

The Association between State-Level Structural Racism and Alcohol and Tobacco Use Behaviors among a National Probability Sample of Black Americans

Nathaniel Woodard¹, James Butler², Debarchana Ghosh³, Kerry M. Green², and Cheryl L. Knott²



ABSTRACT

Background: Structural racism is how society maintains and promotes racial hierarchy and discrimination through established and interconnected systems. Structural racism is theorized to promote alcohol and tobacco use, which are risk factors for adverse health and cancer-health outcomes. The current study assesses the association between measures of state-level structural racism and alcohol and tobacco use among a national sample of 1,946 Black Americans.

Methods: An existing composite index of state-level structural racism including five dimensions (subscales; i.e., residential segregation and employment, economic, incarceration, and educational inequities) was merged with individual-level data from a national sample dataset. Hierarchical linear and logistic regression models, accounting for participant clustering at the state level, assessed associations between structural racism and frequency of alcohol use, frequency of binge drinking, smoking status, and smoking

frequency. Two models were estimated for each behavioral outcome, one using the composite structural racism index and one modeling dimensions of structural racism in lieu of the composite measure, each controlling for individual-level covariates.

Results: Results indicated positive associations between the incarceration dimension of the structural racism index and binge drinking frequency, smoking status, and smoking frequency. An inverse association was detected between the education dimension and smoking status.

Conclusions: Results suggest that state-level structural racism expressed in incarceration disparities, is positively associated with alcohol and tobacco use among Black Americans.

Impact: Addressing structural racism, particularly in incarceration practices, through multilevel policy and intervention may help to reduce population-wide alcohol and tobacco use behaviors and improve the health outcomes of Black populations.

Introduction

Cancer is the second most common cause of death in the United States (1). However, the burden of cancer is not equally shared among all people. Black individuals in the United States continue to have worse cancer survival rates when compared with their White counterparts (2). Structural racism is increasingly recognized as a contributor to these persistent disparities as emerging research continues to demonstrate links between structural racism and cancer incidence, treatment, and mortality (3–11). Structural racism is how society maintains and promotes racial hierarchy and discrimination through established and interconnected systems (12). Theory and evidence suggest that structural racism contributes to racial inequalities in life opportunities and exposures, generating health inequities in turn (13–25). Theory explaining the association between structural racism and health can be summarized in the pathways by which structural racism influences health, including adverse exposures (e.g., adverse physical, social, and economic

exposures), stereotype threats (i.e., anxiety associated with a fear of corroborating negative stereotypes about one's racial group), and the promotion of maladaptive coping behaviors (e.g., smoking and alcohol consumption; ref. 26).

Meta-analyses have identified alcohol consumption as a risk factor for various cancers, such as breast (27–29), colorectal, liver, oral, and stomach cancers (27, 28). Similarly, tobacco use has been identified as a risk factor for cancers such as breast (30), colorectal (31), oral, and lung (32). As such, reducing alcohol and tobacco consumption among minoritized populations is one method to reduce their risk of these cancers. One way to aid in the reduction of alcohol and tobacco use behaviors among Black populations in the United States may be to address issues of structural racism within the country. Theory posits that structural racism is a determinant of alcohol and tobacco use among minoritized populations (26). In addition, prior research has demonstrated associations between structural racism and the presence of alcohol and tobacco retailers, with higher concentrations of alcohol and tobacco retailers in more highly segregated communities with higher concentrations of low-income racial and ethnic minorities (33–36). The increased availability of alcohol and tobacco in these communities promotes increased usage of these products by residents. While existing theory and research suggest an association between structural racism and alcohol and tobacco use behaviors could exist among Black individuals, further empirical research investigating these associations is warranted.

The current study assessed the relationship between structural racism and alcohol consumption and tobacco use behaviors among a national probability sample of Black Americans. On the basis of existing research and theory regarding structural racism and health, we hypothesized that measures of structural racism would be positively associated with alcohol and tobacco use behaviors among study

¹Cancer Care Quality Training Program, Lineberger Comprehensive Cancer Center, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina.

