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Weighed down by discriminatory policing: Perceived unfair treatment and black-white disparities in waist circumference



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ABSTRACT

Police maltreatment, whether experienced personally or indirectly through one's family or friends, represents a potentially harmful stressor, particularly for minority populations. We address this issue by investigating: (1) how waist circumference (WC) varies by personal and vicarious exposure to unfair treatment by police (UTBP); and (2) to what extent exposure to UTBP explains the black-white disparity in WC. We employed data collected from a community-based sample of black ($n = 601$) and white ($n = 608$) adults living in Nashville-Davidson county Tennessee to address these questions. Results from our final linear regression model showed that those who reported vicarious UTBP had WCs that were approximately 2 in. greater than those who did not ($b = 2.03$; $p = 0.003$). While personal UTBP was not linked to higher WC, a post-hoc analysis suggested that our ability to detect an association was complicated by selection. Binary mediation analysis revealed that differential exposure to vicarious UTBP accounted for approximately 12% of the black-white WC disparity among women. We found no black-white differences in WC among men. The association between vicarious UTBP and WC did not vary by age, race, or gender. Overall, our findings point toward the role of discriminatory policing as a potential upstream contributor to racial disparities in health.

1. Introduction

1.1. Policing, race, and health

Recent high-profile killings of unarmed men by police were pivotal in the emergence of The Black Lives Matter movement (BLM). The BLM, however, points to these slayings as the visible surface of a much wider and deeply-rooted problem where police regularly intrude on the lives of black citizens (Garza, 2014). A new wave of research seems to corroborate these claims by providing evidence that discriminatory policing represents a potential upstream detriment to population health. For instance, a small but growing body of research shows that aggressive policing is linked to poor mental health (Oh, DeVlyder, & Hunt, 2017; Geller, Fagan, Tyler, & Link, 2014; DeVlyder et al., 2017a; DeVlyder, et al., 2017b) and high levels of police surveillance - the regular monitoring and stopping and search citizens - is linked to increased psychological distress, obesity, and hypertension (Sewell & Jefferson, 2016; Sewell, Jefferson, & Lee, 2016; Sewell 2017).

Also consistent with the claims of the BLM, exposure to police encounters occurs unevenly throughout society with the most invasive policing occurring among minority populations (Fagan, Geller, Davies,

& West, 2010; Bjornstrom, 2015; Glaser, 2015). Nationally representative surveys of US adults show that approximately 40–60% of blacks but only 7–10% of whites report ever having been treated unfairly by police (e.g. Weitzer & Tuch, 2005; Robert Wood Johnson 2017). Community-level data on police stops and searches also point to the heavy burden faced by minority populations. Data collected by the Metro Nashville Police Department (MNPd) and analyzed by a non-profit organization shows that traffic stops in Nashville predominantly occur in low income, black, or Hispanic neighborhoods and that black drivers are five times more likely to be stopped multiple times per year compared to white ones. Moreover, blacks are searched during automobile stops at a rate more than two times that of whites despite the fact that incriminating evidence is found at a higher rate among whites (Gideon's Army, 2016).

In this study we posit that UTBP, experienced personally or vicariously through a close friend or family member, represents a virulent stressor contributing to racial disparities in obesity. UTBP is defined as interactions in which an individual perceives that police are deviating from procedural justice- unequally enforcing the law, making disrespectful comments or gestures, making unnecessary stops and searches, or making threats (Tyler & Wakslak, 2004). Our focus on vicarious

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exposure, represents a unique strength of this study. While exposure to vicarious racism has received a fair amount of scholarly attention (e.g. Heard-Garris, Cale, Camaj, Hamati, & Dominguez, 2017), vicarious exposure to UTBP, in particular, has received very little. However, vicarious exposure to UTBP may be particularly important within the context of stress and health. Black parents often worry that their children will encounter a life shattering interaction with police. This fear has led to the culturally ubiquitous “talk” where black parents instruct their children on how to safely navigate police encounters (Thomas, 2013; Whitaker & Snell, 2016). Given the scope of these phenomena it seems plausible and perhaps likely that having a family or close friend experience UTBP will have detrimental health consequences.

1.2. *Unfair treatment by police as a stressor*

UTBP is conceptualized as a discrete event that is transformed into a chronic strain because it precipitates ruminative stress and heightened vigilance. When UTBP occurs, the inherent power differential between the police and the public is particularly meaningful. Police are afforded tremendous power to use physical violence, impose legal sanctions, and engage in other forms of coercion and inducements by the state. UTBP simultaneously represents a threat to physical safety, freedom, financial wellbeing, sense of agency, and sense of self (Harris, 2010; Brunson, 2007; Henning, 2017). One study, for instance, showed that exposure to racial discrimination was associated with increased body mass index (BMI) and waist circumference because those who experienced discrimination also experienced chronic vigilance (Hicken, Lee, & Hing, 2017). This pattern may extend to exposure to UTBP as well.

