</sup> CAPS: Public Mental Health Outpatient Clinics. <sup>4</sup> Sexually transmitted diseases.

( $p < .05$ ) with all the outcomes. Similarly, most behavior and adverse life events, including having suffered violence, substance use, multiple sex partners, exchange of sex for money/drugs, and

cigarette smoking, were also associated with the three outcomes of interest.

Final multivariate models for each comparison can be seen in Table 4. When taking together and comparing the final models, many characteristics were independently associated ( $p < 0.05$ ) with homelessness only (e.g. lower income, living in unstable condition, intellectual disability, cigarette smoking) or incarceration only (e.g. male gender, lower schooling, sex under the effect of alcohol/drugs, multiple sex partners), while a few variables were associated with both conditions (e.g. psychiatric hospitalizations, substance use, and history of STDs, sexual, physical, or verbal violence). In addition, the magnitude of the associations of selected variables was much higher among patients with the co-occurrence of both conditions, including physical violence (OR = 4.69), sexual violence (OR = 5.18), sex under the influence of alcohol/drugs (OR = 2.12), multiple lifetime sexual partner (OR = 4.41), lifetime cigarette smoking (OR = 2.72), and any illicit drug (OR = 4.31) or injecting drug use (OR = 12.22).

## Discussion

The association of sociodemographic, clinical, behavioral, and adverse life characteristics with the events studied indicated a high proportion of patients who experienced homelessness (8.6%), incarceration (16.4%) and the co-occurrence of homelessness and incarceration (9.4%) in their lifetime. Hawthorne et al.<sup>7</sup> found that 11.5% of public mental health patients in the USA had been incarcerated during a one-year period and 9.4% were homelessness, while Cuellar et al.<sup>6</sup>, also in the USA, found 24.0% of history of incarceration during a ten-year period<sup>6,7</sup>. In one of the few studies that have assessed the co-occurrence of both conditions, Hawthorne et al.<sup>7</sup> indicate 3.5% in a one-year period, lower than our results (9.4%)<sup>7</sup>. However, we should note that our data refer to lifetime experience, and these data are not necessarily comparable.

Consistent with previous research that evaluated incarceration and homelessness as separate outcomes<sup>3,7,21-23</sup>, we found that being male was associated with incarceration and co-occurrence of homelessness and incarceration. Our results also evidenced that the exposure to social adversity, characterized by low income, low education and living in unstable housing, were strongly associated with the co-occurrence of homelessness and incarceration; and at least one indicator of

