HHS Public Access

Author manuscript

J Racial Ethn Health Disparities. Author manuscript; available in PMC 2019 April 01.

Published in final edited form as:

J Racial Ethn Health Disparities. 2018 April ; 5(2): 387–397. doi:10.1007/s40615-017-0382-9.

Criminal Justice Contact, Stressors, and Obesity-Related Health Problems among Black Adults in the United States

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Introduction

The United States' (US) criminal justice system may mitigate racial/ethnic health disparity through a stress process that possibly increases an individual's vulnerability to chronic conditions (Massogolia, 2008; Binswanger, Redmond, Steiner & Hicks, 2012). Criminal justice contact—defined as lifetime arrest, parole, or incarceration, seems to exacerbate chronic conditions (Patterson, 2013; Maruschak, Berzofsky & Unangst, 2015); and those who are most likely to have had contact with the criminal justice system, such as Black adults, often already have pre-existing disproportionately high rates of stress and chronic conditions due to the social determinants of health that affect underrepresented minorities (Bharmal, Tseng, Kaplan, and Wong, 2012; Centers for Disease Control and Prevention, 2014; Ginn, 2012; Williams, Mohammed, Leavell & Collins, 2010). Those pre-existing chronic conditions were worsened by the criminal justice contact and manifested into a 2-year decline in life expectancy for each year of being in contact with the criminal justice system (Patterson, 2013).

In 2011–2012, an estimated 40% of persons with criminal justice contact reported having a current chronic condition, to include cancer, high blood pressure, stroke-related problems, diabetes, heart-related problems, kidney-related problems, arthritis, asthma, and cirrhosis of the liver (Maruschak, Berzofsky & Unangst, 2015). Schnittker and John (2007) found that persons with criminal justice contact had an increased risk of experiencing a physical health problem following their release regardless of levels of the contact. Massogolia (2008) also found that persons with criminal justice contact had increased levels of stress-related health outcomes regardless of amount of the criminal justice contact. Binswanger, Krueger, and

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Conflict of interest statement

The authors declare that there are no conflicts of interest.

Steiner (2009) found that persons who have had criminal justice contact have a higher likelihood of experiencing hypertension and cardiovascular disease. They also found that the majority of persons with criminal justice contact (74%) were overweight or obese; females with criminal justice contact experienced lower rates of being overweight but higher rates of being obese.

On the other hand, even without criminal justice system contact, Black adults' higher rates of obesity, which was significantly linked to obesity-related health problems, was higher than all other races/Hispanic origins and at all age ranges. Black women were more likely to be obese than Black men. For both Black men and women, the prevalence of obesity was highest for the age group 20 to 39 (Flegal, Kruszon-Moran, Carroll, Fryar & Ogden, 2016). Those who were married were more at risk for obesity (Teachman, 2016). These Black adults live in the US, which is considered a high-income and developed country with the highest number of obese people when compared to other countries (Audretsch & DiOrio, 2007; Ng, et al., 2014). Some of the patterns of obesity have been observed through socioeconomic status, which have been identified as having an inverse association with obesity in developed countries like the US (McLaren, 2007). Other patterns are observed in biocultural behaviors and may help to shape the epidemiology of obesity among Black adults. Some of the cultural beliefs concerning eating patterns, view of physical activity, being overweight, and perceived risk of shortage of food supply influence the etiology of obesity among Black adults (Sobal, 2001). There has also been some recent examinations of the genetic biomarkers that are associated with obesity among Black adults (McCormack Grant, 2013; Klimentidis, Arora, Zhou, Kittles, & Allison, 2016).

Criminal Justice Contact, Stressors, and Obesity-Related Health Status

Contact with the criminal justice system can be classified as a major life event (Hassine, 2010) that places a person in increased disadvantaged social roles (Western, 2002) whereby increasing susceptibility to chronic stressors (Massoglia, 2008). Chronic stressors occurring in several biopsychosocial domains (e.g. health, economics, crime, and race) have been reported to be higher among African Americans than Whites and also linked with health disparities (Bharmal, Tseng, Kaplan, and Wong, 2012; Centers for Disease Control and Prevention, 2014; Massagolia 2008; Massagolia 2008a; Drucker, 2011; Western & Wildeman, 2009; Lopoo & Western, 2005; Pager, 2003; Wang & Beydoun, 2007; Fisher, Burnet, Huang, Chin & Cagney, 2007). Stress has been documented as a contributor to imbalance in energy and increased appetite that enhances weight. Stress has been known to contribute to the promotion of fat storage in the visceral organs, i.e., stomach, intestine, colon, liver, spleen, pancreas, kidney, adrenal gland, appendix, and gall bladder—leading to increased weight gain through the alteration in food intake which increases a person's vulnerability to ORHPs (Scott, Melhorn, & Sakai, 2012). Persons with criminal justice contact may experience stressful life events while living in disadvantaged environments that have higher crime rates that increase chronic stress exposure (Massogolia 2008, Massogolia, 2008a); coupled with greater access to fast-food restaurants that serve low nutrient foods and less access to supermarkets with healthier food choice (Kawachi & Berkman, 2003). This level of exposure to stressors seems to make it difficult to cope while increasing access to high energy-dense foods with high fat content and the development of risk factors for

chronic conditions including obesity-related health-problems (Adam & Epel, 2007; Pearlin, Lieberman, Menaghan & Mullan, 1981; Lazarus & Folkman, 1984; Pearlin, 1989; Bjorntorp, 2001).