Criminological research shows that vicariously experienced instances of police maltreatment can result in enduring worry and the erosion of trust in law enforcement (e.g. Warren, 2011; Browning, Cullen, Cao, & Kopache, 1994). Moreover, research suggests that negative vicarious experiences alter perceptions of police to a greater extent than interpersonal encounters (Rosenbaum, Schuck, Costello, Hawkins, & Ring, 2005). Given the pronounced link between exposure to vicarious racism, generally, and worse health (e.g. Heard-Garris et al., 2017; Priest et al., 2013; Williams & Mohammed, 2013), it seems plausible that vicarious exposure to UTBP may also be linked to worse health. In particular, having a family member or close friend experience UTBP may impact health in two possible ways. First, vicarious experiences may initiate or intensify worry about one’s friends and family’s future encounters with police and the ramifications of these interactions. Second, these encounters may induce worry and chronic vigilance that similar encounters may happen to them personally. For instance, knowing someone who was victimized often leads to fear that one will be personally victimized (Agnew, 2002).

1.3. *Waist circumference and the stress and health latency problem*

We focus on obesity, as measured by waist circumference (WC), specifically because we are able to partially overcome the stress and illness latency problem. When stressors are experienced at younger ages they can take decades to manifest as chronic health conditions. WC, in contrast, can change in response to stress in much shorter time spans (i.e. weeks, months, or years rather than decades). Exposure to stress is known to elicit eating foods that are high in calories and saturated fats which, in turn, produce a biochemical response that reduces feelings of distress (Dallman, Pecoraro, & la Fleur, 2005). Moreover, stress is also thought to increase one’s chances of being obese through dysregulation of the hypothalamus-pituitary adrenal (HPA) axis which can result in appetite dysregulation, decreased signaling of satiety, and the accumulation of visceral adiposity (Adam & Epel, 2007).

1.4. *Black-White disparities in waist circumference*

Black-white disparities in obesity are well documented with blacks

being 2–3 times more likely to be obese and have WCs that are considerably greater than their white counterparts (Ogden, Carroll, Kit, & Flegal, 2014; Krueger & Reither, 2015; Wang & Beydoun, 2007). The leading hypothesis thought to explain this difference, termed *the differential exposure hypothesis*, suggests that these disparities emerge and persist because blacks are faced with a higher stress burden than whites (Hummer, 1996; Adler, Boyce, Chesney, Folkman, & Syme, 1993). While past work partially supports this hypothesis, racial variation in exposure to commonly measured social stressors only accounts for a small proportion of racial differences in health outcomes, including obesity (e.g. Sternthal, Slopen, & Williams, 2011). It therefore seems plausible that researchers are failing to consider other important racially patterned stressors (Turner, 2012; Williams & Mohammed, 2013). We advance UTBP as one such stressor that has not been integrated well into health disparities research.

1.5. *Gender and racial disparities in waist circumference*

Racial disparities in obesity-related outcomes including BMI and waist circumference are more pronounced among females (Jackson et al. 2013; Mensah, Mokdad, Ford, Greenlund, & Croft, 2005; Wang & Beydoun, 2007). Moreover, some research reports that exposure to stressors is more likely to result in increased BMI among females than males (Hicken, Lee, & Hing, 2017). In this study, we test whether UTBP exposure partially accounts for black-white disparities in WC separately for women and men.

1.6. *Research aims and hypotheses*

Based on these arguments, we present three hypotheses. First and second, those who report personally or vicariously experiencing UTBP will have higher WCs than those who do not. Third, the black-white disparity in WC will be partially explained by blacks’ disproportionate exposure to UTBP. This hypothesis is presented in the context of knowing that black-white disparities in obesity and WC are usually more pronounced among women. In addition, we perform exploratory analyses regarding potential gender, race, and age-based heterogeneity in the relationship between UTBP and WC. We test these hypotheses using a community-based sample of black and white adults (ages 22–69) living in Nashville-Davidson county Tennessee.

2. **Data and methods**

2.1. *The setting*

Nashville represents an ideal setting to evaluate this study’s aims because it is a large diverse southern urban city with evidence of simmering racial tensions between police and communities of color. For example, MNPd’s controversial Operation Safer Streets has been publicly accused of criminalizing minorities (Gonzalez, 2016). Nashville also represents an ideal setting because the MNPd engages in proactive policing – practices that include actively engaging citizens through stops and searches in high-crime areas to detect expectant criminal activity in order to disrupt situations interpreted to be indicative of crime (Geller et al., 2014). Moreover, interviews with black community members described police frequently engaging in aggressive behavior and making racial insults and threats of violence (Gideon’s Army, 2016). Overall, if UTBP exposure is linked to racial differences in WC, Nashville represents a city where we are likely to detect this phenomenon.

2.2. *Study sample*

Data come from the Nashville Stress and Health Study (NSAHS), a probability sample of non-Hispanic black and white adults living in Davidson County, TN (<http://vanderbilt.edu/stressandhealthstudy/>).

Survey Sampling International generated a random sample of 199 block groups in Davidson County. To adequately sample black households, block groups were stratified by the percentage of black residents (2010 Census). The study design included a random sample of 1252 adults living in the sampled and stratified block groups. Approximately 61% of contacted households agreed to participate in the study. The average computer-assisted interview lasted approximately 3 h. Trained same-race interviewers conducted all interviews in the respondent's home or on Vanderbilt University's campus.