²Department of Behavioral and Community Health, School of Public Health, University of Maryland, College Park, Maryland. ³Department of Geography, University of Connecticut, Storrs, Connecticut.

Corresponding Author: Nathaniel Woodard, University of North Carolina at Chapel Hill Lineberger Comprehensive Cancer Center, Cancer Care Quality Training Program, 101 E Weaver St. 2nd Floor, Suite 200, Carrboro, NC 27510. E-mail: woodardn@unc.edu

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participants. This work has implications for future health policy and interventions intended to reduce alcohol and tobacco use among Black populations and mitigate their risk for cancer.

Materials and Methods

Sampling procedures

This study analyzed self-report data collected from a national probability sample of participants in the Religion and Health in African Americans (RHIAA) Study (37–39). Eligible participants were Black Americans living in the United States, who spoke English, and who were age 21 or older at the time of data collection. A professional sampling firm generated a call list of randomly selected households from a national representation of US census tracts in the 50 U.S. states in 2010 (40). Home phone numbers for these households were obtained from publicly available data (e.g., motor vehicle records). Households from the list were called at random and an available adult from the household was solicited to respond. The response rate was 22% (40). Data reflecting a multidimensional structural racism index at the state level (41) were merged into the RHIAA dataset based on participants' state of residence.

Measures

State-level structural racism index

State-level structural racism was assessed with an established composite index, composed of five dimensions, encompassing nine state-level indicators (41). State-level indicators were derived from 2010 U.S. Census data (available from: <http://www.census.gov/programs-surveys/acs/>). With the exception of residential segregation measures, each indicator was measured using each state's ratio of Black to White resident values. These ratios were rescaled from 0 to 100 assigning the maximum ratio a score of 100, the minimum ratio a score of 0, and each value in between a corresponding score between 0 and 100, as per prior research (41). The score within each dimension of structural racism is calculated as the average of the scores for each indicator within that dimension. Structural racism dimensions include: (i) residential segregation; and (ii) gap in incarceration rates; (iii) gap in educational attainment; (iv) gap in economic indicators; and (v) gap in employment status (41). The overall structural racism index score was calculated by averaging scores from the five dimensions of the index. This index was developed by adapting previous state-level measures of structural racism (ref. 42; available from: <https://wallethub.com/edu/states-with-the-most-andleast-%20racial-progress/18428/#rankings-integration>.) to include measures of residential segregation, in consideration of the conceptual validity of the previous measures, and considering the availability of state-level data (41). The five dimensions of the structural racism index and the state-level indicators constituting them are further described below and in Supplementary Table S1.

Residential segregation

Residential segregation (the segregation dimension of structural racism) is measured using two indicators, the average of the index of dissimilarity (41, 43, 44), and the isolation index (41, 43). The index of dissimilarity measures the percentage of Black people who would have to move to achieve an equal distribution of Black and White residents across all blocks within a state (41). Possible values on this measure range from 0 to 100, with higher values indicating greater spatial segregation by race. The isolation index measures the spatial isolation of one group from another. In the context of Black populations, the isolation index measures the extent to which Black residents are

exposed to other Black residents (41). Possible values on this measure range from 0 to 100, with higher values indicating greater spatial isolation among Black residents.

Employment disparity index

The employment disparity index is the average of two indicators, nonlabor force participation and unemployment (41). Possible values on this measure range from 0 to 100, with higher values indicating greater disparities in employment between Black residents and White residents. Nonlabor force participation is the ratio of the proportion of Black residents not participating in the labor force as compared with the proportion of White residents not participating in the labor force. Unemployment is characterized as the ratio of the proportion of unemployed Black individuals compared with the proportion of unemployed White individuals for each state.

Economic disparity index

The economic disparity index is the average of three indicators, the poverty status gap ratio, the median annual household income gap, and the rental housing percent gap (41). Possible values range from 0 to 100, with higher values indicating greater economic disparities between Black and White residents. The poverty status gap ratio is characterized by the Black–White gap in the proportion of people living under the poverty level. The median annual household income gap represents the Black–White gap in median household income, as defined by White income divided by Black income. Finally, the rental housing percent gap represents the Black–White gap in the proportion of the population that rents housing as opposed to owning their home.