The stress literature conceptualized exposure to chronic stressor as the stress experienced through social roles or life events (Thoits, 1995). The “vulnerability” formulation of the life stress paradigm purported that the association between socio-personal life events, and adverse health changes are attenuated by the impact of pre-existing stressful life events that may make an individual vulnerable (Dohrenwend & Dohrenwend, 1981). The stressful life events may be experienced via the primary stress pathway of contact with the criminal justice system in prison—such as isolation from family (Sykes, 1971), and the secondary stress pathway of release from the criminal justice system— such as financial, environmental, and personal issues (Lopoo & Western, 2005). These high stress pathways have been associated with poor diet quality to include low intake of fruits and vegetables and increased consumption of snack foods low in nutrients in nutrients and binge eating which is associated with poor health status such as obesity related health conditions (Fowles, Stang, Bryant, & Kim, 2012; Haynes, Lee, & Yeomans, 2003).

There has been extensive research exploring the relationship between criminal justice involvement and health outcomes (Schnittker & John, 2007; Massogolia 2008, Massogolia, 2008a; Wang & Green, 2010; Wang et al., 2009). However, despite the prevalence of chronic stressors and poor health status among Black adults who have had contact with the criminal justice system, the effect of stress associated with criminal justice contact has been overlooked in research on within-race obesity-related health status (National Center for Health Statistics, 2012; Binswanger, Redmond, Steiner & Hicks, 2012). There has been limited conceptualization on how the stressors associated with the rates of disparities in those who have had contact with the criminal justice system translates into the general population health disparities (Iguchi, Bell, Ramchand, & Fain, 2005). Also, when examining health disparities, there seems to be more variation within races than between races which warrants an examination of the within-race differences in health outcomes and the role of stressors and criminal justice contact (Egede, 2006).

The main objective of this study is to examine how criminal justice contact and stressors are related to obesity related health outcomes and the differential association among Black adults (African Americans and Caribbean Blacks). Although research has established a connection between criminal justice contact, stress, and obesity-related health outcomes such as hypertension, stroke, etc., to the best of the authors’ knowledge, no previous studies have explicitly examined the relationship among Black adults. This is important because many Black adults who have had contact with the criminal justice system are also exposed to chronic stressors which have been linked with obesity-related health problems.

Methods

Sample

The National Survey of American Life (NSAL) was designed to understand intra-and inter-group racial and ethnic differences in mental disorders, psychological distress and informal

and formal service use, as they are manifested in the context of a number of different stressors, risk and resilient factors, and coping resources, among a national sample of diverse adults; with a focus on African Americans and Caribbean Blacks. Conducted by the Program for Research on Black Americans (PRBA) within the Institute for Social Research at the University of Michigan, the NSAL data were collected between February 2001 and March 2003 (Jackson et al., 2005). Although this is a dated dataset, Jackson and Caldwell (2012) reported that the NSAL is the results of successful data collection within Black communities and is currently the most comprehensive large national survey of ethnically diverse Black populations. This included the utilization of multiple methodological innovations for conducting research within Black communities, to include the Wide Area Screening Procedure (WASP). The WASP is a screening mechanism that assist with the identification of Blacks who live in areas where there are few Blacks (Caldwell, Jackson, Tucker & Bowman, 1999).

The NSAL employed a multi-stage probability methods to generate the samples from 252 geographic areas across the United States. The sample of respondents was generated through a four-step sampling process. The NSAL conducted interviews that lasted approximately two hours and 20 minutes and were conducted using laptop computer-assisted personal interview methods in the homes of respondents. Race-ethnic matching of interviewer and respondents, along with community-based interviewers, were utilized in 86% of the interviews conducted. Approximately 14% of the interviews were conducted via the telephone either partially or entirely (Jackson et al., 2005). The NSAL represents a national household probability sample of African American (n= 3570), Black Caribbean (n= 1438), and non-Hispanic White (n= 891) adults. For this study, data were extracted from the restricted-use dataset of the NSAL for the sample of 3,570 African American and 1,438 Caribbean Black (collectively identified as Black adults) United States citizens, who were 18 years or older. Data from the NSAL were made available through the Inter-University Consortium for Political and Social Research (ICPSR) at the University of Michigan (http://www.icpsr.umich.edu/).