The primary purpose of NSAHS is to examine black/white and socioeconomic disparities in health. The morning after the in-person interview, a trained clinician visited the respondent to measure height, weight, waist circumference, and other metabolic indicators. Data collection occurred between April of 2011 and January of 2014. We handled missing data on UTBP ($n = 1$), parental education ($n = 112$), and financial strain in childhood ($n = 1$) through a regression-based imputation procedure (Landerman, Land, & Pieper, 1997). Forty-three cases with missing WC data were dropped giving a final sample size of $N = 1,209$.

2.3. Key measures

Waist circumference was measured by trained clinical interviewers using standard protocols put in place by the Allostatic Load Working Group of the McArthur Research Network. WC was measured in inches using a tape measure just above the upper hip bone. All analyses were replicated using BMI as an alternative measure of adiposity.

Perceived unfair treatment by police comes from one question from the major discrimination measure (Williams, Yu, & Jacksonm 1997). Respondents were asked "Have you or anyone close to you ever had the following experience: "been treated unfairly by police (e.g., stopped, searched, questioned, physically threatened or abused)?" Those responding "yes" were probed whether it happened to them, a spouse, child, or another relative or close friend. Those answering affirmatively to experiencing personal UTBP led to routing past the vicarious UTBP response. This prohibited us from identifying those that experienced both personal and vicarious UTBP. Two variables were created that indicated whether the respondent personally experienced UTBP or vicariously experienced it (Yes = 1). Those identified as having experienced vicarious UTBP did not experience personal UTBP.

We also utilized an item that asks the respondent about when UTBP occurred. The interviewer asked "when was the last time this occurred?" Responses including 1 "in the last month", 2 "in the last six months", 3 "in the last year", and 4 "over a year ago."

2.4. Statistical controls

This study includes an extensive suite of covariates to address potential spuriousness. We identified the following factors as important controls because they are feasibly linked to race, UTBP, and WC: sociodemographic characteristics, stressful life events, and exposure to other types of discrimination, (Geller et al., 2014; DeVlyder et al., 2016; Williams & Mohammed, 2013; Burdette & Hill, 2008). Mental health disorders are also considered because they are frequently linked to obesity and police disproportionately interact with those that have higher rates of mental health disorders (Sugie & Turney, 2017). Similarly, we included indicators of previous trouble with the law controls because UTBP may be correlated with any type of contact and WC (Archibald, Parker, & Thorpe, 2018).

Sociodemographic characteristics were measured with several variables including: age (continuous years), educational attainment of parent (college degree = 1), and financial strain in childhood. The latter variable asked about their family's ability to pay for basic necessities with answers ranging from 1 "could easily afford" to 5 "could not afford." *Years of education* measured years of formal education completed. *Financial strain* in adulthood was measured as a mean

response to six items asking about difficulty in meeting basic needs (Chronbach's $\alpha = 0.82$). *Stressors* were measured using two variables including: the number of stressful life events prior to age eighteen and the number of stressful life events experienced after age seventeen (see McFarland, Taylor, Hill, & Friedman, 2018).

Discrimination was measured by two indices developed by Williams, Yu, Jackson, and Anderson (1997). Perceived everyday discrimination was based on seven items that asked the respondent about the frequency they experience discrimination (e.g. treated with less courtesy than other people, called names). Responses ranged from never "1" to almost always "5" and were averaged (Chronbach's $\alpha = 0.85$). Our measure of perceived unfair treatment asked if the respondent or someone close to the respondent had experienced unfair treatment in various life domains (e.g. school, work, and housing). We summed the number of domains in which unfair treatment occurred (see Williams et al., 1997). UTBP was excluded from this count variable. *Mental health* was measured with two variables. Ever having had generalized anxiety (yes = 1) or major depressive disorder (yes = 1) were measured via the Composite International Diagnostic Interviewer (CIDI) (for more information see Turner & Lloyd, 1999).

Legal problems were measured using three dichotomous indicators: the respondent was stopped or arrested for alcohol more than once (yes = 1), was accused or arrested of crime in last 12 months (yes = 1), and had someone close accused or arrested of crime in last 12 months (yes = 1).

2.5. Analytical strategy

We begin our analysis by presenting descriptive statistics stratified by race and conduct bivariate tests of whether WC varies by race (see Table 1). Descriptive statistics are also stratified by gender because prior evidence suggests the black-white disparity in WC might be limited to women. Whether this is the case in our data is important because it will tell us whether to include men in the mediation analysis. We subsequently present descriptive statistics stratified by gender and UTBP (see Table 2) and conduct bivariate tests of whether WC varies by UTBP. Next, we turn our attention to how UTBP is linked to WC after accounting for statistical controls in Ordinary Least Squares (OLS) multivariate regression models (Table 3). Our general strategy is to first test for associations using a baseline model with minimal demographic control variables and then test for these associations after including all covariates. Model 1 tests for black-white disparities in WC. Model 2 includes measure of UTBP into the model and tests for associations between UTBP and WC. Models 3 and 4 replicate those of 1 and 2 except they include the full set of statistical controls. We also show these models stratified by gender. Multicollinearity did not pose a problem, as the highest variance inflation factor did not exceed 2.02.