Incarceration rate gap

The incarceration rate gap represents the ratio of the incarceration rates among Black residents as compared with those among White residents in a state rescaled to a range of 0 to 100 (41). Higher values indicate greater rates of incarceration among Black residents as compared with White residents. The incarceration rate gap is calculated using 2010 U.S. Census (available from: <http://www.census.gov/programs-surveys/acs/>) and U.S. Bureau of Justice Statistics data (doi: 10.3886/ICPSR34329.v2.).

Educational attainment gap

The educational attainment gap is characterized by the ratio of the proportion of Black residents with no college degree as compared with the proportion of White residents with no college degree within a state. These values were then rescaled to a range of 0 to 100, as described above (41). Higher values indicate greater gaps in educational attainment between Black and White residents.

Alcohol and tobacco use behaviors

Established items based on the Behavioral Risk Factor Surveillance System were used to assess alcohol use (45). Alcohol use data were first collected as dichotomous use in the last 30 days (have used and have not used). Participants that had consumed alcohol then responded to items assessing the frequency of consumption (“During the past 30 days, how many days per month did you have at least one drink of any alcoholic beverage?”) and frequency of binge drinking (“Considering all types of alcoholic beverages, how many times during the past 30 days did you have X [X = 4 drinks for women; 5 drinks for men] or more drinks on an occasion?”). Tobacco smoking behaviors were assessed dichotomously (“Have you smoked at least 100 cigarettes in your entire life?”) with a subsequent item for participants that reported a history of smoking to assess how often they smoked at the time

of their response (“Do you now smoke cigarettes every day, some days, or not at all?”). Two new variables were constructed from these two smoking items to reflect whether the participant currently smoked (current smoking status; yes or no) and a four-category smoking frequency variable (never smoked, former smoker, currently smoke some days, and currently smoke every day).

Demographics

A standard demographic module assessed participant characteristics including gender, age, relationship status, educational attainment, work status, and household income before taxes. Data reflecting engagement in religious behavior (e.g., church attendance, reading religious texts) were also collected using an established five-item measure of religious behavior with possible scores from 5 to 21 (45, 46). Higher scores on the measure indicate more engagement in religious behaviors. This measure has previously demonstrated acceptable internal reliability in the current sample ($\alpha = 0.73$; ref. 45).

Data analysis

Of the 2,370 participants in the RHIAA project, 1,946 who responded to items about alcohol and tobacco use behaviors and provided residential information were included in the current study assessing the association between state-level structural racism and alcohol and tobacco use behaviors. All analyses were performed using SPSS Version 28 with a statistical significance threshold of $P < 0.05$. Descriptive statistics were calculated to summarize the demographic composition of the sample and distributions of study measures. Pearson’s bivariate correlations were performed between study variables to form an initial understanding of how these variables relate to one another in the current dataset.

Multilevel modeling

Analyses accounting for state-level participant clustering were performed via multilevel linear (for drinking days per month and binge drinking events per month), binomial (for smoking status), and multinomial (for the four-category smoking frequency) regression analyses, controlling for participant age, education, income, gender, employment status, and religious behaviors due to their potential influence on alcohol and tobacco use behaviors as suggested in prior research (45). Modeling was conducted using restricted maximum likelihood (REML) with random intercepts. Low intraclass correlation coefficients ($ICC < 0.10$) suggest the influence of clustering by state may be low in the current analysis. Two models were estimated for each of the four outcomes, one using the structural racism index composite measure as the independent variable, and another including four of the five dimensions of the structural racism index (segregation, economic, incarceration, and education; the employment dimension was removed from this model due to multicollinearity concerns between the employment and other dimensions of the index) as the independent variables.

Data availability

The data generated in this study are available upon request from the corresponding author.

Results

All participants self-identified as Black. The mean age was 53.08 years ($SD = 14.48$) and 61.6% of participants were women (Table 1). Just over half (50.7%) of the participants had a gross

Table 1. Participant demographics and behavioral outcomes ($n = 1,946$).

