


Why are black adults over-represented among individuals who have experienced lifetime homelessness? Oaxaca-Blinder decomposition analysis of homelessness among US male adults

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ABSTRACT

Background Non-Hispanic black adults experience homelessness at higher rates than non-Hispanic white adults in many studies. We aim to identify factors that could account for this disparity.

Methods We used national survey data on non-Hispanic black and white men with complete data from the National Epidemiological Survey on Alcohol and Related Conditions Wave III. Using the Oaxaca-Blinder decomposition analysis, we examined race-based disparities in correlates of risk for lifetime homelessness.

Results In our analysis, 905 of 11 708 (7.7%) respondents, representing 6 million adults nationwide, reported lifetime homelessness. Black adults were 1.41 times more likely to have been homeless than white adults (95% CI 1.14 to 1.73; $p=0.002$). Overall, 81.6% of race-based inequality in lifetime homelessness were explained by three main variables with black adults having: lower incomes, greater incarceration histories since age of 18 and a greater risk of traumatic events ($p<0.01$ for each). They also had more antisocial personality disorder, younger age and parental drug use ($p<0.05$ for each).

Conclusion Although previous studies suggested that black homeless men have higher rates of drug abuse than white homeless men, our findings highlight the fact that black-white disparities in lifetime homeless risk are associated with socio-structural factors (eg, income and incarceration) and individual adverse events (eg, traumatic events), and not associated with psychiatric or substance use disorders.

INTRODUCTION

Homelessness has been a recurring social problem across US history with its most recent re-emergence in the mid-1980s. This latest wave of homelessness has now persisted for over three decades, and currently affects over half a million individuals in the USA on any given winter night, in spite of extensive efforts to end it.¹ One of the distinctive characteristics of what was initially called the ‘new homeless’ of the 1980s was a strikingly large numbers of African-Americans.² Efforts to understand the rise of homelessness have focused primarily on high burdens of mental illness or substance use, most dramatically manifested in far higher rates of both morbidity and mortality than in the general population.³ Racial disparities in homelessness have also long-been noted with African-Americans experiencing homelessness at higher rates than non-Hispanic white adults in many, but not all, studies.^{4,5}

While black adults make up approximately 13% of the US population, many surveys, including the annual nationwide point-in-time count (ie, a 1-day unduplicated count of sheltered and unsheltered homeless individuals),⁶ suggest that they make up as many as 40% of homeless adults.⁴ Hispanics, while also noted as a low-income population, have not been found to be over-represented among homeless adults in most surveys.⁵

Several studies, based on local samples or small longitudinal studies, have documented differences between racial groups of homeless adults with respect to both socio-demographic factors and behavioural problems.^{7–10} For example, black homeless adults have been reported in some studies to be younger, less likely to be married or to have completed a high school diploma than white adults⁷; while others suggest they have higher levels of drug abuse but lower rates of alcohol abuse or psychiatric problems.^{8–10} No studies, however, have used nationally representative survey data to examine the differences between black adults with experiencing lifetime homelessness or not, and compare these to the differences observed between white adults with experiencing lifetime homelessness or not, a first step in identifying particular risk factors that can account for the high levels of lifetime homelessness among black adults.

Some national surveys showed a robustly greater risk of homelessness among black adults as compared to white adults while others found either no increased lifetime risk associated with being black,¹¹ or no greater risk when other factors are also considered.¹² To date, however, no national survey data have been analysed with the specific goal of identifying socio-demographic, clinical or behavioural characteristics that are stronger risk or protective factors for lifetime homelessness among members of one racial group as contrasted with another, or that can potentially account for differences in the risk of lifetime homeless between black and white adults.

In this study, we use nationally representative survey data from the National Epidemiologic Survey on Alcohol and Related Conditions Wave III (NESARC-III) to compare non-Hispanic black and white men with and without histories of lifetime homelessness to address the following questions: (1) Does one of the racial groups exacerbate the adverse impact of specific risk factors for homelessness? In other words, do some risk factors (eg, incarceration) affect black adults more severely than white adults



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on bi-variate analysis, and conversely, do some factors (eg, income) have stronger protective effects for one racial group than another? (2) Are the major risk factors for lifetime homelessness similar for black and white adults when examined in multivariate analyses that identify their independent relationships to lifetime homelessness for each racial group, in separate analyses? And finally, (3) are there identifiable risk factors that may account for the differential risks of lifetime homelessness between black and white adults that are identifiable through Oaxaca-Blinder decomposition analysis?

We focus on male adults because women experiencing lifetime homelessness, most often in single-parent families with children, are subject to different risk and protective factors and because most homeless adults are male.⁷ In our study, we relied on self-reported racial groups as non-Hispanic black and white men. While such racial/ethnic categories are simplistic, we favour a social constructivist view of race and ethnicity rather than an essentialist view. In other words, we view cultural, historical, ideological, geographical and legal influences to be the basis for differences between racial groups rather than fixed biological characteristics.¹³ In addition, although the Hispanic population is increasing over time in the USA, older reviews¹⁴ and a more recent study⁵ suggest that non-Hispanic white-Hispanic gap in lifetime homelessness is smaller or often statistically not significant. We thus focus on identifying key risk factors that may explain why lifetime homelessness is more common among black male adults as compared to white male adults in the USA in hope of finding targets for intervention than may be of specific relevance to one group or the other.

METHODS

Data source and study sample

We used data from the NESARC-III.^{15 16} Sponsored by the National Institute on Alcohol Abuse and Alcoholism, NESARC-III is a nationally representative survey, conducted from April 2012 through June 2013, that collected comprehensive information regarding physical and mental health diagnoses, well-being and disabilities among non-institutionalised civilian adults aged 18 or older with a focus on alcohol and other substance use disorders (SUDs).¹⁶ In this study, we limited our sample to non-Hispanic black or white male adults with complete covariate data ($n=11\,708$ unweighted). These individuals were grouped into those with a lifetime homelessness history ($n=905$ unweighted) and those without ($n=10\,803$ unweighted). Lifetime homelessness was assessed by 'yes' responses to either of the following two questions: 'Have you at any time been homeless in last 12 months?' and 'Have you had a time lasting ≥ 1 month when you had no regular place to stay?'

The overall survey response rate of NESARC-III was 60.1%.^{15 16} Further details of the survey, including descriptions, questionnaires, sampling methodology and data sets, are available on the NESARC-III website.¹⁵ The study procedures for this secondary analysis of restricted data were approved by the Institutional Review Board (#2000022543) at Yale School of Medicine. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology reporting guideline.