Next, we conducted mediation analysis to test the extent to which UTBP mediates the black-white disparity in WC using binary mediation models. Because we only find a black-white disparity in WC among women, we restrict our mediation analysis to women as well. Our two proposed mediators are dichotomous, thus the path coefficients and standard errors were rescaled (see <http://www.nrpsychcom/mediation/logmed.html>) prior to calculating indirect associations (not shown). Mediation analyses were conducted using STATA's binary mediation command (see Ender, 2011) and standard errors were calculated using bootstrapping methodology with 1000 replications. All regression models included fixed effects for census tracts because UTBP may be a proxy for living in heavily policed neighborhoods with high levels of crime. These fixed effects help guard against omitted variable bias due to neighborhood conditions. Finally, we tested whether any associations between UTBP (both personal and vicarious) and WC varied by race, age, and race and gender. They did not (see Appendix B).

Table 1
Descriptive statistics stratified by race and gender (N = 1, 209).

	Blacks ^d	Whites ^e	Black Women ^f	White Women ^g	Black Men ^h	White Men ⁱ	Range	
	(n = 601) Mean/Percent	(n = 608) Mean/Percent	(n = 315) Mean/Percent	(n = 323) Mean/Percent	(n = 286) Mean/Percent	(n = 285) Mean/Percent	Min	Max
Waist circumference (inches)	40.05 ^{***}	37.94 ^{***}	41.06 ^{***}	36.74 ^{***}	38.94	39.30	23.5	126
Personal unfair treatment by police (% yes)	24.63 ^{***}	10.86 ^{***}	13.97 ^{***}	6.19 ^{***}	36.36 ^{***}	16.14 ^{***}	0	100
Vicarious unfair treatment by police experienced by family/friend (% yes)	21.13 ^{***}	7.73 ^{***}	26.35 ^{***}	8.67 ^{***}	15.38 ^{***}	6.67 ^{***}	0	100
Age	46.01	45.84	45.33	46.44	46.76	45.16	22	69
Female (% female)	52.41	53.13	–	–	–	–	0	100
Parent has college degree (% yes)	16.14 ^{***}	32.24 ^{***}	17.46 ^{***}	29.41 ^{***}	14.69 ^{***}	35.44 ^{***}	0	100
Financial strain in childhood	2.76 ^{***}	2.41 ^{***}	2.75 ^{***}	2.42 ^{***}	2.77 ^{***}	2.40 ^{***}	1	5
Years of education completed	13.05 ^{***}	14.99 ^{***}	13.17 ^{***}	15.00 ^{***}	12.92 ^{***}	14.98 ^{***}	1	25
Current financial strain	1.58 ^{***}	1.42 ^{***}	1.61 ^{***}	1.46 ^{***}	1.56 ^{***}	1.38 ^{***}	1	3
Stressful life events experienced in childhood (count)	3.57 ^{***}	3.06 ^{***}	3.42	3.00	3.73	3.14 ^{***}	0	18
Stressful life events experienced in adulthood (count)	3.69 ^{***}	2.99 ^{***}	3.89 ^{***}	3.14 ^{***}	3.47 ^{***}	2.83 ^{***}	0	13.2
Discrimination	2.11 ^{***}	1.92 ^{***}	2.09 ^{***}	1.90 ^{***}	2.13 ^{***}	1.95 ^{***}	1	4.78
Perceived unfair treatment (count)	1.46 ^{***}	1.09 ^{***}	1.51 ^{***}	1.15 ^{***}	1.41 ^{***}	1.03 ^{***}	0	6
Anxiety disorder (% ever)	3.83 ^{***}	10.03 ^{***}	5.71 ^{***}	13.62 ^{***}	1.75 ^{***}	5.96 ^{***}	0	100
Depression (% ever)	12.81 ^{***}	30.26 ^{***}	16.83 ^{***}	34.06 ^{***}	8.39 ^{***}	25.96 ^{***}	0	100
Stopped/arrested for alcohol more than once (% yes)	3.99	2.47	1.59	2.17	6.64 [†]	2.81 [†]	0	100
Accused/arrested of crime in last 12 months (% yes)	3.00	2.80	1.27	2.48	4.90	3.16	0	100
Family/friend accused of crime in last 12 months (% yes)	11.48	9.05	13.33	10.84	9.44	7.02	0	100

* p < 0.05 based on a two-sample t-test or a Pearson χ^2 test by race.

** p < 0.01,

*** p < 0.001,

^d compared to whites.

^e compared to blacks.

^f compared to white women.

^g compared to black women.

^h compared to white men.

ⁱ compared to black men.

3. Results

3.1. Unfair treatment by police and waist circumference

Table 1 presents black-white compositional differences in means or percentages for all study variables. WC was normally distributed

(mean_{blacks} = 40.07, standard deviation = 7.84; mean_{whites} = 37.93, standard deviation = 6.97) with blacks having higher levels than whites (t = 5.0; p < .001). Table 1 also shows that this disparity only exists among women. Perceived UTBP was fairly common in this sample with 32% of the full sample reporting either personal or vicarious unfair treatment. Reports of UTBP differed markedly by race,

Table 2
Descriptive statistics stratified by gender and perceived unfair treatment by police.