**Table 2.** Univariate analysis of homelessness and incarceration, PESSOAS Project (N = 2475), Brazil, 2006.

Characteristics	N	Neither		Homelessness only		Incarceration only		Both	
		n (%) <sup>1</sup>	n (%) <sup>1</sup>	OR (95% CI) <sup>2</sup>	n (%) <sup>1</sup>	OR (95% CI) <sup>2</sup>	n (%) <sup>1</sup>	OR (95% CI) <sup>2</sup>	
<b>Sociodemographic</b>									
<b>Gender:</b>									
Women	1277	1009(79.0)	127 (10.0)	1.00	79 (6.2)	1.00	62 (4.9)	1.00	
Men	1198	617(51.5)	85 (7.1)	1.09 (0.82-1.47)	326 (27.2)	6.75 (5.18-8.80)**	170 (14.2)	4.48 (3.30-6.10)**	
<b>Age (years old):</b>									
≥ 40	1351	877(64.9)	119 (8.8)	1.00	230 (17.0)	1.00	125 ( 9.3)	1.00	
18-39	1124	749(66.6)	93 (8.3)	1.09 (0.82-1.46)	175 (15.6)	1.12 (0.90-1.40)	107 (9.5)	1.00 (0.76-1.31)	
<b>Skin color:</b>									
White	1275	891(69.9)	114 (9.9)	1.00	180 (14.1)	1.00	90 (7.1)	1.00	
Non-white	1200	735(61.2)	98 (8.2)	1.04 (0.78-1.39)	225 (18.8)	1.52 (1.22-1.89)**	142 (11.8)	1.91 (1.44-2.53)**	
<b>Family income in the last month<sup>3</sup>:</b>									
≥1 minimum wage	1525	1072(70.3)	109 (7.2)	1.00	243 (15.9)	1.00	101 (6.6)	1.00	
<1 minimum wage	827	488(59.1)	90 (10.9)	1.81 (1.35-2.45)**	141 (17.1)	1.27 (1.01-1.61)*	108 (13.1)	2.35 (1.75-3.14)**	
<b>Schooling (years):</b>									
≥ 5	1253	870(69.4)	104 (8.3)	1.00	180 (14.4)	1.00	99 (7.9)	1.00	
< 5	1222	756(61.9)	108 (8.4)	1.20 (0.90-1.59)	225 (18.4)	1.44 (1.16-1.79)**	133 (10.9)	1.55 (1.17-2.04)*	
<b>Marital status:</b>									
Married/in union	821	619(75.4)	50 (6.1)	1.00	99 (12.1)	1.00	53 (6.5)	1.00	
Single/Divorced/Widower	1654	1007(60.9)	162 (9.8)	1.99 (1.43-2.78)**	306 (18.5)	1.90 (1.48-2.43)**	179 (10.8)	2.08 (1.50-2.87)**	
<b>Type of Housing:</b>									
Stable	2165	1490(68.8)	161(7.4)	1.00	347(16.0)	1.00	167 (7.7)	1.00	
Unstable	310	136(43.9)	51(18.7)	3.47 (2.42-4.98)**	58 (18.7)	1.83 (1.32-2.54)**	65 (21.0)	4.26 (3.05-5.97)**	
<b>Clinical</b>									
<b>Number of psychiatric diagnoses:</b>									
≤1	1357	928(68.4)	110 (8.1)	1.00	206 (15.2)	1.00	113 (8.3)	1.00	
>1	1118	698(62.4)	102 (9.1)	1.23 (0.93-1.64)	199 (17.8)	1.28 (1.03-1.60)*	119 (10.6)	1.40 (1.06-1.84)*	
<b>Psychiatric diagnoses (ICD-10):</b>									
Others	945	712(75.3)	65 (6.9)	1.00	111 (11.8)	1.00	57 (6.0)	1.00	
Severe mental illness	1412	868(61.4)	138 (9.8)	1.74 (1.28-2.38)**	255 (18.1)	1.88 (1.48-2.41)**	152 (10.8)	2.19 (1.59-3.01)**	
Substance use disorders	117	46(39.3)	9 (7.7)	2.14 (1.00-4.57)	39 (33.3)	5.44 (3.40-8.71)**	23 (19.7)	6.25 (3.54-11.03)**	

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Table 2. Univariate analysis of homelessness and incarceration, PESSOAS Project (N = 2475), Brazil, 2006.