Measures

Socio-demographic characteristics

Socio-demographic variables surveyed by NESARC-III included the following categorical variables:¹⁷⁻²⁰ age, sex, marital status (married, never married or other), family income (<US\$20 000, US\$20 000–39 999 or \geq US\$40 000), employment (%), education (\geq Bachelor's degree or not), primary health insurance coverage (private, Medicare, Medicaid or other) and urbanity (rural or urban residence).

Psychiatric and SUDs

NESARC-III used the Alcohol Use Disorder and Associated Disability Interview Schedule²¹ to evaluate Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) diagnostic criteria of past-year diagnosis of the following psychiatric disorders: major depressive disorder, dysthymia, bipolar I disorder, generalised anxiety disorder, post-traumatic stress disorder and panic disorder.¹⁷⁻²⁰ Using such information, we created a binary indicator variable (yes or no) for any past-year psychiatric disorders. We also created a variable indicating the number of past-year psychiatric disorders (none, one, or two or more).

We further included the following past-year substance use disorders (SUDs) based on DSM-5 criteria: alcohol use disorder and other illicit SUDs (ie, cannabis, opioid, cocaine, stimulant, sedative, heroin, hallucinogen, inhalant/solvent or club drug).¹⁷⁻²⁰ We constructed a binary indicator variable (yes or no) and count variable (none, one, or two or more) for any past-year SUDs.

Pain and chronic medical conditions

We included self-reported pain in the past 4 weeks (never, a little bit or moderately, vs quite a bit or extremely) given its established link with homelessness.²² We also considered medical comorbidities in the past 12 months as covariates. Respondents were asked whether they had 14 chronic medical conditions (eg, arthritis, diabetes, and insomnia) (yes or no) in the past 12 months. Among those who responded positively, they were further asked, 'Did a doctor or health professional tell you had (a medical condition)?' Using these two questionnaire items for each medical condition, we created a series of chronic conditions in the past 12 months.²³ For obesity, we calculated a body mass index (BMI), with BMI ≥ 30.0 kg/m² considered obese.²³ Using these variables, we further constructed a count variable representing the number of multiple chronic conditions (0, 1, 2–4 or ≥ 5), and a binary variable (yes or no).

Lifetime behavioural history

Lifetime antisocial and borderline personality disorders, based on the DSM-5 criteria, were also included. Survey participants were further asked six different questions regarding their parental history (ie, alcohol problem, drug use problem, incarceration history, hospitalisation due to mental illness, suicide attempts and suicide completion). These items related to parental history were included because these are considered potential risk factors for lifetime homelessness.²⁴ We also included religiosity, which may reduce risk,²⁵ along with combat and any other unspecified traumatic events.

Data analysis

First, we evaluated the unadjusted odds of having been homeless among black as compared to white male adults. Next, we characterised socio-demographic factors that differed by lifetime homelessness status separately, among non-Hispanic white male adults and among non-Hispanic black male adults. In these bivariate analyses, we used design-based *F*-tests (ie, weight-corrected Pearson's χ^2 statistics) to test differences by the homelessness status. In addition, we tested whether there was a significant interaction between each factor and being black in association with homelessness using bivariate logistic regression analyses. These analyses determined whether being black exacerbated or reduced the adverse impact of specific risk factors for homelessness. We repeated the aforementioned analyses for

clinical characteristics (eg, psychiatric and SUDs and chronic medical conditions) and lifetime behavioural factors.

Third, we used multivariable analysis to identify factors that are independently associated with being homeless net of other factors, again separately, among non-Hispanic black and white men using multivariable-adjusted logistic regression analyses. We used a backward stepwise approach to develop a parsimonious, or efficient, exploratory model of factors associated with being homeless.

Finally, we used Oaxaca-Blinder decomposition analysis to better understand black-white differences in the risk of lifetime homeless.²⁶⁻²⁷ The Oaxaca-Blinder analytic approach is a regression-based decomposition analysis used to explain the gaps between two groups (eg, non-Hispanic black and white men) in their association with an outcome of interest (eg, homelessness). This approach is increasingly used in racial disparities research.²⁸⁻²⁹ The Oaxaca-Blinder decomposition method used here²⁶⁻²⁷ explains the differences in the proportions reporting lifetime homelessness between the two self-identified racial groups, non-Hispanic black and white men. The gap in homelessness is decomposed into the part that is due to group differences in the magnitudes of the effects of the determinants of the outcome on one hand, and the part attributable to the magnitudes of differences in the prevalence of the determinants themselves that affect the outcome, on the other hand.

This method assumes that Y, the dependent variable (ie, homelessness), can be estimated by a multivariable-adjusted linear model with a set of measured variables, Xs. Then, the mean value of Y in each group (ie, in non-Hispanic black and white groups) can be formulated as follows:

$$Y_{Mean}^{Black} = \beta_o^{Black} + \sum_{j=1}^J \cdot \beta_j^{Black} X_{jmean}^{Black} \quad (1)$$

$$Y_{Mean}^{White} = \beta_o^{White} + \sum_{j=1}^J \cdot \beta_j^{White} X_{jmean}^{White} \quad (2)$$

X represents a set of J measured independent or controlling variables. β is a column vector of coefficients representing the relationship between Y and Xs, which is obtained separately for non-Hispanic black and white groups. Differences in the mean value of Y between non-Hispanic black and white groups (ie, equations (1) and (2)) are then as follows:

$$Y_{Mean}^{Black} - Y_{Mean}^{White} = \left(\beta_o^{Black} - \beta_o^{White} \right) + \sum_{j=1}^J \left(\beta_j^{Black} X_{jmean}^{Black} - \beta_j^{White} X_{jmean}^{White} \right) \quad (3)$$

The Oaxaca-Blinder method then decomposes the overall difference into the difference in mean values of Xs and differences in values of intercepts and slope coefficients. As a result, a hypothetical term (ie, β of non-Hispanic black adults and the mean X of non-Hispanic white adults) is also included in equation (3). The difference in Y between non-Hispanic black and white adults in the Oaxaca-Blinder decomposition approach can further be described as follows:

$$Y_{Mean}^{Black} - Y_{Mean}^{White} = \left[\sum_{j=1}^J \left(X_{jmean}^{Black} - X_{jmean}^{White} \right) \beta_j^{Black} \right] + \left[\left(\beta_o^{Black} - \beta_o^{White} \right) + \sum_{j=1}^J \left(\beta_j^{Black} - \beta_j^{White} \right) X_{jmean}^{White} \right] \quad (4)$$

