Cultural Diversity and Ethnic Minority Psychology

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Not Just Sticks and Stones: Indirect Ethnic Discrimination Leads to Greater Physiological Reactivity

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Objectives: We examined the effect of indirect ethnic discrimination on physiological reactivity (i.e., cortisol, blood pressure, heart rate) in Latino emerging adults. ***Method:*** Participants (N = 32) were randomly assigned to be exposed to indirect ethnic discrimination (experimental condition) or not (control condition) while undergoing a cognitive stress task. ***Results:*** Greater total cortisol output was observed in participants in the experimental condition, relative to those in the control condition. No significant differences in heart rate or blood pressure were noted. ***Conclusions:*** Results suggest that witnessing ethnic discrimination affects cortisol recovery responses, but not cardiovascular reactivity. Words that are not intentionally hurtful or directed at a specific person may still "hurt"—affecting biological processes associated with hypothalamic-pituitary-adrenocortical (HPA) axis and potentially leading to long-term health consequences.

Keywords: vicarious discrimination, indirect discrimination, Latino, stress, cortisol

Imagine overhearing this: "My biology partner is Mexican and she always corrects me when I don't say her name 'right.' Why doesn't she just pronounce her name like normal Americans?" Some people would not think twice about this statement, whereas others may be bothered yet unable to pinpoint what exactly is offensive about it. The observer might note that the comment was not directed at him/herself, that it was not meant to be offensive, and/or that confronting the people involved about the offensiveness of the statement would not be worth his or her effort. Little is known about the physiological consequences of such indirect ethnic discrimination (Paradies et al., 2015). We define ethnic discrimination as biased actions or behaviors, including verbal statements, toward an individual or group based on their ethnic background (Fishbein, 1996). Further, indirect discrimination is defined as witnessing or overhearing discrimination. In this current study, we explore whether or not simply witnessing ethnic discrimination affects biological stress and health. Unlike direct discrimination, indirect discrimination does not pose a social-evaluative threat—which elicits the strongest cortisol responses (Dickerson & Kemeny, 2004). Thus, instead of investigating whether indirect ethnic discrimination evokes a biological stress response, we examine the effect of indirect ethnic discrimination on physiological reactivity, and recovery in particular, in the context of having completed a challenging task.

Direct Ethnic Discrimination Is a Life Stressor

Previous research consistently demonstrates that people of color experience multiple forms of psychosocial stress related to their race and ethnicity, which has consequences for health (Clark, Anderson, Clark, & Williams, 1999; Harrell et al., 2011; Harrell, Hall, & Taliaferro, 2003; Harrell, 2000; Paradies et al., 2015; Pascoe & Smart Richman, 2009; Williams & Mohammed, 2009). Experiences of ethnic discrimination may lead to poorer health through multiple pathways, including initiation of acute psychological and physiological stress responses that over time are associated with psychopathology and pathophysiological processes (Paradies et al., 2015). Relevant to our current investigation, physiological stress responses include activation of the hypothalamic-pituitary-adrenocortical (HPA) system, which involves the release of the stress hormone cortisol, and activation of the sympathetic adrenal medullary axis (SAM), which involves measurable changes in cardiovascular functioning (e.g., heart rate and blood pressure). In addition to acute activation of these systems, prolonged activation of stress responses through repeated exposure to ethnic discrimination has deleterious consequences for health (Brondolo et al., 2011; Paradies et al., 2015).

Despite the theorized pathway to HPA activation, only a few studies have explored the association between direct ethnic discrimination and HPA activity (Cohen et al., 2006; Fuller-Rowell, Doan, & Eccles, 2012; Kaholokula et al., 2012; Ratner, Halim, & Amodio, 2013; Richman & Jonassaint, 2008; Townsend, Eliezer, Major, & Mendes, 2014; Weinstein et al., 2013). To our knowledge, no studies have examined this association experimentally. However, there are compelling theoretical and practical reasons to investigate the causal pathway between ethnic discrimination and HPA activation, so that we can elucidate the mechanisms through which ethnic and racial stressors influence health. In terms of SAM

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activation, experimental studies have also found associations between racial discrimination and various cardiovascular responses. For example, using a visual imagery paradigm, Neblett and Roberts (2013) asked African American college students to imagine blatant and subtle racial discrimination and measured their autonomic responses via respiratory sinus arrhythmia and preejection period. They found that associations between imagining racist encounters and autonomic reactivity were moderated by racial identity. Another study simulated racial discrimination (i.e., confederate "researcher" looked at a potential participant and decided s/he would not be eligible for a study based on grade point average, GPA) and found immediate and enduring (i.e., 24 hr later) effects on cardiovascular outcomes (Hoggard, Hill, Gray, & Sellers, 2015).