Characteristics	N	Neither		Homelessness only		Incarceration only		Both	
		n (%) <sup>1</sup>	n (%) <sup>1</sup>	OR (95% CI) <sup>2</sup>	n (%) <sup>1</sup>	OR (95% CI) <sup>2</sup>	n (%) <sup>1</sup>	OR (95% CI) <sup>2</sup>	
History of psychiatric hospitalization:									
Never	788	679(86.2)	41 (5.2)	1.00	47 (6.0)	1.00	21 (2.7)	1.00	
Previous hospitalization	789	517(65.5)	71 (9.0)	2.27 (1.52-3.40)**	128 (16.2)	3.58 (2.51-5.09)**	73 (9.3)	4.57 (2.78-7.52)**	
Current hospitalized	898	430(47.9)	100 (11.1)	3.85 (2.63-5.65)**	230 (25.6)	7.73 (5.52-10.82)**	138 (15.4)	10.38 (6.46-16.68)**	
Age of first hospitalization or treatment in CAPS (years old):									
≥26	1289	947(73.5)	87 (6.8)	1.00	172 (13.3)	1.00	83 (6.4)	1.00	
<26	837	487(58.2)	77 (9.2)	1.72 (1.24-2.38)**	163 (19.5)	1.84 (1.45-2.34)**	110 (13.1)	2.58 (1.90-3.50)**	
Any degree of intellectual disability:									
None	1722	1153(67.0)	124 (7.2)	1.00	292 (17.0)	1.00	153 (8.9)	1.00	
Some	741	466(62.9)	86 (11.6)	1.72 (1.28-2.31)**	110 (14.8)	0.93 (0.73-1.19)	79 (10.7)	1.28 (0.95-1.71)	
Self-reported medical co morbidity:									
No	1342	863(64.3)	113 (8.4)	1.00	239 (17.8)	1.00	127 (9.5)	1.00	
Yes	1109	747(67.4)	98 (8.8)	1.00 (0.75-1.34)	160 (14.4)	0.77 (0.62-0.97)*	104 (9.4)	0.95 (0.72-1.25)	
Lifetime history of STD <sup>5</sup> :									
No	1873	1318(70.4)	147 (7.9)	1.00	279 (14.9)	1.00	129 (6.9)	1.00	
Yes	568	285(50.2)	63 (11.1)	1.98 (1.44-2.73)**	121 (21.3)	2.01 (1.56-2.57)**	99 (17.4)	3.55 (2.65-4.75)**	
Behavior and Adverse life events									
Violence exposure:									
None or verbal violence only	958	749(78.2)	58 (6.1)	1.00	121 (12.6)	1.00	30 (3.1)	1.00	
At least physical violence	1029	591(57.4)	91 (8.8)	1.99 (1.41-2.81)**	216 (21.0)	2.26 (1.77-2.90)*	131 (12.7)	5.53 (3.67-8.35)**	
At least sexual violence	488	286(58.6)	63 (12.9)	2.85 (1.94-4.17)**	68(13.9)	1.47 (1.06-2.04)**	71 (14.6)	6.20 (3.96-9.70)**	
Sex under the influence of drugs and/ or alcohol:									
No	1475	1087(73.9)	118 (8.0)	1.00	191 (13.0)	1.00	79 (5.4)	1.00	
Yes	681	303(44.5)	67 (9.8)	2.04 (1.47-2.82)**	176 (25.8)	3.31 (2.60-4.21)**	135 (19.8)	6.13 (4.52-8.32)**	
Lifetime unsafe sex:									
No	482	353(73.2)	44 (9.1)	1.00	56 (11.6)	1.00	29 (6.0)	1.00	
Yes	1970	1258(63.9)	166 (8.4)	1.06 (0.74-1.51)	344(17.5)	1.72 (1.27-2.34)**	202 (10.3)	1.95 (1.30-2.94)**	
Lifetime number of partner:									
Abstinent or only 1	805	656(81.5)	58 (7.2)	1.00	68 ( 8.5)	1.00	23 (2.9)	1.00	
>1	1523	895(58.8)	133 (8.7)	1.68 (1.22-2.33)*	302 (19.8)	3.26 (2.46-4.31)**	193 (12.7)	6.15 (3.95-9.59)**	