Primary Outcome Measure

The primary outcome measure was obesity-related health problems (ORHPS). Assessment of *ORHPs* was collected from respondents' answers to questions regarding ever being told by a professional that they had either diabetes, blood circulation problems, hypertension, heart problems, or stroke (1 = yes; 0 = no).

Preliminary Outcome Measure and Covariate

Criminal Justice Contact—Respondents were asked a series of questions regarding their contact with the criminal justice system such as ever being arrested (adult or juvenile), ever in any type of correctional facility (adult or juvenile), or whether they were currently on parole which was dichotomized as a measure of criminal justice contact based on responding yes or no to either one (1 = yes; 0 = no).

Covariates

Family Stressors—Family stressors (1 = stressed; 0 = not stressed), were assessed from responses to the following three questions, “Over the past month have you had family or marriage problems; “Over the past month have you had problems with children”; and, “Over the past month have you had problems with love life?”

Neighborhood stressors—Neighborhood stressors (1 = stressed; 0 = not stressed), were assessed from responses to the following two questions: “How often are there problems with muggings, burglaries, assaults or anything else like that in your neighborhood?” and “How much of a problem is the selling and use of drugs in your neighborhood?”

Financial stressors—Family stressors (1 = stressed; 0 = not stressed), were assessed from responses to the following three questions, “Over the past month have you had money problems; “Over the past month have you had job problems?”; and “Have you or any member of your family living here received food stamps?”

Personal stressors—Personal stressors (1 = stressed; 0 = not stressed), were assessed from responses to the following three questions: “Over the past month had you been a victim of a crime?”; “Over the past month did you have problems with police”; and, Over the past month have you been treated badly because of your race?”

Demographic—The demographic variables included gender (1 = male; 0 = female), age (in years), education (1 = high school graduate or more; 0 = less than high school graduate), household income (1 = ≥$30,000; 0 = <$30,000), employed (1 = employed; 0 = not employed), marital status (1 = married; 0 = not married), and US-born (1 = yes; 0 = no).

Statistical analysis

Sample characteristics were summarized for the entire sample (Table 1). Factor analysis was utilized to determine the variable relationships among the stressor variables. Due to the binary nature of the stressor variables, the analysis was performed by first utilizing polychoric correlation using the user-written *command polychoric* in STATA. After the polychoric correlation matrix was developed, we performed exploratory and confirmatory factor analyses using the matrix as input (UCLA: Statistical Consulting Group, n.d.). The item correlations that fell around 0.60 with their respective domain were maintained while those items that correlated poorly were deleted (Nunnally & Bernstein, 1994). The results of the final factor analysis revealed that the items loaded well with their respective domains as intended (range of .64 to .73). Although Nunnally (1981) recommended that an alpha coefficient of .70 or higher is considered acceptable, Hudson (1982) asserted that an alpha coefficient of .60 or greater is usually an acceptable range in nomothetic research; also based on number of items in each domain with higher alpha coefficient expected for higher number of items (Nunnally & Bernstein, 1994). Additionally, Rao-Scott chi-square and Student’s t-tests statistics are used to compare Black adults with obesity-related health problems (ORHPs) with those reporting none (Table 1). The medical and public health literature have identified that when the outcome variable has an incidence of 10% or more, prevalence ratio estimations should be utilized in order to reduce overestimation (McNutt,

Wu, Xue, & Hafner, 2003; Zou, 2004). Hence, in our preliminary exploration (Table 2), modified poisson regression analyses (Lindquist, n.d.) were performed to determine the prevalence ratio of reporting having criminal justice contact with the association of family, neighborhood, financial and personal stressors (Model 1) and the association of family, neighborhood, financial and personal stressors with the addition of socio-demographics and socioeconomic status. Further modified poisson regression analyses (Table 3) were performed to determine the prevalence ratio of reporting ORHPs with the association of criminal justice contact (Model 1); the association of criminal justice contact, socio-demographics and socioeconomic status (Model 2); the association of family, neighborhood, financial, and personal stressors (Model 3); the association of family, neighborhood, financial, personal stressors, socio-demographics and socioeconomic status (Model 4); and the association of criminal justice contact, socio-demographics and socioeconomic status with the addition of family, neighborhood, financial, and personal stressors (Model 5). Statistical procedures accounted for the complex multistage probability sampling design of NSAL incorporating weights and design factors. All of the analyses for the study were performed using the complex survey design feature in STATA version 14 (StataCorp, 2015). P values less than 0.05 were considered significant.

Results

The descriptive characteristics of respondents and weighted percentages are presented for the entire sample and by status of obesity-related health problems (ORHPs) in Table 1. Of the 5,008 total Black adult respondents, 38.5% reported experiencing ORHPs and 34.6% had contact with the criminal justice system throughout their lifetime. They were more likely to be female (55.6%), have at least a high school diploma (61.4%), have an income of less than $30,000 (52.3%), to report being employed (67.4%), not be married (57.8%), report being born in the United States (93.7%), be fairly middle-aged ($\bar{x}$ = 42.2, SD = 16.1) with high financial (62.2%) stressors. The distribution of ORHP was significantly different for gender (p = 0.002), education (p = 0.011), income (p = 0.004), employment (p<.001), marital status (p = 0.027), US-born (p<.001), age (p<.001), and financial stressors (p = 0.006).