Age	Mean	SD
	53.08	14.48
Gender	Frequency	Percentage
Man	747	38.4
Woman	1199	61.6
Household income	Frequency	Percentage
Less than \$5,000	164	8.4
\$5,001–\$10,000	244	12.5
\$10,001–\$20,000	296	15.2
\$20,001–\$30,000	257	13.2
\$30,001–\$40,000	229	11.8
\$40,001–50,000	184	9.5
\$50,001–\$60,000	162	8.3
More than \$60,000	410	21.1
Education	Frequency	Percentage
Grades 1 through 8 (Elementary)	43	2.2
Grades 9 through 11 (Some high school)	175	9.0
Grade 12 or GED (High school graduate)	629	32.3
College 1 year to 3 years (Some college or technical school)	591	30.4
College 4 years or more (College graduate)	508	26.1
Employment	Frequency	Percentage
Receiving disability	215	11.0
Retired	477	24.5
Not currently employed	233	12.0
Part-time employed	233	12.0
Full-time employed	788	40.5
Religious behaviors (scale ranges from 5 to 21)	Mean	SD
	15.87	3.54
Drinking days per month	Mean	SD
	3.01	5.98
Binge drinking events per month	Mean	SD
	0.59	2.58
Current smoking status	Frequency	Percentage
Not a current smoker	1499	77.2
Yes, a current smoker	443	22.8
Smoking frequency	Frequency	Percentage
Never smoked	1093	56.3
Former smoker	406	20.9
Currently smoke some days	135	7.0
Currently smoke every day	308	15.9

Eligible participants self-identified as Black.

household income of over \$30,000 and 56.5% had attended a college or technical school. A sizable portion of the sample was retired (24.5%) and 40.5% of participants were working full-time. The mean number of reported drinking days per month was 3.01 ($SD = 5.98$) and the mean number of binge drinking events per month was 0.59 ($SD = 2.58$). Over half (56.3%) of the sample had never smoked cigarettes, 20.9% were former smokers who had quit, and the remaining 22.8% were current smokers. Sample representation by state is presented in Table 2. State racism index and dimension scores are presented in Supplementary Table S2.

Bivariate correlations between the structural racism index and its dimensions were all significant with magnitudes of association ranging from -0.06 to 0.90 (Supplementary Table S3). In addition, each measure of structural racism demonstrated statistically significant positive correlations with at least one alcohol or tobacco use outcome, with the exception of the segregation index. Each of the alcohol and tobacco use measures were also positively associated with one another.

Table 2. Sample representation by state ($n = 1,946$).

State (2-letter code)	Frequency	Percentage
Alabama (AL)	108	5.5
Arizona (AZ)	6	0.3
Arkansas (AR)	19	1.0
California (CA)	44	2.3
Colorado (CO)	2	0.1
Connecticut (CT)	15	0.8
Delaware (DE)	8	0.4
Florida (FL)	63	3.2
Georgia (GA)	169	8.7
Illinois (IL)	131	6.7
Indiana (IN)	14	0.7
Kansas (KS)	4	0.2
Kentucky (KY)	18	0.9
Louisiana (LA)	132	6.8
Maryland (MD)	147	7.6
Massachusetts (MA)	17	0.9
Michigan (MI)	128	6.6
Minnesota (MN)	3	0.2
Mississippi (MS)	63	3.2
Missouri (MO)	51	2.6
Nebraska (NE)	2	0.1
Nevada (NV)	5	0.3
New Hampshire (NH)	1	0.1
New Jersey (NJ)	52	2.7
New York (NY)	152	7.8
North Carolina (NC)	87	4.5
Ohio (OH)	90	4.6
Oklahoma (OK)	18	0.9
Oregon (OR)	2	0.1
Pennsylvania (PA)	124	6.4
South Carolina (SC)	53	2.7
Tennessee (TN)	39	2.1
Texas (TX)	74	3.9
Utah (UT)	1	0.15
Vermont (VT)	1	0.1
Virginia (VA)	69	3.5
Washington (WA)	1	0.1
Wisconsin (WI)	33	1.7

States not represented in the current sample include Alaska (AK), Hawaii (HI), Idaho (ID), Iowa (IA), Maine (ME), Montana (MT), New Mexico (NM), North Dakota (ND), Rhode Island (RI), South Dakota (SD), West Virginia (WV), and Wyoming (WY).