it continues

**Table 2.** Univariate analysis of homelessness and incarceration, PESSOAS Project (N = 2475), Brazil, 2006.

Characteristics	N	Neither		Homelessness only		Incarceration only		Both	
		n (%) <sup>1</sup>	n (%) <sup>1</sup>	OR (95% CI) <sup>2</sup>	n (%) <sup>1</sup>	OR (95% CI) <sup>2</sup>	n (%) <sup>1</sup>	OR (95% CI) <sup>2</sup>	
Age first sexual intercourse (years old):									
Abstinent or ≥18	1282	926(72.2)	105 (8.2)	1.00	174 (13.6)	1.00	77 (6.0)	1.00	
<18	1193	700(58.9)	107 (9.0)	1.35 (1.01-1.80)*	231 (19.4)	1.76 (1.41-2.19)**	155 (13.0)	2.66 (2.00-3.56)**	
History of exchange of sex for money:									
No	1811	1351(74.6)	145 (8.0)	1.00	220 (12.2)	1.00	95 (5.3)	1.00	
Yes	648	270(41.7)	65 (10.0)	2.24 (1.63-3.09)**	177 (27.3)	4.03 (3.18-5.10)**	136 (21.0)	7.16 (5.34-9.60)**	
HIV/Aids Knowledge:									
Good	1354	943(69.6)	93 (6.9)	1.00	207 (15.3)	1.00	111 (8.2)	1.00	
Poor	1095	669(61.1)	117 (10.7)	1.77 (1.33-2.37)**	189 (17.3)	1.29 (1.03-1.60)*	120 (11.0)	1.52 (1.16-2.01)*	
HIV risk perception:									
Low	1390	954(68.6)	118 (8.5)	1.00	214 (15.4)	1.00	104 (7.5)	1.00	
High	957	584(61.0)	85 (8.9)	1.18 (0.87-1.58)	172 (18.0)	1.31 (1.05-1.65)*	116 (12.1)	1.82 (1.37-2.42)**	
Previous HIV testing:									
No	1807	1219(67.5)	151 (8.4)	1.00	292 (16.2)	1.00	145 ( 8.0)	1.00	
Yes	668	407(60.9)	61 (9.1)	1.21 (0.88-1.66)	113 (16.9)	1.16 (0.91-1.48)	87 (13.0)	1.80 (1.35-2.40)**	
Lifetime cigarette smoking:									
No	701	589(84.0)	40 (5.7)	1.00	58 ( 8.3)	1.00	14 ( 2.0)	1.00	
Yes	1762	1028(58.3)	172 (9.8)	2.46 (1.72-3.53)**	345 (19.6)	3.41 (2.53-4.58)**	217 (12.3)	8.88 (5.12-15.39)**	
Substance use exposure:									
None	805	664(82.5)	58 (7.2)	1.00	64 ( 8.0)	1.00	19 (2.4)	1.00	
Only alcohol	1043	719(68.9)	89 (8.5)	1.42 (1.00-2.01)	172 (16.5)	2.48 (1.83-3.37)**	63 (6.0)	3.06 (1.81-5.17)**	
Any drug except injecting drugs	555	228(41.1)	60 (10.8)	3.01 (2.04-4.45)**	147 (26.5)	6.69 (4.81-9.30)**	120 (21.6)	18.39 (11.08-30.53)**	
Injecting drug use	72	15(20.8)	5 (5.9)	3.82 (1.34-10.88)*	22 (30.6)	15.21 (7.52-30.79)**	30 (41.7)	69.89 (32.38-150-86)**	

<sup>1</sup> Percent relative to the total number (N) of each exposure category. <sup>2</sup> Odds ratio and 95% confidence interval comparing homelessness only, incarceration only, or both with those with neither one, separately. <sup>3</sup> Brazilian minimum wage in 2006 = US\$ 200. <sup>4</sup> CAPS; Public Mental Health Outpatient Clinics. <sup>5</sup> Sexually transmitted diseases. \* Chi-square test statistically significant ( $P < 0.05$ ). \*\* Chi-square test statistically significant ( $P \leq 0.001$ ).

**Table 3.** Intermediate multivariate analyses of homelessness and incarceration according to each domain, PESSOAS Project (N = 2,475), Brazil, 2006.