Of the respondents reporting that they experienced ORHPs, 59.4% were Black adult females compared to 40.6% being Black adult males. The majority of the respondents reporting that they experienced ORHPs (64.5%) had less than a high school diploma compared to 35.5% of those with at least a high school diploma. Most of the respondents reporting that they experienced ORHPs (56.8%) had incomes less than $30,000 compared to 43.2% of those with incomes of at least $30,000. The employment status of respondents reporting that they experienced ORHPs were 56.3% (employed) and 43.7% (unemployed). The marital status of respondents reporting that they experienced ORHPs were 54.7% (unmarried) and 45.3% (married). The majority of the respondents reporting that they experienced ORHPs (96.2%) identified as US born compared to 3.8% who identified as foreign born. Most of the respondents reporting that they experienced ORHPs (66.1%) reported that they experienced financial stressors compared to 33.9% who reported not experiencing financial stressors.

In preliminary modified poisson regressions, Black adults who reported experiencing family stressors (PR: 1.15, 95% CI: 1.02, 1.29), neighborhood stressors (PR: 1.27, 95% CI: 1.15, 1.40), financial stressors (PR: 1.25, 95% CI: 1.11, 1.40), and personal stressors (PR: 1.34, 95% CI: 1.17, 1.52) were associated with higher odds of having contact with the criminal justice system. After adjusting for the association of sociodemographic and socioeconomic statuses, the odds of having criminal justice contact increased for Black adults who reported experiencing family stressors (PR: 1.15 to PR: 1.32) and financial stressor (PR: 1.25 to PR: 1.29). The association with the odds of having contact with the criminal justice contact decreased for Black adults who reported experiencing neighborhood stressors (PR: 1.27 to PR: 1.21) and experiencing personal stressors (PR: 1.34 to PR: 1.22). Black adults who were male (PR: 2.87, 95% CI: 2.50, 3.29), younger (PR: 0.99, 95% CI: 0.99, 1.00), who were born in the United States (PR: 1.76, 95% CI: 1.40, 2.22), and with less than a high school education (PR: 0.77, 95% CI: 0.67, 0.89) were associated with higher odds of having contact with the criminal justice system.

Further modified poisson regressions, identified that Black adults who had contact with the criminal justice system was associated with 1.02 (95% CI: 0.92, 1.13) higher odds of experiencing obesity-related health problems than those who had no contact with the criminal justice system although it was not statistically significant (Table 3, Model 1). When the model adjusted for the association of sociodemographic and socioeconomic statuses, the odds of experiencing obesity-related health problems (ORHPs) for Black adults who had contact with the criminal justice system (PR: 1.23, 95% CI: 1.08, 1.40) became statistically significant and higher than those who had no contact with the criminal justice system. Black adult males (PR: 0.80, 95% CI: 0.72, 0.88) were associated with decreased odds of experiencing ORHPs compared to Black adult females. Black adults who were older (PR: 1.03, 95% CI: 1.03, 1.04), who were married (PR: 1.20, 95% CI: 1.08, 1.32), and who were born in the United States (PR: 1.51, 95% CI: 1.28, 1.79) were associated with greater odds of experiencing ORHPs. (Table 3, Model 2).

Black adults who reported experiencing financial stressors (PR: 1.16, 95% CI: 1.04, 1.30) were associated with higher odds of experiencing ORHPs than those who did not report experiencing any financial stressors; family, neighborhood, and personal stressors were not statistically significant (Table 3, Model 3). When the model adjusted for the association of sociodemographic and socioeconomic statuses, the odds of experiencing ORHPs for Black adults who reported experiencing family stressors (PR: 1.23, 95% CI: 1.09, 1.38), financial stressors (PR: 1.32, 95% CI: 1.17, 1.48), and personal stressors (PR: 1.17, 95% CI: 1.03, 1.33) were statistically significant and higher than those who reported not having any of these stressors; neighborhood stressors remained not statistically significant. Black adults who were male (PR: 0.90, 95% CI: 0.82, 0.99) were associated with lower odds of experiencing ORHPS. Black adults who were older (PR: 1.03, 95% CI: 1.03, 1.04), who were married (PR: 1.21, 95% CI: 1.09, 1.35) and who were born in the United States (PR: 1.50, 95% CI: 1.26, 1.78) were associated with greater odds of experiencing obesity-related health problems (Table 3, Model 4).