In the Oaxaca-Blinder decomposition analysis, the black-white gap can be further decomposed into *explained* and *unexplained* parts.²⁶ The explained part of the black-white gap, $\sum_{j=1}^J (X_{jmean}^{Black} - X_{jmean}^{White}) \beta_j^{Black}$, is the aggregated group difference in Y, which is derived from differences in a set of the mean values of measured independent or controlling variables. The unexplained part, $(\beta_o^{Black} - \beta_o^{White}) + \sum_{j=1}^J (\beta_j^{Black} - \beta_j^{White}) X_{jmean}^{White}$, is due to differences in intercepts and coefficient estimates. In other words, a residual difference in Y between non-Hispanic black and white adults still remains even if non-Hispanic black adults may have had the same mean levels of independent or controlling variables as non-Hispanic white adults. This technique thus allows identification of significant factors that generate disparity, or inequality, between non-Hispanic black and white adults in Y, the proportion with lifetime homelessness. Since experiencing homelessness was a binary outcome, we specified a logit model accordingly.³⁰ We reported a final single model, which included all factors being controlled simultaneously.

All statistical analyses were conducted in Stata MP/6-Core 15.1 (College Station, TX, USA) and were weighted/accounted for NESARC-III survey design (eg, unequal probability of selection, clustering and stratification) using the *svy* commands.¹⁶ We used $p < 0.05$ as the test of statistical significance.

RESULTS

Socio-demographic characteristics of the study sample

Of 11 708 survey respondents (88.0 million non-Hispanic black and white men nationwide), 905 (7.7%) reported lifetime homelessness (table 1). The odds that non-Hispanic black adults would be homeless were 1.41 times greater than that of non-Hispanic white adults (95% CI 1.01 to 1.65; $p = 0.002$). Among non-Hispanic black adults, those with lifetime homelessness were less likely to be currently married, employed or to have completed a Bachelor's degree or higher than those without lifetime homelessness ($p < 0.01$ for all). Those with lifetime homelessness were also more likely to have an income $> US\$20\ 000$ or to have no health insurance than those without lifetime homelessness. Similar patterns were found among non-Hispanic white adults ($p < 0.01$ for all). Lacking health insurance was the only socio-demographic factor that had a significantly different impact on black and white adults, that is, a significant interaction effect, with being black and uninsured having a stronger association with lifetime homelessness than being white and uninsured (OR = 0.64; 95% CI 0.45 to 0.92 for interaction term).

Clinical characteristics of the study sample

Among non-Hispanic black men, those with lifetime homelessness were more likely to report almost all past-year psychiatric disorders than those without lifetime homelessness ($p < 0.001$), with the exception of generalised anxiety disorder (table 2). Similar patterns were found for SUDs in the past year ($p < 0.001$). In addition, those with lifetime homelessness were more likely to report lifetime antisocial personality disorder, borderline personality disorder, parental drug use problems, incarceration history of parents, incarceration history and suicide attempt ($p < 0.001$ for all). Similar patterns were found to differentiate among white adults by lifetime homelessness status.

There were only two factors in which significant interactions between race and risk factors were observed. Generalised anxiety disorder (OR = 0.37; 95% CI 0.181 to 0.78 for interaction term) had a greater adverse impact on white adults than black adults

Table 1 Demographic characteristics (column %) of male adults by race/ethnicity and lifetime homelessness

	Non-Hispanic white adults			Non-Hispanic black adults			Bivariate analysis of experiencing lifetime homelessness		
	Experiencing homelessness	Not experiencing homelessness	P value	Experiencing homelessness	Not experiencing homelessness	P value	Main effect of being black, OR (95% CI)	Main effect of each factor, OR (95% CI)	Interaction of being black and each factor, OR (95% CI)
Sample size									
Unweighted sample	606	7949		299	2854				
Weighted population	4 921 791	70 563 107		1 113 708	11 355 268				
Age, mean±SD	44.8±13.2	48.3±15.3	<0.001	42.4±19.7	42.7±21.1	0.847	0.86 (0.52 to 1.43)	0.99 (0.97 to 0.99)	1.01 (1.00 to 1.02)
Marital status									
Married	33.8	58.9		17.7	36.2		Reference	Reference	Reference
Never married	25.9	20.8	<0.001	47.4	38.4	<0.001	1.20 (0.78 to 1.83)	2.17 (1.73 to 2.71)	1.17 (0.70 to 1.92)
Other	40.3	20.3		35.0	25.4			3.46 (2.85 to 4.20)	0.82 (0.50 to 1.33)
Income (US\$)									
<20 000	40.9	15.0		60.4	30.6		Reference	Reference	Reference
≥20 000 and <40 000	26.3	20.9	<0.001	22.6	26.8	<0.001	1.02 (0.77 to 1.36)	0.46 (0.37 to 0.58)	0.93 (0.66 to 1.61)
≥40 000	32.9	64.1		17.0	42.6			0.19 (0.15 to 0.24)	1.08 (0.71 to 1.63)
Employed	69.8	74.9	0.007	60.6	70.6	0.006	1.56 (1.16 to 2.11)	0.77 (0.64 to 0.93)	0.83 (0.57 to 1.20)
≥Bachelor's degree	16.5	34.0	<0.001	8.3	15.7	0.005	1.21 (0.97 to 1.51)	0.38 (0.30 to 0.49)	1.26 (0.73 to 2.16)
Veteran	21.9	19.3	0.210	18.1	15.7	0.372	1.32 (1.04 to 1.67)	0.85 (0.66 to 1.10)	1.40 (0.90 to 2.18)
Insurance									
Private	36.7	66.3	<0.001	18.7	45.6	>0.001	1.12 (0.88 to 1.42)	0.30 (0.24 to 0.37)	0.93 (0.63 to 1.37)
Medicare	20.7	23.3	0.230	19.6	17.8	0.560	1.33 (1.07 to 1.66)	0.86 (0.68 to 1.10)	1.31 (0.82 to 2.09)
Medicaid	15.7	5.2	<0.001	25.6	11.4	<0.001	1.33 (1.07 to 1.64)	3.44 (2.59 to 4.55)	0.78 (0.48 to 1.28)
Uninsured	29.3	13.2	<0.001	39.3	27.0	<0.001	1.44 (1.12 to 1.84)	2.72 (2.18 to 3.41)	0.64 (0.45 to 0.92)
Living in urban areas	11.1	72.8	0.493	92.1	86.9	0.206	0.80 (0.33 to 1.92)	0.92 (0.72 to 1.17)	1.92 (0.80 to 4.60)

Data were from National Epidemiologic Survey on Alcohol and Related Conditions-III.