Multilevel Modeling

Drinking days per month

Neither multilevel linear model estimating the number of participant drinking days per month demonstrated any significant associations between structural racism measures and drinking days per month ($P > 0.05$; **Table 3**). The lack of significant findings in these multilevel models mirror those in the bivariate analyses. These results suggest that no significant relationship exists between state-level structural racism assessed via the composite measure or the four dimensions (segregation, economic, incarceration, and education) and drinking days per month in the current sample.

Binge drinking events per month

The multilevel linear model using the state-level structural racism composite measure to estimate the number of binge drinking events per month demonstrated no statistically significant association between the two variables ($P = 0.13$; **Table 4**). However, the second model of binge drinking events demonstrated statistical significance for the incarceration dimension of structural racism ($P < 0.05$) and did not demonstrate significance for any of the remaining structural racism dimensions. These results indicate that for every 10-point increase in the incarceration dimension score, the expected number of binge drinking events per month increases by 0.10 occasions, controlling for the other dimensions of structural racism and the individual-level covariates. This suggests an estimated difference of 0.78 more binge drinking events per month or 9.34 more binge drinking events per year between participants in the states with the highest and lowest scores on the incarceration dimension of the structural racism index (incarceration dimension scores ranged from 0.08 to 77.92 among states in the current analysis).

Current smoking status

Binomial logistic modeling using the state-level structural racism composite measure to estimate participant smoking status did not demonstrate a significant association between these variables ($P = 0.23$; **Table 5**). The incarceration and education dimensions both demonstrated statistical significance in the second model including the dimension-level measures of structural racism. The results for this model suggest that every 10-point increase in the incarceration dimension multiplies the odds of being a current smoker as compared with being a nonsmoker by 1.10, ($P = 0.04$), and every 10-point increase in the education dimension multiplies the odds of being a

Table 3. Hierarchical linear regressions for the structural racism index and dimensions predicting number of drinking days per month ($N = 1,920$).

Model A:	Estimate	SE	95% confidence interval		P value
			Lower bound	Upper bound	
Structural racism index	0.00	0.02	-0.04	0.05	0.86
Model B:					
Segregation dimension	0.04	0.03	-0.02	0.10	0.20
Economic dimension	-0.01	0.02	-0.06	0.04	0.70
Incarceration dimension	-0.00	0.01	-0.03	0.03	0.79
Education dimension	-0.00	0.01	-0.03	0.03	0.85

Model A uses the state-level structural racism composite index as the primary independent variable.

Model B uses four dimensions of the state-level composite index (segregation, economic, incarceration, and education) as the primary independent variables. Both models control for participant age, gender, income, education, employment, and religious behavior.

Table 4. Hierarchical linear regressions for the structural racism index and dimensions predicting number of binge drinking events per month ($N = 1,909$).

Model A:	Estimate	SE	95% confidence interval		P value
			Lower bound	Upper bound	
Structural racism index	0.01	0.01	-0.00	0.03	0.13
Model B:					
Segregation dimension	0.00	0.01	-0.02	0.03	0.66
Economic dimension	-0.01	0.01	-0.02	0.01	0.54
Incarceration dimension	0.01*	0.01	0.00	0.02	0.03
Education dimension	-0.01	0.01	-0.02	0.00	0.13

Model A uses the state-level structural racism composite index as the primary independent variable.

Model B uses four dimensions of the state-level composite index (segregation, economic, incarceration, and education) as the primary independent variables.

Both models control for participant age, gender, income, education, employment, and religious behavior.