In the full model (Table 3, Model 5), considering both the association of criminal justice contact and the stressors, the odds of experiencing ORHPs for Black adults who had

criminal justice contact was reduced (PR: 1.23 to PR: 1.14) and not statistically significant. Black adults who reported experiencing family stressors (PR: 1.21, 95% CI: 1.08, 1.36), financial stressors (PR: 1.30, 95% CI: 1.16, 1.47), and personal stressors (PR: 1.16, 95% CI: 1.02, 1.31) were statistically significant and higher than those who reported not experiencing any of these stressors; neighborhood stressors was not statistically significant. Black adults who were male (PR: 0.85, 95% CI: 0.77, 0.94) were associated with lower odds of experiencing ORHPS. Black adults who were older (PR: 1.03, 95% CI: 1.03, 1.04), who were married (PR: 1.21, 95% CI: 1.10, 1.34) and who were born in the United States (PR: 1.47, 95% CI: 1.24, 1.75) remained associated with greater odds of experiencing obesity-related health problems.

Discussion

This current study empirically examined how criminal justice contact and stressors are related to obesity related health outcomes and the differential association among Black adults. The initial examination of the relationship between criminal justice contact and stressors revealed that all four stressors (familial, neighborhood, financial, and personal) were associated with a higher prevalence ratio of coming in contact with the criminal justice system. Further exploration in the adjusted model, which included both sociodemographic and socioeconomic categories, showed that the odds of coming in contact with the criminal justice system increased for those Black adults who were experiencing family and financial stressors but decreased for those who reported experiencing neighborhood and personal stressors. Other studies have postulated that a person's life stressors are linked to an increased probability of having contact with the criminal justice system (Hochstetler, Murphy, & Simons, 2004; Ryan, Davis & Yang, 2001; Greene, Haney & Hurtado, 2000).

The unadjusted model showed that criminal justice contact was not associated with higher odds of experiencing obesity related health problems (ORHPs) although financial stressors was a significant factor. In the adjusted model, an association between criminal justice contact and higher odds of experiencing ORHPs was identified as the "vulnerability burden" of being female, older, married, and born in the US was added to the model—similar results were asserted in other studies. Herbert, Plugge, Foster and Doll (2012) found that obesity was more prevalent among female than male with criminal justice contact; which increases risk for ORHPs. Gates and Bradford (2015) reported that female with criminal justice contact were more likely to gain weight than their male counterparts possibly due to their level of lower level of energy intake and atypical antipsychotic medications. Klimentidis, et al. (2016) reported that central adiposity, or belly fat, associated with obesity was negatively associated with Black adults being of West African ancestry among Black adult men but not among Black adult women. These results suggest that the Black adult male gender coupled with West African ancestry is associated with reduced chance of gaining the belly fat linked to obesity. This further suggests that genetic predispositions may partially explain the within race disparity that exists among Black adults.

When taken into consideration the role of age, Carson and Sabol (2016) showed that the criminal justice contact population, during the period 1993 to 2013, aged at a rate higher than the general US population. The aging criminal justice contact population, on average,

have earlier onset of chronic conditions to include ORHPs (Aday, 2003). Although marital status is considered an indicator of social support which is inversely related to ORHPs, being married is associated with higher BMI which is positively related to ORHPs (Teachman, 2016). Individuals who are married are less likely to be concerned about their weight as they are not actively in the marriage market and not trying to attract a partner. Consequently, they may experience increased weight gain as they have a consistent partner with whom to eat frequent and regular meals, leading to weight gain (Wilson, 2012). The marital quality has been identified as poor for couples where one of the member's experience criminal justice contact during the marriage. Researchers have speculated that the criminal justice contact during marriage may influence a change in the way spouses interact while reducing their shared household's support system (Massoglia, Remster, & King, 2011). This may lead to emotional eating caused by the negative affect which has been identified as an important contributor to ORHPs (Van Strien & Ouwens, 2003; Canetti, Bachar & Berry, 2002). The association with being US-born may be connected to the United States having the second highest criminal justice contact rate in the world accounting for 2.2 million persons in prison representing a 14% increase (Walmsley, 2015); and persons with criminal justice contact reported ever having a ORHPs 1.5 times more than the general population (Maruschak, Berzofsky & Unangst, 2015).

The "vulnerability burden" of age, being married, and being born in the US produced an association between family and financial stressors and higher odds of experiencing ORHPs, while personal stressors remained associated—these results have been maintained in previous studies. When examining neighborhood environments and obesity, Powell-Wiley et al., (2013) found that an increase in BMI was associated with negative perceptions of built environment in the neighborhoods and not with the violence or level of cohesion in the neighborhoods. This possibly accounts for the results of this study that show no association between neighborhood stressors and obesity-related health problems since we did not assess for experiences of the physical environment in the neighborhood. Black adults are faced with more chronic stressors throughout the life course that might advance the association between obesity related health problems and age. Zajacova and Burgard (2010) found that as a person aged from their early thirties to early fifties, their body weight increased and their physical health status gradually declined. They also found that the onset of weight gain for Black adults occur earlier than white adults causing them to gain more as they increase in age. Married persons with criminal justice contact have also been identified as having increased stressors that include maintenance of intimacy and commitment, economic stability, family role transformations, and psychological changes that are associated with physical health status (Fishman, 1990; Arditti, 2005; Hairston, Rollin & Jo, 2004; Massagolia 2008; Massagolia 2008a).