Table 2 Psychiatric and medical comorbidities and behavioural history among male adults by race/ethnicity and lifetime homelessness

Sample size	Non-Hispanic white adults				Non-Hispanic black adults				Bivariate analysis of experiencing lifetime homelessness		
	Experiencing homelessness	Not experiencing homelessness	P value	Experiencing homelessness	Not experiencing homelessness	P value	Main effect of being black, OR (95% CI)	Main effect of each factor, OR (95% CI)	Interaction of being black and each factor, OR (95% CI)		
	606	7949		299	2854						
Weighted population	4 921 791	70 563 107		1 113 708	11 355 268						
Past-year psychiatric disorder											
Any psychiatric disorder	35.1	12.9	<0.001	33.1	11.4	<0.001	1.43 (1.12 to 1.82)	3.65 (3.05 to 4.38)	1.05 (0.72 to 1.53)		
Major depressive disorder	15.7	6.7	<0.001	17.2	5.7	<0.001	1.37 (1.10 to 1.69)	2.57 (1.88 to 3.52)	1.33 (0.76 to 2.31)		
Dysthymia	12.0	2.5	<0.001	9.0	1.7	<0.001	1.44 (1.16 to 1.80)	5.31 (3.77 to 7.46)	1.11 (0.62 to 1.99)		
Generalised anxiety disorder	12.4	3.6	<0.001	5.0	3.6	0.298	1.53 (1.23 to 1.89)	3.77 (2.81 to 5.06)	0.37 (0.18 to 0.78)		
Post-traumatic stress disorder	10.7	2.5	<0.001	8.6	3.7	0.001	1.46 (1.16 to 1.82)	4.72 (3.31 to 6.71)	0.52 (0.27 to 1.02)		
Panic disorder	7.5	1.7	<0.001	5.4	1.5	<0.001	1.44 (1.15 to 1.79)	4.81 (3.10 to 7.47)	0.79 (0.35 to 1.81)		
Bipolar 1 disorder	6.4	1.4	<0.001	6.3	1.1	<0.001	1.40 (1.13 to 1.74)	4.93 (3.30 to 7.36)	1.24 (0.60 to 2.56)		
Number of psychiatric disorders											
None	87.1	64.9		88.6	66.9		Reference	Reference	Reference		
1	9.1	18.1	<0.001	7.7	19.8	<0.001	1.43 (1.12 to 1.82)	2.67 (2.12 to 3.36)	1.27 (0.82 to 1.97)		
≥2	3.8	17.0		3.7	13.3			6.01 (4.66 to 7.77)	0.79 (0.46 to 1.35)		
Past-year substance use disorder											
Alcohol use disorder	31.0	16.9	<0.001	35.3	17.0	<0.001	1.32 (1.03 to 1.70)	4.90 (3.75 to 6.40)	1.20 (0.84 to 1.70)		
Any illicit substance use disorder	16.1	3.8	<0.001	22.3	6.6	<0.001	1.34 (1.06 to 1.70)	2.22 (1.83 to 2.69)	0.83 (0.53 to 1.31)		
Cannabis use disorder	10.5	2.6	<0.001	18.2	5.4	<0.001	1.32 (1.05 to 1.67)	4.33 (3.15 to 5.97)	0.90 (0.54 to 1.48)		
Opioid use disorder	5.8	0.7	<0.001	3.2	0.7	<0.001	1.44 (1.17 to 1.78)	8.94 (5.19 to 15.40)	0.56 (0.23 to 1.35)		
Cocaine use disorder	2.8	0.3	<0.001	3.2	0.7	<0.001	1.41 (1.14 to 1.74)	9.62 (3.89 to 23.78)	0.49 (0.14 to 1.71)		
Stimulant use disorder	1.9	0.3	<0.001	0.1	0.0	0.002	1.43 (1.16 to 1.76)	6.25 (2.60 to 15.00)	*		
Sedative use disorder	1.5	0.3	<0.001	0.5	0.1	0.072	1.42 (1.15 to 1.75)	4.74 (2.30 to 9.76)	0.73 (0.13 to 3.99)		
Heroin use disorder	1.3	0.2	<0.001	0.3	0.1	0.318	1.42 (1.15 to 1.75)	6.74 (2.32 to 19.60)	0.41 (0.04 to 4.07)		
Hallucinogen use disorder	0.1	0.1	0.478	0.0	0.2	0.512	1.41 (1.14 to 1.74)	2.11 (0.25 to 18.03)	*		
Club drug use disorder	0.2	0.2	0.820	1.5	0.1	0.001	1.39 (1.12 to 1.71)	1.19 (0.26 to 5.54)	8.89 (0.97 to 81.77)		
Solvent/inhalant use disorder	0.7	0.0	<0.001	0.6	0.0	<0.001	1.41 (1.14 to 1.74)	26.42 (3.44 to 203.18)	1.53 (0.04 to 55.99)		
Number of illicit Substance use disorders											
None	83.9	96.2		77.7	93.4		Reference	Reference	Reference		
1	12.1	3.2	<0.001	18.6	6.1	>	1.34 (1.06 to 1.70)	4.31 (3.10 to 6.00)	0.85 (0.50 to 1.44)		
≥2	4.0	0.5		3.7	0.5			8.50 (4.47 to 16.13)	1.16 (0.50 to 2.72)		
Past-year chronic medical condition											