The Impact of Indirect Discrimination on Health Is Less Clear

Although Harrell (2000) argues that vicarious racism is a race-related stress that people of color face, the majority of previous research studies have focused on direct, rather than vicarious (indirect), experiences with discrimination. In fact, Paradies et al.'s (2015) meta-analyses of studies published between 1983 and 2013 indicate that only 18% of studies of racism assessed indirect discrimination. Further, there were only six studies that examined indirect discrimination and physical health—which broadly included blood pressure, overweight, heart conditions/illnesses, diabetes, cholesterol, and other medical conditions.

Examples of indirect (i.e., vicarious) discrimination include overhearing negative comments about one's group. Research suggests that indirect discrimination is more prevalent than direct discrimination (Priest, Perry, Ferdinand, Paradies, & Kelaher, 2014; Tynes, Giang, Williams, & Thompson, 2008). Witnessing discrimination directed toward ingroup members may bolster the belief that discrimination is pervasive, which is more costly to well-being than attributing single events to discrimination (Schmitt, Branscombe, Postmes, & Garcia, 2014). Furthermore, members of ethnic minority groups may be impacted by stereotypes and stigma even when they are not direct targets of discrimination (Feagin, 1991; Harrell, 2000; Huynh & Fuligni, 2012; Quintana & McKown, 2008).

The limited research on the physiological effects of indirect racial/ethnic discrimination has yielded mixed results. For example, indirect racial discrimination is associated with blood pressure (BP) reactivity and anger (Armstead, Lawler, Gorden, Cross, & Gibbons, 1989; Fang & Myers, 2001), but not with heart rate (HR; Fang & Myers, 2001). In terms of HPA activity, one study found that recent exposure to a highly publicized racial incident is associated with a heightened stress response as demonstrated by elevated cortisol levels (Richman & Jonassaint, 2008). Similarly, viewing a racially charged movie clip was associated with increased cortisol production in African Americans (Weinstein et al., 2013). Given the mixed findings on cardiovascular response and scant evidence on HPA response to indirect ethnic discrimination, additional studies are needed to understand how these common experiences impact physiological reactivity.

In sum, there is strong evidence that *direct* racial/ethnic discrimination affects cardiovascular reactivity and emerging evidence that it is associated with HPA activity. While there are a few studies examining the cardiovascular effects of *indirect* racial/ethnic discrimination, the findings are inconsistent. Thus, it remains unclear whether and to what extent *indirect* racial/ethnic discrimination affects both biological stress mechanisms widely known to be activated under psychosocial stress: activation of the HPA system as indicated by release of cortisol and SAM as indicated by changes in BP and HR. Given the ubiquity of indirect racial/ethnic discrimination, we conceptualize it as a chronic social stressor, and our current study takes a snapshot of the physiological impact of indirect ethnic discrimination.

Effects of Discrimination on Latino Emerging Adults

The association between discrimination and poor health is well-documented among African Americans and adults (Cunningham et al., 2012; Harris et al., 2012; McDonald, Terry, & Tehranifar, 2014) but poorly understood among Latinos, children, and adolescents. Latinos face powerful and pervasive stereotypes of being perpetual foreigners in the United States (Devos & Banaji, 2005; Devos, Gavin, & Quintana, 2010; Devos & Heng, 2009; Devos & Ma, 2008; Huynh, Devos, & Smalarz, 2011; Immigration Policy Center, 2008; Rydell, Hamilton, & Devos, 2010). Assumptions that Latinos are not American (e.g., inquiries about where they are from) send the message that they are not considered American and they do not belong, and this may be a source of chronic social stress.

Latino emerging adults attending college often encounter the additional challenge of coping with stigma associated with their ethnic background (Harwood, Huntt, Mendenhall, & Lewis, 2012; Huber & Cueva, 2012; Minikel-Lacocque, 2013). For instance, although overt discrimination decreases over time, ethnic minority youth may feel devalued by society, and these feelings increase during the transition from adolescence to adulthood (Huynh & Fuligni, 2012). Further, these perceptions of devaluation contribute to somatic and depressive symptoms (Huynh & Fuligni, 2012). A meta-analysis indicates that greater stress reactivity and poor recovery from laboratory stress are associated with higher future systolic and diastolic BP and poor cardiovascular status (Chida & Steptoe, 2010). Given that stress-related diseases (e.g., mental health disorders, obesity, heart disease, high BP, and so on) develop over time, it is important to identify what social factors elicit stress earlier in development, before adulthood (Paradies et al., 2015).