Characteristics	Only homelessness	Only incarceration	Both
	OR (95% CI) <sup>2</sup>	OR (95% CI) <sup>2</sup>	OR (95% CI) <sup>2</sup>
Domain 1 - Sociodemographic			
Gender:			
Women		1.00	1.00
Men		6.34 (4.84-8.29)**	3.99 (2.90-5.47)**
Skin color:			
White		1.00	1.00
Non-white		1.43 (1.13-1.81)*	1.79 (1.33-2.41)**
Family income in the last month <sup>3</sup> :			
≥1 minimum wage	1.00		1.00
<1 minimum wage	1.39 (1.01-1.91)*		1.90 (1.38-2.60)**
Schooling (years):			
≥ 5		1.00	
< 5		1.41 (1.11-1.78)*	
Marital status:			
Married/in union	1.00	1.00	
Single/Divorced/Widower	1.68 (1.19-2.36)*	1.43 (1.09-1.86)*	
Type of Housing:			
Stable	1.00		1.00
Unstable	2.72 (1.85-3.99)**		2.66 (1.84-3.85)**
Domain 2 – Clinical			
Number of psychiatric diagnoses:			
≤1		1.00	1.00
>1		1.32 (1.04-1.68)*	1.43 (1.04-1.95)*
Psychiatric diagnoses (ICD-10):			
Others		1.00	1.00
Severe mental illness		1.17 (0.90-1.54)	1.34 (0.94-1.92)
Substance use disorders		2.78 (1.65-4.73)**	3.89 (1.99-7.59)**
History of psychiatric hospitalization:			
Never	1.00	1.00	1.00
Previous hospitalization	1.76 (1.14-2.72)*	2.88 (1.96-4.23)**	2.84 (1.65-4.90)**
Current hospitalized	3.36 (2.24-5.05)**	6.17 (4.28-8.91)**	7.17 (4.28-12.02)**
Age of first hospitalization or treatment in CAPS (years old):			
≥26	1.00	1.00	1.00
<26	1.35 (0.96-1.92)	1.37 (1.05-1.79)*	1.84 (1.31-2.60)**
Any degree of intellectual disability:			
None	1.00		1.00
Some	1.46 (1.07-2.00)*		1.39 (1.00-1.94)
Lifetime history of STD <sup>5</sup> :			
No	1.00	1.00	1.00
Yes	2.24 (1.60-3.13)**	2.15 (1.65-2.81)**	4.24 (3.07-5.86)**
Domain 3 – Behavior and Adverse life events			
Violence exposure:			
None or verbal violence only	1.00	1.00	1.00
At least physical violence	1.74 (1.21-2.50)*	1.55 (1.16-2.08)*	3.74 (2.24-6.27)**
At least sexual violence	2.65 (1.77-3.95)**	1.03 (0.71-1.50)	3.63 (2.05-6.44)**
Sex under the influence of drugs and/ or alcohol:			
No		1.00	1.00
Yes		1.75 (1.33-2.32)**	2.23 (1.53-3.27)**

it continues

**Table 3.** Intermediate multivariate analyses of homelessness and incarceration according to each domain, PESSOAS Project (N = 2,475), Brazil, 2006.

Characteristics	Only homelessness	Only incarceration	Both
	OR (95% CI) <sup>2</sup>	OR (95% CI) <sup>2</sup>	OR (95% CI) <sup>2</sup>
Lifetime number of partner:			
Abstinent or only 1		1.00	1.00
>1		2.29 (1.52-3.43)**	3.81 (1.77-8.23)**
History of exchange of sex for money:			
No	1.00	1.00	1.00
Yes	1.49 (1.04-2.14)*	2.05 (1.56-2.70)**	2.21 (1.52-3.22)**
HIV/Aids Knowledge:			
Good	1.00	1.00	1.00
Poor	2.01 (1.48-2.73)**	1.51 (1.16-1.96)*	2.30 (1.58-3.36)**
HIV risk perception:			
Low			1.00
High			1.63 (1.13-2.34)*
Lifetime cigarette smoking:			
No	1.00	1.00	1.00
Yes	1.77 (1.21-2.60)*	1.80 (1.26-2.58)**	3.09 (1.56-6.10)**
Substance use exposure:			
None	1.00	1.00	1.00
Only alcohol	1.15 (0.80-1.67)	1.35 (0.93-1.95)	1.45 (0.73-2.88)
Any drug except injecting drugs	2.15 (1.37-3.38)**	2.49 (1.63-3.79)**	5.04 (2.52-10.07)**
Injecting drug use	2.02 (0.66-6.15)	3.88 (1.75-8.61)**	11.58 (4.38-30.58)**
HIV risk perception:			
Low			1.00
High			1.63 (1.13-2.34)*
Lifetime cigarette smoking:			
No	1.00	1.00	1.00
Yes	1.77 (1.21-2.60)*	1.80 (1.26-2.58)**	3.09 (1.56-6.10)**
Substance use exposure:			
None	1.00	1.00	1.00
Only alcohol	1.15 (0.80-1.67)	1.35 (0.93-1.95)	1.45 (0.73-2.88)
Any drug except injecting drugs	2.15 (1.37-3.38)**	2.49 (1.63-3.79)**	5.04 (2.52-10.07)**
Injecting drug use	2.02 (0.66-6.15)	3.88 (1.75-8.61)**	11.58 (4.38-30.58)**