	Women			Men		
	Unfair to Self (n = 64)	Unfair to Other (n = 111)	No Unfair Treatment (n = 463)	Unfair to Self (n = 150)	Unfair to Other (n = 63)	No Unfair Treatment (n = 358)
Waist circumference (inches)	39.54	41.68 ^{**}	38.10	39.08	40.37	38.92
Age	44.78	44.39	46.41	44.22 [†]	45.46	46.78
Parent has college degree (% yes)	14.06 [†]	23.42	24.89	23.33	25.81	25.63
Financial strain in childhood	2.73	2.65	2.55	2.74 ^{**}	2.78 [†]	2.49
Years of education completed	13.09 ^{**}	13.81	14.30	12.98 ^{***}	14.05	14.33
Current financial strain	1.84 ^{**}	1.53	1.49	1.59 ^{***}	1.50	1.41
Stressful life events experienced in childhood (count)	5.19 ^{***}	3.67 [†]	2.82	4.97 ^{***}	3.41	2.79
Stressful life events experienced in adulthood (count)	5.24 ^{***}	4.31 ^{***}	3.08	3.45 ^{**}	4.21 ^{***}	2.84
Discrimination	2.50 ^{***}	2.11 ^{***}	1.89	2.25 ^{***}	2.19 ^{***}	1.93
Perceived unfair treatment count (count)	1.92 ^{***}	1.96 ^{***}	1.09	1.76 ^{***}	1.75 ^{***}	0.90
Anxiety disorder (% ever)	9.38	14.41	8.64	2.00	4.75	4.75
Depression (% ever)	32.81	24.32	24.84	14.67	17.46	18.16
Stopped/arrested for alcohol more than once (% yes)	7.81 ^{**}	2.70	0.86	11.33 ^{***}	1.59	2.51
Accused/arrested of crime in last 12 months (% yes)	7.81 ^{***}	0.90	1.30	9.33 ^{***}	1.59	2.23
Family/friend accused of crime in last 12 months (% yes)	18.75 [*]	18.92 ^{**}	9.50	10.00	15.87 ^{**}	6.15

P values were assessed based off the results of either a two-sample t-test or a Pearson χ^2 test.

* p < .05;

** p < .01;

*** p < .001 based on a within-race test compared to those not reporting unfair treatment.

Table 3
Waist circumference regressed on race and unfair treatment by police.

	Full Sample (N = 1209)				Women (N = 638)				Men (N = 571)			
	Model 1 ^e	Model 2 ^e	Model 3 ^f	Model 4 ^f	Model 5 ^e	Model 6 ^e	Model 7 ^f	Model 8 ^f	Model 9 ^e	Model 10 ^e	Model 11 ^f	Model 12 ^f
Black (ref. = whites)	1.40 [*] (0.60)	0.99 (0.61)	1.44 [*] (0.62)	1.16 ^a (0.63)	2.66 ^{**} (0.91)	2.17 [*] (0.92)	3.04 ^{**} (0.95)	2.68 ^{**} (0.97)	-0.21 (0.80)	-0.45 (0.81)	-0.34 (0.82)	-0.53 (0.83)
Personal UTBP [§]	-	0.01 (0.62)	-	-0.17 (0.66)	-	0.32 (1.15)	-	-0.64 (1.24)	-	0.56 (0.73)	-	0.47 (0.80)
Vicarious UTBP [§]	-	2.36 ^{***} (0.61)	-	2.00 ^{**} (0.68)	-	2.37 [*] (0.94)	-	2.04 [*] (0.97)	-	1.86 ^a (0.95)	-	1.74 ^a (1.00)
Adjusted R ²	0.05	0.06		0.06	0.13	0.14	0.13	0.14	0.00	0.01		0.00

^a p < .10;

^{*} p < .05;

^{**} p < .01;

^{***} p < .001 (two-tailed tests); standard errors in parentheses. UTBP = unfair treatment by police.

^e These models include covariates for age, gender, parental education, financial strain in childhood, and fixed effects for census tract.

^f Includes all study covariates.

[§] The reference group consists of those that did not report any type of unfair treatment by police.

however. Blacks were more likely to report personal (24.9%) and vicarious (20.9%) UTBP compared to their white counterparts (personal UTBP: 10.8%; $\chi^2 = 41.1$; $p < 0.001$; vicarious UTBP: 7.7%; $\chi^2 = 43.1$; $p < .001$). Overall, 45.8% of blacks reported personal or vicarious UTBP compared to 18.5% among whites ($\chi^2 = 103.3$; $p < 0.001$). Men were more likely to report personal UTBP while women were more likely to report vicarious UTBP. Blacks were also more disadvantaged on socioeconomic indicators and had more exposure to stressors and discrimination. Whites were more likely to have had depression or generalized anxiety disorder.

Table 2 presents descriptive statistics stratified by gender and UTBP. Women who reported personal UTBP did not differ in WC from women who reported no UTBP. Women who experienced vicarious UTBP had higher WCs than women who did not report UTBP ($p < 0.01$). Men who reported personal or vicarious UTBP did not differ in WC from those who did not report UTBP.