*Estimate is significant at the 0.05 level.

current smoker by 0.90 ($P = 0.02$). This is an estimated 2.17 times the odds of being a current smoker for participants in the state with the highest levels of structural racism in incarceration as compared with states with the lowest levels (incarceration dimension scores ranged from 0.08 to 77.92 among states represented in the current analysis) and an estimated 0.37 times the odds of being a current smoker for participants in the state with the highest levels of structural racism in education as compared with states with the lowest levels (education dimension scores ranged from 0 to 100 among states in the current analysis).

Smoking frequency categorization

Multinomial logistic regression modeling did not demonstrate a statistically significant association between the composite structural racism index and smoking frequency categorization (Table 6). The incarceration dimension was the only dimension of the four to demonstrate statistical significance in the second model. This model demonstrated statistically significant associations when comparing never-smokers with former smokers ($P = 0.04$) and everyday smokers ($P = 0.02$). Results suggest that for every 10-point increase in structural racism in incarceration, the odds of being a former smoker are multiplied by 1.10, as are the odds of being an everyday smoker. This equates to 2.17 times the odds of being a former smoker and 2.17 times the odds of being an everyday smoker for participants in the state with the highest levels of structural racism in incarceration as compared with states with the lowest levels (scores on the incarceration dimension of structural racism ranged from 0.08 to 77.92 among states represented in the current analysis).

Table 5. Hierarchical binary logistic regressions for the structural racism index and dimensions predicting current smoking status ($N = 1,942$).

Model A:	Odds Ratio (OR)	95% confidence interval		P value
		Lower bound	Upper bound	
Structural racism index	1.01	0.99	1.03	0.23
Model B:				
Segregation dimension	1.00	0.98	1.02	0.94
Economic dimension	1.00	0.98	1.02	0.84
Incarceration dimension	1.01*	1.00	1.02	0.04
Education dimension	0.99*	0.98	1.00	0.02

Model A uses the state-level structural racism composite index as the primary independent variable.

Model B uses four dimensions of the state-level composite index (segregation, economic, incarceration, and education) as the primary independent variables.

Both models control for participant age, gender, income, education, employment, and religious behavior.

*OR is significant at the 0.05 level.

Discussion

The current study tested associations between state-level measures of structural racism and alcohol and tobacco use behaviors among Black Americans. Bivariate analyses generally suggest that as state-level structural racism increases, so too do alcohol and tobacco use among Black individuals. Multilevel modeling permits a more rigorous investigation of these bivariate associations, accounting for state-level clustering of participants and controlling for individual-level covariates (age, gender, employment status, household income, educational attainment, and religious behaviors).

In multilevel models, measures of structural racism were not associated with participant drinking days per month. While the composite index of state-level structural racism was positively associated with participant binge drinking, smoking status, and smoking frequency in the bivariate analyses, the associations between the composite measure and alcohol and tobacco use measures did not maintain statistical significance in the multilevel models. In isolation, these findings would suggest that state-level structural racism may not be associated with alcohol and tobacco use behaviors when controlling for individual-level confounders. However, multilevel analyses replacing the composite measure of structural racism with four of its dimensions (segregation, economic, incarceration, and education), suggest that different manifestations of structural racism may be associated with alcohol and tobacco use behaviors.

Interestingly, though structural racism has most often been characterized via residential segregation (26, 47), the residential segregation dimension did not reach statistical significance in any of the analyses

Table 6. Hierarchical multinomial logistic regressions for the structural racism index and dimensions predicting smoking frequency ($N = 1,942$).

Model A:		Odds Ratio (OR)	95% confidence interval		P value
			Lower bound	Upper bound	
Former smokers	Structural racism index	1.02	1.00	1.03	0.09
Some day smokers		1.03	1.00	1.05	0.09
Everyday smokers		1.02	0.99	1.04	0.17
Model B:					
Former smokers	Segregation dimension	1.00	0.97	1.02	0.66
	Economic dimension	0.99	0.97	1.01	0.44
	Incarceration dimension	1.01*	1.00	1.02	0.04
	Education dimension	1.00	0.99	1.01	0.64
Some day smokers	Segregation dimension	1.02	0.97	1.06	0.44
	Economic dimension	1.00	0.98	1.04	0.74
	Incarceration dimension	1.01	1.00	1.03	0.13
	Education dimension	0.98	0.97	1.00	0.09
Everyday smokers	Segregation dimension	0.99	0.97	1.02	0.54
	Economic dimension	1.00	0.98	1.02	0.77
	Incarceration dimension	1.01*	1.00	1.03	0.02
	Education dimension	0.99	0.98	1.00	0.09

Participants that had never smoked serve as the reference group in these analyses.