<sup>1</sup> Percent relative to the total of each exposure category. <sup>2</sup> Odds ratio and 95% confidence interval comparing only homelessness, only incarceration and both groups with those neither one, separately. <sup>3</sup> Brazilian minimum wage in 2006 = US\$ 200. <sup>4</sup> CAPS: Public Mental Health Outpatient Clinics. <sup>5</sup> Sexually transmitted diseases. \* Chi-square test statistically significant ( $P < 0.05$ ).

\*\* Chi-square test statistically significant ( $P \leq 0.001$ ).

socioeconomic circumstance remained associated with homelessness and incarceration when these outcomes were analyzed separately. People with mental illness are often contextualized in disadvantaged social settings<sup>1,24</sup>. Previous studies also reported associations of socioeconomic position with incarceration and homelessness among people with mental illness<sup>1,21,22,25</sup>. Being non-white was associated with higher chances of incarceration and the co-occurrence of incarceration and homelessness in the present study after adjusting for socioeconomic position (income and education) in the intermediate models. However, this association did not remain statistically significant in the final models, contrary to previous studies<sup>3,7,23,26,27</sup>. Although the reason for

this difference is not clear, we should point out that these previous studies were carried out in the United States, and less is known about the association of race with incarceration and homelessness in psychiatric patients in settings marked by higher racial miscegenation such as in Brazil<sup>28,29</sup>. Thus, contextual factors related to different ways of living determined as by race may partially explain our results. In addition, methodological issues such as statistical power and study design could also be possible explanations. Furthermore, because variables considered in the final models vary across the studies, comparability is limited. Nevertheless, further studies are needed for a better understanding of homelessness and incarceration in different racial contexts.

**Table 4.** Final Multivariate models of homelessness and incarceration, PESSOAS Project (N = 2,475), Brazil, 2006.

Characteristics	Only homelessness	Only incarceration	Both
	OR (95% CI) <sup>2</sup>	OR (95% CI) <sup>2</sup>	OR (95% CI) <sup>2</sup>
Sociodemographic			
Gender:			
Women		1.00	1.00
Men		5.04 (3.65-6.96)**	2.39 (1.49-3.83)**
Family income in the last month <sup>3</sup> :			
≥1 minimum wage	1.00		1.00
<1 minimum wage	1.44 (1.02-2.04)*		3.63 (2.34-5.65)**
Schooling (years):			
≥ 5		1.00	1.00
< 5		2.03 (1.53-2.69)**	3.22 (2.08-5.01)**
Type of Housing:			
Stable	1.00		1.00
Unstable	2.31 (1.48-3.61)**		3.25 (1.79-5.90)**
Clinical			
Psychiatric diagnoses (ICD-10):			
Others			1.00
Severe mental illness			1.67 (1.03-2.70)*
Substance use disorders			1.69 (0.74-3.87)
History of psychiatric hospitalization:			
Never	1.00	1.00	1.00
Previous hospitalization	1.68 (1.10-2.57)*	2.29 (1.54-3.40)**	1.97 (1.02-3.81)*
Current hospitalized	2.15 (1.39-3.33)**	4.85 (3.29-7.14)**	2.34 (1.20-4.58)*
Any degree of intellectual disability:			
None	1.00		
Some	1.40 (1.00-1.97)		
Lifetime history of STD <sup>5</sup> :			
No	1.00	1.00	1.00
Yes	1.88 (1.32-2.68)**	1.66 (1.22-2.26)**	1.95 (1.26-3.03)*

it continues

Participants with severe mental illness (psychotic disorders, depression with psychotic symptoms, and bipolar disorder) were 67% more likely of having a history of co-occurrence of homelessness and incarceration, and we should note that this association was not present when assessing homelessness or incarceration separately. This finding is important to promote mental health policies for the protection of patients with severe mental disorders, since they may indicate increased vulnerability in these groups of patients. Similarly, Hawthorne et al.<sup>7</sup> found that patients with schizophrenia, bipolar, or other psychotic disorder diagnoses have been associated with incarceration<sup>7</sup>.