Continued

Table 2 Continued

	Non-Hispanic white adults		Non-Hispanic black adults		Bivariate analysis of experiencing lifetime homelessness			
	Experiencing homelessness	Not experiencing homelessness	Experiencing homelessness	Not experiencing homelessness	P value	Main effect of being black, OR (95% CI)	Main effect of each factor, OR (95% CI)	Interaction of being black and each factor, OR (95% CI)
Pain	25.6	9.2	19.7	10.5	<0.001	1.54 (1.24 to 1.91)	3.41 (2.70 to 4.30)	0.61 (0.40 to 0.94)
Any medical comorbidity	63.7	61.3	64.7	58.5	0.116	1.28 (0.93 to 1.76)	1.11 (0.90 to 1.37)	1.17 (0.78 to 1.76)
Number of chronic conditions								
None	36.3	38.7	35.3	41.5		Reference	Reference	Reference
1	23.6	24.4	24.9	28.3	0.039	1.28 (0.93 to 1.76)	1.03 (0.79 to 1.35)	1.00 (0.63 to 1.58)
2–4	31.2	31.5	33.8	25.5			1.06 (0.83 to 1.46)	1.47 (0.92 to 2.35)
≥5	8.9	5.4	6.1	4.7			1.74 (1.20 to 2.52)	0.88 (0.42 to 1.83)
Behavioural history								
Antisocial personality disorder	33.1	4.5	32.8	5.8	<0.001	1.43 (1.14 to 1.80)	10.46 (8.22 to 13.32)	0.75 (0.51 to 1.12)
Borderline personality disorder	36.8	8.8	35.7	8.0	<0.001	1.42 (1.32 to 1.78)	6.05 (4.84 to 7.56)	1.05 (0.68 to 1.63)
Religiosity	69.4	75.5	94.1	92.7	0.421	0.90 (0.52 to 1.57)	0.74 (0.59 to 0.91)	1.72 (0.94 to 3.16)
Parental history								
Alcoholic/problem drinker	46.3	21.4	37.5	17.1	<0.001	1.54 (1.22 to 1.95)	3.17 (2.51 to 4.00)	0.92 (0.61 to 1.37)
Drug user	18.3	4.1	23.4	6.5	<0.001	1.34 (1.08 to 1.66)	5.20 (3.94 to 6.86)	0.85 (0.49 to 1.47)
Incarceration	21.5	5.5	26.4	10.3	<0.001	1.38 (1.10 to 1.73)	4.74 (3.69 to 6.10)	1.38 (1.10 to 1.73)
Hospitalisation due to mental illness	11.8	4.6	8.9	4.8	0.006	1.44 (1.15 to 1.79)	2.77 (2.09 to 3.65)	0.70 (0.41 to 1.19)
Suicide attempts	8.8	2.3	4.1	1.8	0.011	1.46 (1.18 to 1.80)	4.06 (2.78 to 5.93)	0.57 (0.28 to 1.15)
Completed suicide	2.0	0.8	0.9	0.8	0.731	1.41 (1.15 to 1.73)	2.50 (1.12 to 5.59)	0.49 (0.12 to 2.00)
Traumatic events								
Any	79.8	52.8	66.5	45.0	<0.001	1.96 (1.36 to 2.84)	3.52 (2.79 to 4.43)	0.69 (0.44 to 1.08)
Witnessed	75.3	54.9	69.7	47.8	<0.001	1.46 (1.05 to 2.03)	2.50 (1.97 to 3.17)	1.01 (0.67 to 1.52)
Repeatedly exposed	21.6	14.6	19.3	11.9	0.007	1.38 (1.10 to 1.73)	1.61 (1.25 to 2.08)	1.10 (0.68 to 1.79)
Incarceration history								
Lifetime	56.9	16.3	62.4	22.3	>0.001	1.32 (1.00 to 1.74)	6.78 (5.51 to 8.34)	0.86 (0.62 to 1.18)
Before age 18 only	25.1	4.5	29.1	9.3	>0.001	1.34 (1.06 to 1.70)	7.15 (5.49 to 9.33)	0.85 (0.55 to 1.32)
Lifetime suicide attempt	17.6	2.9	13.7	2.5	>0.001	1.45 (1.16 to 1.83)	7.13 (5.18 to 9.81)	0.88 (0.42 to 1.86)

* Indicates that the interaction effect was not quantified due to limited sample sizes. Data were from National Epidemiologic Survey on Alcohol and Related Conditions-III.

and parental incarceration history (OR=1.38; 95% CI 1.10 to 1.73 for interaction term) had a greater impact on black adults.

Factors associated with being homeless

Factors that were independently associated with experiencing lifetime homelessness were similar among non-Hispanic black and white men in separate analyses (table 3). Among non-Hispanic black men, factors that are associated with an increased likelihood of lifetime homelessness included: being never married (adjusted OR (AOR)=1.81; 95% CI 1.05 to 3.09); being uninsured (AOR=1.77; 95% CI 1.28 to 2.45); having antisocial personality disorder (AOR=3.54; 95% CI 2.30 to 5.44) or borderline personality disorder (AOR=2.26; 95% CI 1.43 to 3.56); having lifetime incarceration history (AOR=2.95; 95% CI 2.12 to 4.11); and parental history of drug use problems (AOR=2.12; 95% CI 1.16 to 3.88). The only factor that was associated with a decreased likelihood of lifetime homelessness was income. For example, an income level of \geq US\$40 000 was associated with a lower likelihood of experiencing lifetime homeless (AOR=0.41; 95% CI 0.26 to 0.65). Similar patterns were found among non-Hispanic white men. For each variable, the OR for black adults fell within the 95% CIs for white adults, suggesting no difference in effects.

Decomposition of black–white gaps in the homelessness

Table 4 presents the main results of the Oaxaca-Blinder decomposition analyses for race-based inequalities in relation to a history of homelessness. The coefficient in each row represents the average contribution of each variable to explaining the gap in reported homelessness. In other words, the differences between the observed coefficient for experiencing lifetime homelessness in non-Hispanic black male group versus the counterfactual coefficient for the same outcome (ie, experiencing lifetime homelessness) of the non-Hispanic black male group had the same value of the non-Hispanic white male group.

For example, the negative coefficient of income \geq US\$40 000 and lifetime homelessness (coefficient= -0.013 ; 95% CI -0.019 to -0.007) reflects the fact that non-Hispanic black men were poorer than non-Hispanic white men, and this difference was significantly related to the greater risk of lifetime homelessness among black adults. In other words, if non-Hispanic black men were counterfactually assigned to the same income level as that of non-Hispanic white men, the race-based disparity in homelessness would have been smaller (ie, negative coefficient) than what we observed. In sum, larger, significant coefficients imply that more of the disparity between non-Hispanic black and white men in lifetime homelessness can be explained by the corresponding variables associated with lifetime homelessness. Overall, 81.6% of race-based inequalities in homelessness could be explained by the six variables: less income ($p<0.001$), incarceration history since age of 18 ($p<0.001$), any report of a traumatic event ($p=0.006$), and to a lesser extent by antisocial personality disorder ($p=0.023$), younger age ($p=0.034$) and parental drug use problems ($p=0.043$).

DISCUSSION

To our knowledge, this is the first study to empirically investigate the sources of race-based inequalities in the risk of lifetime homelessness among US male adults using a statistical method specifically developed for such a purpose—the Oaxaca-Blinder decomposition method. We found that race-based inequalities in lifetime homelessness were primarily associated with differences in income, incarceration history, exposure to traumatic events, and to a lesser extent by antisocial personality disorder, age and parental drug use.