Model A uses the state-level structural racism composite index as the primary independent variable.

Model B uses four dimensions of the state-level composite index (segregation, economic, incarceration, and education) as the primary independent variables.

Both models control for participant age, gender, income, education, employment, and religious behavior.

*OR is significant at the 0.05 level.

conducted, which might suggest that segregation may be better captured at a finer scale of analysis than the state (e.g., at the level of the county or census tract). Still, other dimensions of structural racism (e.g., structural racism in incarceration) may influence population health statewide, independent of local residential segregation. Given the lack of significant findings in both the bivariate and multilevel analyses for the segregation dimension, current findings suggest the critical importance of considering new and alternative measures of structural racism and measurement at different geographic scales.

The education dimension of state-level structural racism was inversely associated with participant smoking status in the bivariate and multilevel analyses, suggesting that participants in states with greater structural racism in education would be less likely to be current smokers than participants in states with less structural racism in education. This finding is counter to our hypothesis and what current theory surrounding health and structural racism would suggest. Yet, there was no significant association between the education dimension and smoking frequency. The education dimension was also the only dimension of structural racism to demonstrate inverse associations with any other structural racism measures and was the only dimension inversely associated with any alcohol and tobacco use measures. Given the lack of existing research and theory to support an inverse association between structural racism in education and other measures of structural racism or alcohol and tobacco use, additional scrutiny may be warranted when considering this particular finding. It may be that residual confounders (e.g., healthcare access) not included in the current analysis could be contributing to this unexpected finding.

The incarceration dimension was positively associated with participant binge drinking, smoking status, and smoking frequency, even after controlling for three other dimensions of structural racism and individual level covariates. This makes the incarceration dimension the dimension of structural racism most frequently associated with alcohol and tobacco use behaviors in the current analysis. This may suggest that structural racism in incarceration is a particularly salient construct

contributing to alcohol and tobacco use among Black populations. Mass incarceration stunts social capital and support in Black communities by extracting community members, breaking up families, and otherwise limiting human resources, capital, and support available in Black communities (48), and many Black individuals may use alcohol and tobacco as ways to cope with this manifestation of structural racism (26). Inequitable federal and state policies (e.g., Jim Crow Laws), over-policing in Black communities, and over-sentencing of Black offenders as compared with White offenders have contributed to Black men having the highest incarceration rates in the United States (49). The imprisonment of Black Americans also limits Black political power and promotes systemic joblessness by disqualifying many Black Americans from voting and employment opportunities due to prior conviction (50–52). Persistent structural discrimination, incarceration, joblessness, and lack of social and other resources are part of an insidious cycle of poor living conditions, adverse life experiences, and maladaptive coping among minoritized populations in America.

Findings from the current study support existing theory regarding structural racism and health positing that structural racism is linked to alcohol and tobacco use among minoritized populations (26). As theory suggests, structural racism perpetuates unjust systems that disadvantage minoritized populations, limiting their desirable opportunities and resources and promoting undesirable conditions that facilitate unhealthy behaviors like drinking and smoking. While a different population of interest, this notion is supported by a recent qualitative study in which Latinx individuals cited structural racism and discrimination as sources of mental health concern, while identifying alcohol consumption as a method for coping with those concerns (53). The promotion of maladaptive coping behaviors via structural racism is exacerbated by the availability of alcohol and tobacco products to enact these behaviors. Previous work has demonstrated positive associations between structural racism and alcohol and tobacco retailer density (34–36). Greater retailer density suggests greater availability of alcohol and

tobacco products, promoting greater utilization of these products. The promotion of maladaptive coping and the availability of substances to engage in alcohol and tobacco use are plausible explanations for associations detected between structural racism and alcohol and tobacco use behaviors in this study.