We have also found that history of previous hospitalization and being current hospitalized

were associated with higher chances of having the three outcomes. Previous studies have also shown that psychiatric hospitalizations and the use of emergency psychiatric unit are more frequent among patients with mental illness who have history of homelessness<sup>3,26</sup> or incarceration<sup>30</sup>. Patients under an acute psychiatric episode and clinical destabilization with increased severity of symptoms, which often require hospitalization, are potentially more vulnerable to criminality and homelessness<sup>31</sup>. Studies have demonstrated that routine outpatient services and high psychiatric medication access reduce the chances of arrest among individuals with mental illness<sup>32,33</sup>. These evidences show that the ability of the mental health system to deliver and coordinate psychiatric treatment in outpatient

**Table 4.** Final Multivariate models of homelessness and incarceration, PESSOAS Project (N = 2,475), Brazil, 2006.

Characteristics	Only homelessness	Only incarceration	Both
	OR (95% CI) <sup>2</sup>	OR (95% CI) <sup>2</sup>	OR (95% CI) <sup>2</sup>
Behavior and Adverse life events			
Violence exposure:			
None or verbal violence only	1.00	1.00	1.00
At least physical violence	1.62 (1.12-2.35)*	1.96 (1.44-2.69)**	4.69 (2.62-8.40)**
At least sexual violence	2.35 (1.56-3.54)**	1.68 (1.11-2.53)*	5.18 (2.63-10.20)**
Sex under the influence of drugs and/or alcohol:			
No		1.00	1.00
Yes		1.41 (1.04-1.91)*	2.12 (1.37-3.29)**
Lifetime number of partners:			
Abstinent or only 1		1.00	1.00
>1		1.73 (1.14-2.64)*	4.41 (1.77-11.00)**
History of exchange of sex for money:			
No			1.00
Yes			1.73 (1.12-2.68)*
HIV/Aids Knowledge:			
Good	1.00		
Poor	1.44 (1.03-2.02)*		
HIV risk perception:			
Low			1.00
High			1.70 (1.13-2.57)*
Lifetime cigarette smoking:			
No	1.00		1.00
Yes	1.63 (1.10-2.42)*		2.72 (1.27-5.83)*
Substance use exposure:			
None	1.00	1.00	1.00
Only alcohol	1.41 (0.96-2.08)	1.09 (0.74-1.61)	1.40 (0.65-2.99)
Any drug except injecting drugs	2.65 (1.67-4.19)**	1.84 (1.18-2.86)*	4.31 (1.97-9.40)**
Injecting drug use	2.76 (0.88-8.66)	3.46 (1.47-8.13)*	12.22 (4.07-36.64)**

<sup>1</sup> Percent relative to the total of each exposure category. <sup>2</sup> Odds ratio and 95% confidence interval comparing only homelessness, only incarceration and both groups with those neither one, separately. <sup>3</sup> Brazilian minimum wage in 2006 = US\$ 200. <sup>4</sup> CAPS: Public Mental Health Outpatient Clinics. <sup>5</sup> Sexually transmitted diseases. \* Chi-square test statistically significant ( $P < 0.05$ ). \*\* Chi-square test statistically significant ( $P \leq 0.001$ ).

services, including the provision of easy access to medication, can act as a primary prevention approach to decrease rates of homelessness and incarceration among mental illness patients.