From a historical perspective, it is well known and widely acknowledged that over the entire 400-year history of the USA from colonial times to the present, black adults have been systematically denied—often explicitly by the law itself—equal civil rights and myriad socio-economic opportunities.³¹ This long-standing racial discrimination has led to profound adverse effects in self-determination and dignity, but of more immediate

Table 3 Multivariable-adjusted factors associated with experiencing lifetime homeless among male adults by race/ethnicity using a backward stepwise approach

Parenthesis indicates a reference group	Experiencing homelessness among non-Hispanic white adults			Experiencing homelessness among non-Hispanic black adults		
	AOR	95% CI	P value	AOR	95% CI	P value
Age	1.00	0.99 to 1.01	0.803	1.02	1.00 to 1.03	0.014
Marital status (married)						
Never married	1.26	0.88 to 1.81	0.206	1.81	1.05 to 3.09	0.032
Other	1.58	1.25 to 1.99	<0.001	1.58	0.93 to 2.68	0.090
Income (<US\$20 000)						
\geq US\$20 000 and <US\$40 000	0.63	0.48 to 0.83	0.001	0.62	0.43 to 0.89	0.009
\geq US\$40 000	0.41	0.31 to 0.55	<0.001	0.41	0.26 to 0.65	<0.001
Uninsured (insured)	1.38	1.05 to 1.80	0.019	1.77	1.28 to 2.45	0.001
Antisocial personality disorder (no)	3.50	2.65 to 4.63	<0.001	3.54	2.30 to 5.44	<0.001
Borderline personality disorder (no)	1.60	1.17 to 2.18	0.003	2.26	1.43 to 3.56	0.001
Any drug use disorder (no)	1.58	1.09 to 2.29	0.016	1.35	0.81 to 2.24	0.246
Pain (never, a little or moderate)	1.81	1.35 to 2.44	<0.001	1.40	0.82 to 2.38	0.215
Any traumatic event (no)	1.96	1.51 to 2.54	<0.001	1.16	0.75 to 1.79	0.504
Lifetime incarceration history (no)	2.52	1.93 to 3.30	<0.001	2.95	2.12 to 4.11	<0.001
Lifetime suicide attempt (no)	2.03	1.41 to 2.93	<0.001	1.77	0.75 to 4.19	0.189
Parental history						
Alcohol problems (no)	1.41	1.06 to 1.87	0.019	1.32	0.88 to 2.00	0.180
Drug use problems (no)	1.60	1.09 to 2.34	0.016	2.12	1.16 to 3.88	0.015

Data were from National Epidemiologic Survey on Alcohol and Related Conditions-III. AOR, adjusted OR.

Table 4 Decomposition results of the 'explained gap' for black–white disparity in experiencing lifetime homelessness

	Coefficient	95% CI	P value
Socio-demographic factors			
Age	0.005	0.000 to 0.009	0.034
Married	−0.005	−0.010 to −0.000	0.050
Income ≥ US\$40 000	−0.013	−0.019 to −0.007	<0.001
Employed	0.001	−0.001 to 0.002	0.338
College-educated	0.002	−0.001 to 0.006	0.190
Veteran	−0.001	−0.002 to 0.001	0.505
Uninsured	−0.004	−0.009 to 0.001	0.109
Urban residence	0.002	−0.002 to 0.006	0.432
Psychiatric disorders			
Major depressive disorder	−0.000	−0.001 to 0.000	0.494
Dysthymia	0.001	−0.000 to 0.002	0.202
Generalised anxiety disorder	0.000	−0.000 to 0.001	0.555
Post-traumatic stress disorder	−0.000	−0.002 to 0.001	0.649
Panic disorder	−0.000	−0.000 to 0.000	0.691
Bipolar 1 disorder	−0.000	−0.000 to 0.000	0.951
Antisocial personality disorder	−0.006	−0.012 to −0.001	0.023
Borderline personality disorder	−0.000	−0.002 to 0.002	0.940
Substance use disorders			
Alcohol use disorder	−0.000	−0.000 to 0.000	0.719
Cannabis use disorder	−0.002	−0.005 to 0.001	0.237
Opioid use disorder	0.000	−0.001 to 0.001	0.804
Cocaine use disorder	−0.001	−0.003 to 0.001	0.156
Stimulant use disorder	0.001	−0.001 to 0.002	0.520
Sedative use disorder	−0.000	−0.001 to 0.000	0.224
Heroin use disorder	0.000	−0.000 to 0.001	0.562
Hallucinogen use disorder	0.000	−0.000 to 0.001	0.300
Club drug use disorder	0.000	−0.001 to 0.001	0.684
Solvent/inhalant use disorder	−0.000	−0.000 to 0.000	0.964
Behavioural history			
Pain	−0.001	−0.003, to 0.001	0.267
Incarceration history since age of 18	−0.010	−0.015 to −0.006	<0.001
Religiosity	0.002	−0.003 to 0.006	0.410
≥2 Medical chronic conditions	−0.001	−0.003 to 0.001	0.425
Parental history			
Alcoholic/problem drinker	0.001	−0.000 to 0.003	0.083
Drug user	−0.003	−0.005 to −0.000	0.043
Incarceration	−0.003	−0.008 to 0.001	0.132
Hospitalisation due to mental illness	−0.000	−0.000 to 0.000	0.804
Suicide attempts	0.000	−0.001 to 0.001	0.590
Suicide completed	−0.000	−0.000 to 0.000	0.750
Any traumatic event	0.003	0.001 to 0.004	0.006
Lifetime suicide attempt	0.001	−0.001 to 0.003	0.524
Total explained gap	−0.033	−0.071 to −0.065	<0.001
Total unexplained gap	0.007	−0.022 to 0.037	0.619
Total predicted gap	−0.025	−0.053 to 0.002	0.073
Explained %	81.6		
Unexplained %	18.4		

Data were from National Epidemiologic Survey on Alcohol and Related Conditions-III. In this final single model, all factors were controlled for simultaneously.

relevance to this study, in the denial of education, employment and housing opportunities leading to lost income and wealth, as well as mistreatment by the criminal justice system, although through different mechanisms in different eras.³¹ It is thus not

surprising that income and incarceration history are the most prominent factors associated with race-based disparities in the lifetime homelessness.