Pronounced within-race compositional differences were observed depending on exposure to personal, vicarious, or no exposure to UTBP for blacks and whites (not shown). In particular, blacks who experienced personal UTBP tended to be disadvantaged compared to their non-exposed counterparts on financial strain, stressful life events, discrimination, unfair treatment, and past legal history. Blacks who experienced vicarious UTBP were fairly similar to those who did not experience UTBP but were disadvantaged in terms of stressful life events in adulthood, discrimination, and unfair treatment. These compositional differences were similar among whites.

Pronounced within-gender compositional differences were observed as well as seen in Table 2. In particular, women who experienced personal UTBP tended to be disadvantaged compared to their non-exposed counterparts on exposure to financial strain, educational attainment, stressful life events, discrimination, unfair treatment, and past legal history. Women who experienced vicarious UTBP were disadvantaged in terms of exposure to stressful life events in adulthood, discrimination, unfair treatment, and having a family member or friend accused of a crime. These compositional differences were similar among men. Overall, Table 2 presents support that vicarious UTBP exposure is linked to higher WCs, but pronounced compositional differences that vary by UTBP exposure suggest multivariate test of these associations are required.

Table 3 presents the results of a series of multivariate models predicting WC. Model 1 reveals marked racial disparities in WC as blacks had elevated WC compared to whites ($b = 1.42$; $p < .05$). Model 2 shows that personal UTBP was unrelated to WC while those who experienced vicarious UTBP had higher WCs compared to those who did not experience UTBP ($b = 2.37$; $p < 0.001$) after controlling for

baseline demographic characteristics. The inclusions of UTBP into model 2 decreased the black-white difference in WC (i.e. from 1.42 to 1.01). Models 3 and 4 show that these same results remain after including the full array of study controls. In particular, vicarious UTBP was positively associated with WC ($b = 2.02$; $p < 0.01$) and the inclusion of this variable into the model decreased the black-white disparity in WC (i.e. from 1.40 to 1.16). Table 3 also shows the black-white disparity in WC is only extant among women, personal UTBP was not associated with WC among women or men, and vicarious UTBP was positively associated with WC among both women and men. Overall, Table 3 provides suggestive evidence that vicarious UTBP may mediate the black-white difference in WC seen among women.

3.2. Probing for evidence of selection

Because we found no evidence for our hypothesis that personal UTBP and WC would share a positive association (see Table 3), we performed a post hoc analysis to test whether those who experienced personal UTBP had lower WC's at the time of exposure – which would provide evidence for health selection. If this is the case, we would expect to see people with the smallest WC near the time of exposure and observe increases in WC with increases in time since exposure. We tested this possibility by regressing WC on time since UTBP, an ordinal variable described in the measures section. We used a linear regression model after including controls for race, gender, age, parental education, and financial strain in childhood and limiting the model to those who reported personal UTBP. The results of this regression were plotted in Fig. 1. It shows a positive association between time since personal UTBP and WC ($b = 1.28$; $p = 0.06$). The mean WC for those not exposed to any UTBP is also shown as a point of comparison in the figure. No evidence was found for selection among those reporting vicarious UTBP ($b = -0.69$; $p = 0.33$).

The inclusion of some older adults in the model may be conflating the association between personal UTBP and WC. In order to identify those that were likely to have experienced policing outside of the proactive policing model, we tested whether there was an association between age – collapsed into three categories 22–35, 36–50, and 51–69 – and time since personal UTBP. We found that those ages 51–69 were more likely to report UTBP that occurred more than a year ago ($\chi^2 = 12.7$; $p < 0.05$) than their younger counterparts. While we cannot definitively identify those who experienced UTBP prior to implementation of proactive policing practices, we identified this group as especially likely to have done so.

Next, we removed those who experienced personal UTBP in the last year and those who likely experienced personal UTBP in the distant past (i.e. those over fifty that experienced UTBP more than a year prior to the study) from our analysis and re-ran models 2 (for both men and

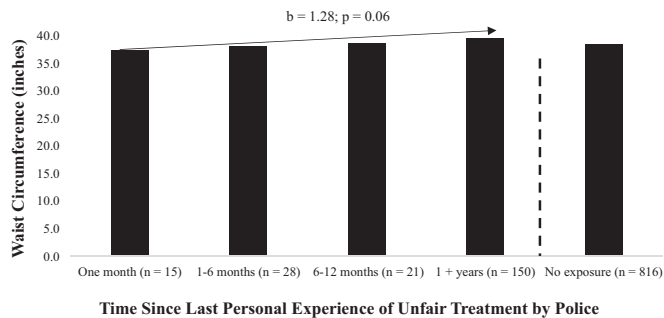


Fig. 1. Average Waist Circumference by Amount of Time, Since Last Experience of Personal Unfair Treatment by Police. Notes: The solid line reflects the positive association between time since personal UTBP and waist circumference based on a linear regression among those that reported a personal experience of unfair treatment by police (n = 214). Controls for age, gender, race, parental education, and financial strain in childhood were included. The dashed line signifies that those that did not report any type of UTBP were not included in the regression. The average waist circumference among those that did not report any type of unfair treatment by police is presented as a point of reference.

women), 6 (women only), and 10 (men only) from Table 3. These models showed that women and men who reported personal UTBP had WCs that were 2.5 and 1 in. larger, respectively, than their non-exposed counterparts (See Appendix Table A). While the magnitude of these associations were consistent with those between vicarious UTBP and WC ($b_{\text{women and men}} = 1.02; p = 0.21; b_{\text{women}} = 2.46; p = 0.12; b_{\text{men}} = 1.05; p = 0.22$), they were not statistically different from zero. Limited power was a concern. Assuming the association between UTBP and WC was two, the power to detect these associations in models 1–3 was 0.74, 0.47, and 0.42, respectively.