When results were further tested in the full model, the "vulnerability burden" of family, financial, and personal stressors seemed to overshadow the relationship between criminal justice contact and ORHPs—the literature corroborates these findings. While the criminal justice contact rates of all demographic groups are impacted, various subgroups of the population are disproportionately affected (Western & Wildeman, 2009). Living as a subordinate member of society who has had criminal justice contact and with certain sociodemographic characteristics has been identified as additional stressors that are

associated with physical health status (Klest, 2012; Lopoo & Western, 2005; Massagolia 2008a). Black females had a 1.6 to 4.1 higher odds of having criminal justice contact than white females across all age groups while Black men had a 3.8 to 10.5 greater odds of having criminal justice contact than white men and a 1.4 to 3.1 increased odds than Hispanic men (Carson, 2015). Criminal justice contact has been reported to be related to stressors of transition that are associated with events that require major adjustments in behavior in a relatively short period of time (Thoits, 1995; Harding, Morenoff, and Herbert, 2013). It seems that the results of the full criminal justice contact experience, to include family, financial and personal stressors, may be associated with obesity related health outcomes.

A link has been identified between stress and increased consumption of fatty and sweet foods and calories which exacerbates weight gain associated with obesity related health problems (Oliver, Wardle, and Gibson 2000; Zellner, et. al. 2006). The stressors associated with families with criminal justice contact seem to outweigh the actual association of ORHPs with criminal justice contact. It has been found that families with members who have had criminal justice contact were more likely to have children with academic, psychological and behavioral difficulties (Shlafer and Poehlmann, 2010); and increased episodes of domestic violence and increased likelihood of a partner engaging in extramarital relationships (Siennick, Stewart, & Staff, 2014). Carr and Friedman (2006) observed that family relationships declined in their quality of engagement as there was an increase in BMI which accompanies ORHPs. Persons with criminal justice contact also experience financial stressors, which is associated with ORHPs; with nearly 65 percent of families with a member with criminal justice contact reporting extreme difficulties meeting their basic family needs. deVuono-powell, Schweidler, Walters, and Zohrabi (2015) found that 49 percent reported having difficulty meeting basic food needs and 48 percent reported meeting basic housing needs due to the financial costs associated with the criminal justice contact.

Part of the financial stressor associated with ORHPs is observed in the food stamp cycle hypothesis which argues that participants in the food stamp program engage in an overconsumption feast directly after receiving benefits and then engage a famine later in the month that leads to increased weight over time (Townsend, Peerson, Love, Achterberg, & Murphy, 2001). Researchers have found that the food stamp program is associated with an increase in BMI for men and women which is connected to ORHPs (Baum, 2007; Webb, Schiff, Currivan, & Villamor, 2008,) The personal stress associated with perceived discrimination has been documented by criminologists showing that 53 percent of ethnic/minority persons with criminal justice contact believed that they had experience some form of racial discrimination (Edgar and Martin, 2004). Researchers also found that perceived discrimination by the police or due to race was positively associated with weight gain (Cozier, Wise, Palmer, & Rosenberg, 2009). Racial discrimination, as a psychosocial stressor, has been reported to be associated with weight gain. The stress associated with racial discrimination may produce a preference for fatty and energy-dense meals as a means to cope causing an increase in weight related to ORHPs (Laitinen, Ek & Sovio, 2002).

In this study, the “vulnerability burden” formulation of the life stress paradigm manifested as the association between criminal justice contact and ORHPs was attenuated by the relationship between family, financial, and personal stressors (Dohrenwend & Dohrenwend,

1981). A person's criminal justice contact seemed to underscore their vulnerability to family, personal, and financial stressors which may have influenced the association with ORHPs. The applicability of the "vulnerability burden" formulation relative to the association between criminal justice contact and ORHPs was indicated relevant due to the relationship between the vulnerability status of Black adults reporting family, personal, and financial stressors coupled with sociodemographic factors (Christian & Thomas, 2009). Similar to other studies, on average, the odds of a Black adult's obesity-related health problems increased as there were changes in their criminal justice contact relative to stressors and sociodemographic influences (Lee, Wildeman, Wang, Matusko & Jackson, 2014; Wilper et al., 2009; Binswanger, Krueger & Steiner, 2009).