The median household incomes among black adults were just over half (63.7%) of those of white adults in 2017,³² while unemployment among black men (6.1%) was double that of white adults (2.9%) in 2018,³³ as was the rate of poverty. Mass incarceration of black adults accelerated during the 1980s brought about by harsh new drug laws,³⁴ and other policies together identified as representing the 'New Jim Crow'.³⁵ These policies not only increased incarceration in black adults (in the absence of any increase in crime³⁴) but in doing so sharply reduced access to jobs and public housing as well as other forms of public assistance that are denied to those with criminal records. These policies thus generated a strong association of past incarceration with homelessness for all racial groups. This study showed this association to be particularly significant in rendering black adults vulnerable to homelessness.¹¹

Although the prevalence rates of mental and substance-related illnesses and their associations with homelessness were similar among non-Hispanic black and white men, antisocial personality disorder was identified in our analysis as a weak but significant factor in race-based homelessness disparities. This should not be understood as reflecting any intrinsic association of character disorder and race, which has been described in a recent literature review as weak at best³⁶ but rather reflects well-described racial differences in social environments during childhood and adolescence, fostering different developmental experiences among black and white Americans.³⁷ As meticulously demonstrated by Massey and Denton,³⁸ residential segregation and concentrated poverty have increased during the post-civil rights era creating settings in which the behaviours that define antisocial personality are more likely to reflect the social environment rather than individual psychopathology.³⁹ The observed association of black homelessness with exposure to traumatic experiences and reported parental drug use (but notably not their own drug use) further emphasises the environmental rather than psychopathological differences in the adverse experiences of black youth.^{2,3} Abundant data thus show black adults have higher rates of experiencing adverse events in the course of development than white adults.⁴⁰

While our results are not surprising, given well-known history of race relations in America, these are the first empirical data addressing the differential risk of lifetime homelessness between black and white Americans and have several implications. First, contrary to the intensively studied associations between psychiatric or SUDs and homelessness, and the view that its advent reflected closure of state psychiatric hospitals in the 1950s and 1960s, we find little evidence that such factors play a role in the differential risk of homelessness between black and white adults. Previous studies of racial differences in rates of homelessness focused on, in part, higher levels drug abuse among black men as compared to white men.^{8–10} Such differences did not emerge in this study and do not explain the disparities in the lifetime homelessness. Rather, racial disparities of homelessness can be best understood as reflecting socio-structural rather than individual factors.

Second, the most effective interventions for individuals experiencing homelessness have been focused on affordable housing options, including the combination of housing subsidies with mental health treatment,⁴¹ or efforts related to enhancing access to education and employment.⁴² Income supports for people with disabilities seem to be effective in preventing homelessness,⁴³ and it is noteworthy that all of these interventions focus on socio-structural barriers rather than psychopathology. Future intervention studies, at the individual and public policy levels, should

address these factors, as they make black men more vulnerable to homelessness than white men, but in fact, address factors leading to homelessness among black and white adults alike.

Several limitations of the present study warrant mention. First, we used lifetime homelessness as the definition of homelessness, and we were unable to consider duration (eg, transient or chronic) or numbers of episodes of past homelessness.⁴⁴ Duration and episodes of experiencing homelessness should be considered in the future research as race-based disparities may vary by these factors. Second, the survey participants were non-institutionalised (ie, housed) adults at the time of the survey, and therefore, our findings not be generalisable to adults who are currently homeless. Further, with a response rate of 60%, the survey may not have included people with more severe cognitive disabilities. Third, we relied on cross-sectional data, and thus, causal conclusions are not possible. Fourth, there may be potential psycho-social or other confounders (eg, social or interpersonal engagement, experiences of housing discrimination, availability of community resources, and stress management or coping skills), for which measures were not available in our data. Future studies would benefit from addressing these limitations. Finally, we acknowledge that data are from 2012 to 2013, which is nearly a decade ago. However, we believe that disparities found in our study are likely to be persistent to date as non-Hispanic black adults continue to be over-represented among homeless adults in the USA. Analyses of more recent data may be informative, although no such data are available to our knowledge.

Our study has several notable strengths including the use of data from a large nationally representative sample, which collected extensive data on psychiatric and SUD diagnoses that were based upon DSM-5 diagnostic criteria, along with several measures of other important factors. Overall, the present results highlight the fact that race-based disparities in homelessness are largely due to socio-structural factors, rather than differences in the prevalence of psychiatric or SUDs.

What is already known on this subject

- ▶ Non-Hispanic black adults experience homelessness at higher rates than non-Hispanic white adults in many studies. Moreover, while black adults make up approximately 13% of the US population, they make up as many as 40% of homeless adults. To date, however, no national survey data have analysed identifying socio-demographic, clinical or behavioural characteristics that are stronger risk or protective factors for experiencing lifetime homelessness that can potentially account for differences in the risk of homelessness between black and white adults. Authors aim to identify potential factors that could account for this disparity.

What this study adds

- ▶ Black adults were 1.41 times more likely to have been homeless than white adults. Furthermore, 81.6% of race-based inequality in past homelessness was explained by three main factors with black adults having: lower incomes, greater incarceration histories since age of 18 and a greater risk of traumatic events. Our findings highlight the fact that black–white disparities in lifetime homeless risk are associated with socio-structural factors (eg, income and incarceration) and individual adverse events (eg, traumatic events), and not associated with psychiatric or substance use disorders.