Exposure to violence was strongly associated with the three outcomes, especially staggering higher chances of sexual and physical violence among those with history of co-occurrence of homelessness and incarceration. Adverse socioeconomic conditions (low income and low education) coincide with violence. Residents of poor areas are more vulnerable to violent crimes worldwide, including assault and rape<sup>24</sup>. Noxious family environments are also related to violence. Patients in acute psychiatric crisis can behave aggressively, increasing their vulnerability to homelessness and incarceration. The high magnitude

of the association in the co-occurrence of both outcomes suggests that such interpretation is plausible. Nevertheless, the cross-sectional design of our study cannot rule out a potential reverse causality: patients may have experienced violence when they were in prison or living on the streets. Wolff & Shy<sup>13</sup>, for instance, presented high rates of sexual victimization among incarcerated men and women in the USA. Sexual violence in prison includes inmate-on-inmate and staff-on-inmate sexual victimization and is related to behaviors varying from sexually misconduct to sexual assaults<sup>34</sup>.

Our results also corroborate the hypothesis regarding the relationship between homelessness and incarceration and history of risky sexual activities and substance use. Sex under the influ-

ence of alcohol or illicit drugs, lifetime number of partners and history of exchange sex for money were strongly associated with the co-occurrence of both conditions. Previous studies reported high rates of sexual exploration, unplanned pregnancy, unprotected sex, and multiple sexual partners among homeless and incarcerated individuals<sup>34,35</sup>. It is possible that non-consensual or unwanted sexual practices are connected to the context of the patients' lives. In fact, selling sex to meet subsistence needs (survival sex) has been frequently observed among the homeless<sup>36</sup>. Moreover, the social groups to which individuals belong are crucial to explain these outcomes. Patients from family environments marked by abuse, neglect, or caregiver substance use are more likely to engage in risky behaviors in adulthood. Lack of family support also seems to play a decisive role after leaving home. Having a close family member seems to protect against risk taking<sup>36</sup>. In summary, exposure to violence, risky sexual practices and substance use may be part of a cluster of vulnerability to homelessness and incarceration shared by Brazilian patients with mental illness.

Despite the relevance and magnitude of our results, some limitations must be pointed out. First, our results may not be generalizable to all psychiatric patients in Brazil because of the exclusion of more severely ill patients and those who did not have capacity to consent to participation in the study. In addition, the cross-sectional design limits our capacity to establish definite cause-effect relationships. We did not direct-

ly assess psychiatric diagnoses or symptoms, but rather obtained these data from medical charts. It is possible that the prevalence of history of homelessness incarceration, and the co-occurrence of both in this population may be underestimated because of the exclusion of Public Mental Health Outpatient Clinics for substance use disorders (CAPS-AD) from the study, which have a higher concentration of patients with substance use disorder and/or IDU. However, we should note that the present study is the first known national representative study to assess potential factors associated with history of homelessness, incarceration and the co-occurrence of both conducted in a national sample of psychiatric patients in public mental health care in Brazil.

In conclusion, the current study showed that history of incarceration and homelessness among psychiatric patients in Brazil are strongly correlated, and they share many associated factors, such as socioeconomic disadvantage, severe psychiatric conditions, exposure to violence, unsafe sexual behavior, and drug use. Our findings have implications in efforts to reduce the likelihood of criminal arrest and homelessness episodes among psychiatric patients, because many of these associated factors are potentially modifiable. Thus, integrated care as well as intersectoral actions for addressing social adversities, and reduce exposure to illicit drugs and violence in this extremely vulnerable population must be considered at the health, judiciary, and social department levels. The implementation of these integrated policies is urgently needed in Brazil.

## Collaborations

APS Melo and MDC Guimarães, worked on the conception, delineation, application of instruments, analysis and interpretation of the data and writing and review of the report. LV Camello, FCR Barros, EP Lima, worked on the analysis and interpretation of the data and writing of the article.

## Acknowledgments

Financing of this project was provided by The Brazilian National STD/AIDS Program, Ministry of Health. LV Camelo was supported by CAPES postdoctoral research fellow. MDC Guimarães was CNPq research fellow during the preparation of this manuscript.

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Artigo apresentado em 25/05/2016  
 Aprovado em 21/10/2016  
 Versão final apresentada em 23/10/2016