3.3. Mediation analysis

Fig. 2 present our mediation analyses for UTBP among women. We find a significant indirect association for vicarious ($z = 2.32; p < 0.05$) but not personal ($z = -0.86; p > 0.05$) UTBP. Based on this analysis, 12% of the black-white disparity in WC was explained by vicarious UTBP. Taken together, our analyses suggest that black women have higher WCs than white women, in part because they are more likely to experience vicarious UTBP. There is no evidence to support personal UTBP as a mechanism underlying the black-white gap in WC.

3.4. Robustness checks

We tested the possibility of subgroup variation in the associations between UTBP and WC using two OLS regression models for eight sub-populations. Our samples were stratified by race (i.e. black and white),

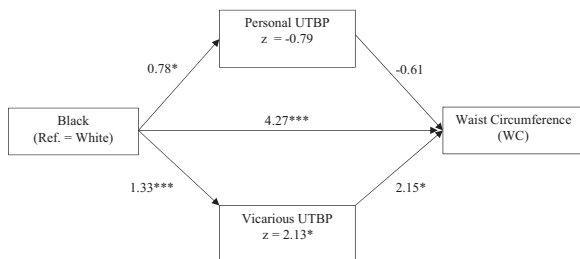


Fig. 2. Mediation analysis predicting WC among women with all study control variables included as covariates. Reported coefficients are unstandardized. UTBP = Unfair treatment by police. Z statistics and standard errors were calculated using a bootstrap method with 1000 replications. Proportion of total association mediated due to UTBP experienced by family or friend = 0.12. ***p < .001, *p < .05 (two-tailed). Standardized indirect effect for personal UTBP = -.01. Standardized indirect for vicarious UTBP = 0.03.

age (i.e. those for younger than thirty compared to those thirty or older), and both race and gender (i.e. black females, white females, black men, and white men). The first model tests for these associations net of basic controls while the second tests them after including all study controls. We tested whether the UTBP coefficients varied across subpopulation using a t-test. Overall, our results are consistent with our main results from Table 3 as none of the coefficients varied by subpopulation (See Appendix A). All study findings were replicated using BMI as the outcome. These analyses provided identical substantive results as those reported here. Finally, other ancillary models showed our key findings were robust in models that examined personal and vicarious UTBP separately.

4. Conclusion

This study showed that those reporting vicarious UTBP had higher WCs than those not reporting UTBP. Moreover, exposure to vicarious UTBP explained about 12% of the black-white disparity in WC among women. Personal UTBP was not associated with WC and did not contribute to the black-white gap in WC.

Our data point to two phenomena that may have obfuscated our efforts to detect an association between personal UTBP and WC. First, it seems plausible that the people most at risk for experiencing personal UTBP spend more time in public places and are slimmer than their counterparts than their less at-risk counterparts. Evidence shows that people who spend more time doing indoor activities, like watching television, using the computer, and working on arts and crafts, are more likely to be obese than their counterparts who spend more time on activities outside the home (Patel, Spaeth, & Basner, 2016). If personal UTBP leads to increased WC and this type of selection is occurring we would expect that WC should be larger as time since personal UTBP increases.

Second, older adults may have experienced a qualitatively different kind of UTBP because of historical shifts in policing style over the past 20–25 years (Heymann, 2000). In particular exposure to personal UTBP in the context of the proactive policing model may have been more detrimental than similar exposure outside of proactive policing practices because of worry and chronic vigilance about future encounters. To test whether these phenomena might be preventing us from detecting a true association, we excluded those who reported UTBP as occurring within the last year and those older than fifty from our analysis. We found suggestive evidence that those reporting personal UTBP had larger WCs than those that did not. This evidence was only suggestive because the key associations were not statistically significant – which was likely due limited statistical power.

Our findings suggest there are collateral consequences for people of color that have not been previously considered when evaluating the ramifications of proactive policing practices. Proactive models of policing advocate methods such as stopping people for minor crimes or no crimes at all. From a community level, the justification for such action is that it leads to the arrest and detainment of a small number of potentially violent criminals and thus decreases the amount of violent crime more broadly. The utility of these practices has been a subject of debate among researchers and policy makers with the general consensus that small decreases in violent crime are possible with hefty increases in proactive and invasive policing (e.g. Fagan, 2017). At a personal level, the stopping, searching, and detaining of innocent people has been argued by proactive policing advocates to be little more than a nuisance for innocent people (Kelling & Bratton, 2015; Kelling & Cole, 1996), implying that the costs of inconveniencing people are worth the benefits of decreasing violent crimes. Our research counters this argument by revealing the “stress burden” incurred by those who vicariously experienced UTBP.