Limitations

Although this study was intended to add to the body of knowledge in the area of Black adult criminal justice contact and its relationship with stress and obesity-related health problems, several limitations should be acknowledged. First, this study was observational and based on cross-sectional data which is limited in interpreting causal relationships and no directionality of relationships can be inferred. A longitudinal study following a cohort of 18-year old Black adults through their adulthood would better extricate the trajectories of criminal justice contact, stressors, and ORHPs over the life course. In addition, although the poisson models we used were adequate in terms of goodness of fit, more optimally specified models, like propensity score models, could identify possible confounders or selection bias in reference to history of criminal justice contact. A sample with Black adults who identity a more normative level of exposure to personal stressors (based on stress-distress literature for Black adults) may have provided a stronger support for the model (Williams, 2000) and allowing for a more stratified look at the sample. Consequently, the results from this sample of Black Adults most likely underestimated the association between criminal justice contact, stress, and obesity-related health problems. The crude measures for stressors that are used in the study does not seem to adequately capture the complex interplay of personal, familial, neighborhood, and financial stressors experienced in lives of Black adults. The NSAL sample excluded persons who were institutionalized in prisons, jails, nursing homes, and long-term care facilities; excluded any persons serving in the military who lived in non-civilian housing; and excluded persons who were unable to complete the interview in English; therefore, the results are not generalizable to those populations. This study's generalizability was confined to Black adults, so it should be replicated for other ethnic groups such as Africans who have migrated to America, Hispanics, Asians, or Whites.

Strengths

To the best of the authors' knowledge, this is the first study to investigate the relationship between criminal justice contact, and obesity-related health problems while taking into consideration the "vulnerability burden" of stressors among Black adults representing both African-Americans and Caribbean Blacks. We took into consideration the heterogeneity of the pre and post-criminal justice contact of Black adults to examine the role of stress and sociodemographic/SES status in the contribution of obesity-related health outcomes. Examining the with-in race differences sheds light on some of the characterization of the stress associated with criminal justice contact distinctive to Black adults. Although this was

a cross-sectional study, access to the NSAL restricted data allowed for rich information regarding criminal justice contact and stressors among Black adults that is not readily accessible.

Conclusion

This study contributes to the public health literature around prevention of obesity-related health problems, because it is the first to examine the relationship of stress and criminal justice contact with obesity-related health problems utilizing a representative sample of Black adults (including African Americans and Caribbean Blacks). There seems to be a link between criminal justice contact, stressors, sociodemographic/SES status which could make Black adults more susceptible to chronic stress that translate into physical health problems (Warnecke et al., 2008; Massagolia 2008a). Our analyses allowed us a rare opportunity to explore possible sources of obesity-related health disparities among Black adults through self-reported measures of obesity-related health, stress, criminal justice contact, and sociodemographic/SES measures. Findings from this study suggest that there is a mechanism that links the stressors, i.e. family, financial, and personal issues, associated with criminal justice contact to obesity related health status. These findings emphasize the need to further explore the family, financial, and personal stressors for Black adults with criminal justice contact in order to further our understanding of their obesity-related health problems.

Acknowledgments

Support: This research was supported by a grant from the National Heart, Lung, and Blood Institute to the University of Mississippi Medical Center (1R25HL126145-01—MPIs Drs. Bettina Beech and Keith Norris). Research conducted by the last author was supported by a grant from the National Center for Minority Health and Health Disparities (P60MD000214). The last author is a visiting scholar in the Center for Biobehavioral Health Disparities Research in the Social Science Research Institute at Duke University.

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Table 1

Descriptive Characteristics of Black Adults (African-American or Afro-Caribbean) with Obesity-Related Health Problems (ORHPs) Compared With Those with no ORHPs, 2001–2003 National Survey of American Life (N = 5008)

	Total Sample N (wt%)	ORHPs [a] N (wt%)	No ORHPs [a] N (wt%)	p-Value [b]
Total		1859 (38.5)	3149 (61.5)	
Gender				0.002
Male	1833 (44.4)	609 (40.6)	1224 (46.8)	
Female	3175 (55.6)	250 (59.4)	1925 (53.2)	
Education				0.011
>=HS	2032 (61.4)	659 (35.5)	1373 (40.6)	
<HS	2976 (38.6)	1200 (64.5)	1776 (59.4)	
Income				0.004
≥$30,000	2239 (47.7)	722 (43.2)	1517 (50.5)	
<$30,000	2769 (52.3)	1137 (56.8)	1632 (49.5)	
Employed				<.001
Employed	3401 (67.4)	1018 (56.3)	2383 (74.3)	
Not Employed	1597 (32.6)	841 (43.7)	756 (25.6)	
Marital Status				0.027
Married	1834 (42.2)	691 (45.3)	1143 (40.2)	
Not Married	3166 (57.8)	1168 (54.7)	1998 (59.8)	
Place of Birth				<.001
US-born	3837 (93.7)	1514 (96.2)	2323 (92.2)	
Foreign-born	1114 (6.3)	327 (3.8)	787 (7.8)	
Criminal Justice Contact				0.655
Contact	1392 (34.6)	533 (35.1)	859 (34.2)	
No Contact	3616 (65.5)	1326 (64.9)	2290 (65.8)	
Personal Stressors				0.36
Stressed	645 (13.4)	252 (14.2)	393 (12.8)	
Not Stressed	4363 (83.6)	1607 (85.8)	2756 (87.2)	
Neighborhood Stressors				0.199
Stressed	2036 (41.7)	799 (43.2)	1237 (40.7)	
Not Stressed	2972 (58.3)	1060 (56.8)	1912 (59.3)	
Family Stressors				0.146
Stressed	1574 (31.2)	586 (33.0)	988 (30.1)	
Not Stressed	3434 (68.8)	1273 (67.0)	2161 (69.9)	
Financial Stressors				0.006
Stressed	3177 (62.2)	1252 (66.1)	1925 (59.8)	
Not Stressed	1831 (37.8)	607 (33.9)	1224 (40.2)	
Age (mean, SD)	42.2 (16.1)	45.8 (17.1)	40.97 (15.6)	<.001