Structurally racist systems and practices maintained for centuries in the United States ultimately affect the health of various groups differently and contribute to the persistent inequities present between racial groups today (12, 20–25). Some researchers argue that if structural racism is not addressed, health inequities will continue to persist and impede progress toward improving population health (26). As such, opposing, eliminating, and aiding populations to recover from structural racism through multilevel policy and intervention to address structural discrimination may help to ameliorate population-level health outcomes. The current work suggests structural racism in incarceration is a specific construct to target to help reduce alcohol and tobacco use behaviors among Black individuals. Reducing engagement in these adverse health behaviors has implications for reducing the risk of cancer (e.g., breast, colorectal, liver, oral, and lung (27–32)) among this population.

Limitations

This study should be interpreted in context of its limitations. First, exposure to structural racism was characterized at the state level in this study. While statewide policies and practices are likely to influence experiences within their borders, the experiences of individuals from one part of a state may not reflect the experiences of individuals from another part of that same state. As such, characterizing exposure to structural racism based on smaller areas (e.g., counties or census tracts) could more accurately depict exposure to structural racism among community members. However, state-level characterization could be more appropriate for dimensions of structural racism that are more directly affected by state-level policies and laws, such as incarceration. In addition, structural racism measurement at the county or neighborhood levels is less developed when compared with state-level measurement (22) and using more local measures would have limited the multi-dimensional assessment and analysis of structural racism in the current study.

Second, data analyzed for this study were captured in 2010, which could present concerns about the present-day relevance of these findings. Nonetheless, structural racism has endured for hundreds of years (54) and the resulting inequities are not likely to change considerably within a decade, as is suggested by studies on the longstanding impacts of redlining practices (i.e., the denial of mortgages, insurance loans, and other financial services to residents of certain areas, based on race or ethnicity) prominent in the United States before the 1970s (3, 35, 55–59). As such, conclusions from the current study likely remain relevant and have potentially actionable implications for health promotion.

The current sample only included Black participants. Additional research is needed to examine the influence of structural racism on maladaptive coping behaviors among other racial and ethnic populations. Though the current dataset is national, it is not representative of the nation, nor of Black individuals in the United States, and it is

limited to English speakers, which could introduce selection bias and discourage participation from Black Spanish speakers. Thus, the results of the current study may not be generalizable beyond the sample. Unaccounted for covariates (e.g., immigration status, health-care access or insurance status, and additional lifestyle-related factors) may also influence the current results, and the findings should be considered in context of the covariates not included in the analysis. Self-report and recall bias are additional limitations, and reports of alcohol and tobacco use could be underestimated in the current dataset (60).

Conclusions

This study demonstrates positive associations between state-level structural racism in incarceration and alcohol use and tobacco smoking behaviors among Black residents in the United States. Future research examining the intersection between structural racism and health should carefully consider which aspects or dimensions of structural racism to assess (e.g., incarceration, economic, education, and segregation) and how to assess them (e.g., to characterize structural racism at the state level or at the community/neighborhood level). Subsequent research is not only required to better understand structural racism, but also to develop methods, interventions, and policies to dismantle structural racism and mitigate its impact on health outcomes. Addressing structural racism is a pivotal step in improving population health by eliminating health disparities and achieving health equity.

Authors' Disclosures

No disclosures were reported.

Authors' Contributions

N. Woodard: Conceptualization, resources, data curation, software, formal analysis, investigation, methodology, writing—original draft, writing—review and editing. **J. Butler:** Resources, supervision, methodology, writing—review and editing. **D. Ghosh:** Resources, supervision, methodology, writing—review and editing. **K.M. Green:** Resources, supervision, methodology, writing—review and editing. **C.L. Knott:** Resources, supervision, funding acquisition, investigation, methodology, project administration, writing—review and editing.

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Note

Supplementary data for this article are available at Cancer Epidemiology, Biomarkers & Prevention Online (<http://cebp.aacrjournals.org/>).

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