Several study limitations are noteworthy. First, UTBP was measured retrospectively and is therefore susceptible to recall errors, especially age-based recall errors. While this limitation remains a concern, its seriousness as a threat to our findings is mitigated by the fact that recall bias generally leads to underreports of stressful life events (Glasner & Van der

Vaart, 2009). Thus, our tests were likely conservative estimates of the association between UTBP and WC. Second, we were not able to measure one’s history of incarceration, which may have led to a spurious association. This limitation is offset, however, by the finding that UTBP was only related to WC among those who experienced it vicariously. Third, our external validity is limited to a small geographical area.

Our indicators of UTBP were quite blunt, did not account for one’s the life course history with police, and did not include other relevant factors that may imbue police interactions with a particular sense of salience and meaning. Future research should assess police interactions and pay particular attention to the frequency, severity, timing, and context in which they occur. The extent to which a stressor is perceived as stressful is dependent on its perceived threat, predictability, and ability to control it. The frequency, type, and severity of UTBP exposure will likely combine with one’s personal, network-based and collective experiences with police, to influence these characteristics. The current study does not have such exposures. Moreover, based on our measure of UTBP we do not know how far in the past (beyond one year) the event occurred. Finally, longitudinal data would have been optimal for mediation analysis and the utilization of cross-sectional data thus represents a limitation (MacKinnon, 2008). This limitation, however, is somewhat mitigated by the fact that reverse causation seems unlikely in

the three associations underlying the mediating influence of vicarious UTBP. In particular, it seems unlikely that WC influenced one’s exposure to vicarious UTBP.

This study adds to a growing body of work pointing to discriminatory policing practices as a potential upstream contributor to population health and racialized health disparities (Geller et al., 2014; Sewell et al., 2016; Sewell, 2017; Sewell, 2016; DeVlyder et al., 2016). Given that scholars are frequently unable to empirically account for the social factors that underlie racial disparities in health and mortality, UTBP represents a promising avenue of study that may help do so. This study points to the “stress burden” of vicarious UTBP incurred by African Americans in the Nashville area. To the extent that exposure to UTBP is shaped by top-down police policies, alterations to these policies might serve as a lever capable of improving the health of minorities living in urban areas. For this reason, future research that examines linkages between police practices and policies, discriminatory policing, and health disparities is urgently needed.

Ethics

This research uses de-identified human data that does not meet the definition of human subjects research.

Appendix Table A. Waist circumference regressed on unfair treatment by police among those fifty or younger that did not report unfair treatment within the last year

	Full Sample (N = 628)	Women (N = 337)	Men (N = 291)
	Model 1 ^a	Model 2 ^a	Model 3 ^a
Personal UTBP	1.023 (0.805)	2.463 (1.585)	1.050 (0.853)
Vicarious UTBP	1.712 (0.889)	0.975 (1.232)	2.545 * (1.234)
Adjusted R ²	0.04	0.13	0.04

* p < .05 (two-tailed tests); standard errors in parentheses. UTBP = unfair treatment by police.
^a This model includes covariates for age, race, gender, parental education, and financial strain in childhood.

Appendix B. Waist circumference regressed on race and unfair treatment by police

Panel A								
	Model 1 ^a	Model 2 ^b	Model 3 ^a	Model 4 ^b	Model 5 ^a	Model 6 ^b	Model 7 ^a	Model 8 ^b
	Blacks (n = 601)		Whites (n = 608)		Age < 30 (n = 100)		Age ≥ 30 (n = 1,109)	
Personal UTBP	0.15 (0.86)	-0.11 (0.93)	-0.15 (0.95)	0.02 (1.04)	-4.47 (4.60)	-0.92 (5.43)	-0.15 (0.64)	-0.31 (0.69)
Vicarious UTBP ^c	1.65† (0.87)	1.29 (0.90)	3.16** (1.08)	3.10 (1.13)	5.12 (3.43)	3.30 (3.74)	2.34** (0.69)	1.99† (0.71)
Adjusted R ²	0.02	0.02	0.17	0.17	-0.08	-0.06	0.04	0.05

Panel B								
	Model 9 ^a	Model 10 ^b	Model 11 ^a	Model 12 ^b	Model 13 ^a	Model 14 ^b	Model 15 ^a	Model 16 ^b
	Black Women (n = 315)		Black Men (n = 286)		White Women (n = 323)		White Men (n = 285)	
Personal UTBP	0.55 (1.70)	0.03 (1.87)	0.68 (0.97)	0.35 (1.09)	-0.92 (2.05)	-1.67 (2.26)	0.37 (1.22)	0.39 (1.36)
Vicarious UTBP ^c	2.13 (1.33)	1.99 (1.39)	2.24† (1.26)	1.84 (1.36)	2.25 (1.65)	1.87 (1.73)	2.95† (1.72)	2.91 (1.84)
Adjusted R ²	-0.02	-0.04	0.06	0.06	0.21	0.23	0.05	0.02

† p < .10; * p < .05; ** p < .01; *** p < .001 (two-tailed tests); standard errors in parentheses. UTBP = unfair treatment by police.
^a All models include covariates for age, gender, parental education, and financial strain in childhood.
^b Includes all study covariates.
^c The reference group consists of those that did not report any type of unfair treatment by police.

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