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REFERENCES

- 1 The Council of Economic Advisers. The state of homelessness in America. 2019. Available <https://www.whitehouse.gov/wp-content/uploads/2019/09/The-State-of-Homelessness-in-America.pdf> (accessed 5 Feb 2020)
- 2 Rossi PH. The old homeless and the new homelessness in historical perspective. *Am Psychol* 1990;45:954–9.
- 3 Aldridge RW, Story A, Hwang SW, et al. Morbidity and mortality in homeless individuals, prisoners, sex workers, and individuals with substance use disorders in high-income countries: a systematic review and meta-analysis. *Lancet* 2018;391:241–50.
- 4 National Alliance to End Homelessness. Racial disparities in homelessness in the United States. 2018. Available <https://endhomelessness.org/resource/racial-disparities-homelessness-united-states/> (accessed Feb 5 2020)
- 5 Fusaro VA, Levy HG, Shaefer HL. Racial and ethnic disparities in the lifetime prevalence of homelessness in the United States. *Demography* 2018;55:2119–28.
- 6 US Department of Housing and Urban Development. HUD 2019 continuum of care homeless assistance programs homeless populations and subpopulations. 2019. Available https://files.hudexchange.info/reports/published/CoC_PopSub_NatTerrDC_2019.pdf (accessed February 16, 2020)
- 7 Jones MM. Does race matter in addressing homelessness? A review of the literature. *World Med Health Policy* 2016;8:139–56.
- 8 North CS, Smith EM. Comparison of white and nonwhite homeless men and women. *Soc Work* 1994;39:639–47.
- 9 Leda C, Rosenheck R. Race in the treatment of homeless mentally ill veterans. *J Nerv Ment Dis* 1995;183:529–37.
- 10 Rosenheck R, Leda C, Frisman L, et al. Homeless mentally ill veterans: race, service use, and treatment outcomes. *Am J Orthopsychiatry* 1997;67:632–8.
- 11 Greenberg GA, Rosenheck RA. Correlates of past homelessness in the National Epidemiological Survey on Alcohol and Related Conditions. *Adm Policy Ment Health* 2010;37:357–66.
- 12 Tsai J. Lifetime and 1-year prevalence of homelessness in the US population: results from the National Epidemiologic Survey on Alcohol and Related Conditions-III. *J Public Health (Oxf)* 2018;40:65–74.
- 13 Sen M, Wasow O. Race as a bundle of sticks: designs that estimate effects of seemingly immutable characteristics. *Annu Rev Polit Sci* 2016;19:499–522.
- 14 Conroy S, Heer D. Hidden hispanic homelessness in los angeles: the “latino paradox” revisited. *Hisp J Behav Sci* 2003;25:530–8.
- 15 National Institute on Alcohol Abuse and Alcoholism. National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III). 2017. Available <https://www.niaaa.nih.gov/research/nesarc-iii>
- 16 National Institute on Alcohol Abuse and Alcoholism. National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III): source and accuracy statement. 2018. Available https://www.niaaa.nih.gov/sites/default/files/NESARC_Final_Report_FINAL_1_8_15.pdf
- 17 Rhee TG, Barry LC, Kuchel GA, et al. Associations of adverse childhood experiences with past-year DSM-5 psychiatric and substance use disorders in older adults. *J Am Geriatr Soc* 2019;67:2085–93.
- 18 Rhee TG, Rosenheck RA. Comparison of opioid use disorder among male veterans and non-veterans: disorder rates, socio-demographics, co-morbidities, and quality of life. *Am J Addict* 2019;28:92–100.
- 19 Rhee TG, Rosenheck RA. Association of current and past opioid use disorders with health-related quality of life and employment among US adults. *Drug Alcohol Depend* 2019;199:122–8.
- 20 Rhee TG, Rosenheck RA. Use of drug treatment services among adults with opioid use disorder: rates, patterns, and correlates. *Psychiatr Serv* 2019.

- 21 Grant BF, Goldstein RB, Smith SM, *et al.* The alcohol use disorder and associated disabilities interview schedule-5 (AUDADIS-5): reliability of substance use and psychiatric disorder modules in a general population sample. *Drug Alcohol Depend* 2015;148:27–33.
- 22 Hwang SW, Wilkins E, Chambers C, *et al.* Chronic pain among homeless persons: characteristics, treatment, and barriers to management. *BMC Fam Pract* 2011;12:73.
- 23 Rhee TG, Barry LC, Kuchel GA, *et al.* Associations of adverse childhood experiences with past-year DSM-5 psychiatric and substance use disorders in older adults. *J Am Geriatr Soc* 2019;67:2085–93.
- 24 Nilsson SF, Laursen TM, Hjorthoj C, *et al.*, Risk of psychiatric disorders in offspring of parents with a history of homelessness during childhood and adolescence in Denmark: a nationwide, register-based, cohort study. *Lancet Public Health* 2017; 2: e541–e550.
- 25 Tsai J, Rosenheck RA. Religiosity among adults who are chronically homeless: association with clinical and psychosocial outcomes. *Psychiatr Serv* 2011;62:1222–4.
- 26 Oaxaca R. Male-female wage differentials in urban labor markets. *Int Econ Rev (Philadelphia)* 1973;14:693–709.
- 27 Blinder AS. Wage discrimination: reduced form and structural estimates. *J Hum Resour* 1973;8:436–55.
- 28 Kirby JB, Taliaferro G, Zuvekas SH. Explaining racial and ethnic disparities in health care. *Med Care* 2006;44:164–72.
- 29 O'donnell O, Van Doorslaer E, Wagstaff A, *et al.* *Analyzing health equity using household survey data: a guide to techniques and their implementation*. The World Bank, 2007.
- 30 Fairlie RW. An extension of the Blinder-Oaxaca decomposition technique to logit and probit models. *J Econ Soc Meas* 2005;30:305–16.
- 31 National Alliance to End Homelessness. Racial inequality. 2020. Available <https://endhomelessness.org/homelessness-in-america/what-causes-homelessness/inequality/> (accessed 5 Feb 2020)
- 32 U.S. Census Bureau. American community survey briefs: household income in 2017. 2018. Available <https://www.census.gov/content/dam/Census/library/publications/2018/acs/acsbr17-01.pdf> (accessed 3 Mar 2020)
- 33 US Bureau of Labor Statistics. Unemployment rates by age, sex, race, and hispanic or latino ethnicity. 2020. Available https://www.bls.gov/web/empsit/cpsee_e16.htm (accessed 4 Mar 2020)
- 34 Western B. *Punishment and inequality in America*. Russell Sage Foundation, 2006.
- 35 Alexander M. *The new Jim Crow: mass incarceration in the age of colorblindness*. The New Press, 2010.
- 36 DeLisi M. Race and (antisocial) personality. *J Crim Justice* 2018;59:32–7.
- 37 Kotlowitz A. *There are no children here: the story of two boys growing up in the other America*. Anchor, 1992.
- 38 Massey DS, Denton NA. *American apartheid: segregation and the making of the underclass*. Harvard University Press, 1993.
- 39 Hawkins DF, McKean JB, White NA, *et al.* *Roots of African American violence: ethnocentrism, cultural diversity, and racism*. Lynne Rienner Publishers, Incorporated, 2017.
- 40 Maguire-Jack K, Lanier P, Lombardi B. Investigating racial differences in clusters of adverse childhood experiences. *Am J Orthopsychiatry* 2020;90:106–14.
- 41 Hwang SW, Tolomiczenko G, Kouyoumdjian FG, *et al.* Interventions to improve the health of the homeless: a systematic review. *Am J Prev Med* 2005;29:311–9.
- 42 de Vet R, van Luitelaar MJ, Brilleslijper-Kater SN, *et al.* Effectiveness of case management for homeless persons: a systematic review. *Am J Public Health* 2013;103:e13–26.
- 43 Edens EL, Kasproff W, Tsai J, *et al.* Association of substance use and VA service-connected disability benefits with risk of homelessness among veterans. *Am J Addict* 2011;20:412–9.
- 44 Kuhn R, Culhane DP. Applying cluster analysis to test a typology of homelessness by pattern of shelter utilization: results from the analysis of administrative data. *Am J Community Psychol* 1998;26:207–32.