[a] Column percentages of those who report experiencing ORHPs or not experiencing ORHPs, not percentage of the whole sample.

[b] Rao-Scott Chi-square p-value indicates whether the distribution of obesity-related health status is significantly different by sub-group.

Abbreviations: ORHP, Obesity-Related Health Problems; N, Sample Size; wt%, Weighted Percentages; SD, Standard Deviation; HS, High School; US, United States

Table 2

Stressors as Predictors of Criminal Justice Contact Among Black Adults (African American or Afro Caribbean), 2001–2003 National Survey of American Life (N=5008)

	Model 1 **PR (95% CI)**	**Model 2** **PR (95% CI)**
Stressors		
Family Stressor	1.15 (1.02, 1.29) *	1.32 (1.19, 1.47) ***
Neighborhood Stressor	1.27 (1.15, 1.40) ***	1.21 (1.09, 1.34) ***
Financial Stressor	1.25 (1.11, 1.40) ***	1.29 (1.15, 1.45) ***
Personal Stressor	1.34 (1.17, 1.52) ***	1.22 (1.09, 1.35) **
Socio-demographics		
Male		2.87 (2.50, 3.29) ***
Age		0.99 (0.99, 1.00) **
Married		1.07 (0.97, 1.18)
US-Born		1.76 (1.40, 2.22) ***
Socioeconomic Status		
Education		0.77 (0.67, 0.89) **
Income		0.88 (0.77, 1.00)
Employed		0.94 (0.82, 1.06)

Abbreviations: ORHP, Obesity-Related Health Problems, N, Sample Size; PR, Prevalence Ratio; CI, Confidence Interval; H/O, History Of; US, United States

* p<.05

** p<.01

*** p<.001

Table 3

Criminal Justice Contact and Stressors as Predictors of Obesity-Related Health Problems (ORHPs) Among Black Adults (African American or Afro Caribbean), 2001–2003 National Survey of American Life (N=5008)

	Model 1 PR (95% CI)	**Model 2** PR (95% CI)	**Model 3** PR (95% CI)	**Model 4** PR (95% CI)	**Model 5** PR (95% CI)
Criminal Justice					
Status	1.02 (0.92,	1.23 (1.08,			1.14 (1.00,
Criminal Justice	1.13)	1.40)**			1.29)
Contact				0.90 (0.82,	
Socio-demographics		0.80 (0.72,		0.99)*	0.85 (0.77,
Male		0.88)***		1.03 (1.03,	0.94)**
Age		1.03 (1.03,		1.04)***	1.03 (1.03,
Married		1.03)***		1.21 (1.09,	1.04)***
US-Born		1.20 (1.08,		1.35)***	1.21 (1.10,
Socioeconomic Status		1.32)**		1.50 (1.26,	1.34)***
Education		1.51 (1.28,		1.78)***	1.47 (1.24,
Income		1.79)***			1.75)***
Employed			1.04 (0.93,	1.00 (0.91,	
Stressors		0.98 (0.90,	1.16)	1.09)	1.00 (0.92,
Family Stressor		1.07)	1.03 (0.94,	0.99 (0.89,	1.09)
Neighborhood		0.95 (0.85,	1.14)	1.10)	1.00 (0.89,
Stressor		1.06)	1.16 (1.04,	0.97 (0.88,	1.11)
Financial Stressor		0.97 (0.87,	1.30)**	1.07)	0.97 (0.88,
Personal Stressor		1.08)	2.02 (1.70,		1.08)
			2.40)	1.23 (1.09,	
				1.38)**	1.21 (1.08,
				1.05 (0.96,	1.36)**
				1.14)	1.04 (0.95,
				1.32 (1.17,	1.13)

Model 1 PR (95% CI)	Model 2 PR (95% CI)	Model 3 PR (95% CI)	Model 4 PR (95% CI)	Model 5 PR (95% CI)
			1.48) ***	1.30 (1.16,
			1.17 (1.03,	1.47) ***
			1.33) *	1.16 (1.02,
				1.31) *

Abbreviations: ORHP, Obesity-Related Health Problems, N, Sample Size; PR, Prevalence Ratio; CI, Confidence Interval; H/O, History Of; US, United States

* p<.05

** p<.01

*** p<.001