Current Study

To summarize, the current study addresses four key limitations in the empirical literature. Although previous research focused on direct discrimination, we examined the impact of the more common experience of indirect ethnic discrimination on stress reactivity. In addition to measuring cardiovascular outcomes (e.g., BP and HR), our study would shed light on how indirect ethnic discrimination affects neuroendocrine (HPA) reactivity via salivary cortisol levels (Granger et al., 2007). The collected experimental data would provide critical evidence to link indirect ethnic discrimination and health. Further, examination of these effects among Latino emerging adults provided important data regarding the association between discrimination and maladjustment among Latino youth (Huynh & Fuligni, 2010, 2012; Huynh & Gillen-

O'Neel, 2016). Importantly, Latinos are one of the fastest growing ethnic groups in the United States, and it is crucial to understand how stress specific to this group may contribute to stress-related health disparities (e.g., overweight, diabetes) in Latino populations (Centers for Disease Control and Prevention, 2014). Similar to Lucas et al. (2016)—who used cognitive tasks to elicit stress and then examined how exposure to injustice affected perceived racism and biological stress reactivity—we examined the effect of indirect ethnic discrimination on physiological reactivity in the context of having completed a challenging task. A meta-analysis (Dickerson & Kemeny, 2004) indicated that stressors that evoke the largest changes in cortisol and slower recovery times are those that pose a social-evaluative threat (e.g., when an individual performs a task that is judged by others). However, indirect discrimination does not pose a social-evaluative threat because it is directed at someone else. Indeed, studies have found stronger psychological reactions (e.g., anxiety, shame) to direct discrimination than indirect discrimination (Carter & Forsyth, 2010). Further, Hoggard and colleagues found that African American college students were more likely to cope with racially stressful events with rumination compared with nonracially stressful events. This suggests that indirect discrimination may affect recovery because observers may ruminate about the experience, prolonging the experience by questioning whether they could have or should have intervened. Thus, instead of measuring whether manipulation of indirect discrimination evokes a biological stress response, our study sought to examine whether the normal biological *recovery* from stress is affected by exposure to indirect discrimination.

Using a cognitive stress task allowed us to simulate stressors of college life (e.g., feeling overwhelmed by schoolwork; preparing for an upcoming exam) that are not ethnicity-related (Hoggard, Byrd, & Sellers, 2012), and thus isolate the effect of an indirect ethnic discrimination experience on biological stress in a more ecologically valid manner. Assessing recovery allowed for examination of how an individual biologically copes with stress after the stressor is over (Page-Gould, Mendes, & Major, 2010). Lengthening and exacerbating the stress response results in prolonged higher cortisol levels that can be physiologically detrimental to the individual. Prolonged exposure to cortisol causes impairment of immune responses and increased susceptibility to disease, alterations in metabolism affecting cardiovascular health, accelerated cell aging, and decreased cognitive abilities (Berger & Sarnyai, 2015; Epel, 2009; Juster, McEwen, & Lupien, 2010; Kyrou, Chrousos, & Tsigos, 2006). A prolonged recovery after witnessing or overhearing discrimination would demonstrate that individuals who are already stressed, for reasons that may have nothing to do with ethnicity (e.g., a cognitive stress task), may be more biologically sensitive (or reactive) to ethnicity-related stress. Increased sensitivity leading to stronger and prolonged biological responses was demonstrated in cases where racial discrimination was perceived (Berger & Sarnyai, 2015; Sawyer, Major, Casad, Townsend, & Mendes, 2012; Van Marle, Hermans, Qin, & Fernández, 2010). We tested for differences in cortisol responses in two ways: differences in total cortisol output in response to the stressor, and differences in cortisol output at each time point after the stressor. Also consistent with previous research protocols using the same cognitive stress task (e.g., Creswell, Pacilio, Lindsay, & Brown, 2014; Taylor, Lerner, Sherman, Sage, & McDowell, 2003), which is described below, we measured HR and BP in timed intervals before, during, and after the stress task.

Our study is a novel contribution to the literature because (a) we examined the effect of indirect ethnic discrimination (instead of direct discrimination), which is argued to differ in impact on cardiovascular reactivity (Hoggard, Byrd, & Sellers, 2015); and (b) we measured actual BP, HR, and cortisol responses to a discrimination situation instead of how individuals think they might respond or relying on self-reports of prior experiences. Although all participants underwent the stress task, we expected participants in the indirect ethnic discrimination condition, as compared with the control condition, would have elevated levels of cortisol at each poststressor assessment point (e.g., delayed recovery; Page-Gould et al., 2010) and greater total cortisol output (e.g., greater response to stressor; Pruessner, Kirschbaum, Meinlschmid, & Hellhammer, 2003). Such results would suggest that witnessing ethnic discrimination after a stressor affects cortisol recovery. Similarly, we expected a larger increase in HR and BP immediately after the stressor in the indirect ethnic discrimination condition as compared with the control condition (Armstead et al., 1989; Fang & Myers, 2001). These results would suggest that witnessing discrimination after a stressor also affects cardiovascular reactivity.

Method

Pilot Testing Conversation Scripts

Before using them in the main study described below, we pilot tested four scripts (see Appendix) to examine whether or not indirect ethnic discrimination elicited negative affect in two contexts: a relationship context (i.e., confederate talks about sibling's boyfriend) and a classroom context (i.e., confederate talks about classmate). We recruited participants from Amazon's Mechanical Turk (MTurk), an Internet marketplace where paid workers complete Human Intelligence Tasks (HITs). Eligible participants were at least 18 years old, self-identified as Latina/Latino, resided in the United States, and have completed at least 5,000 HITs on MTurk with a 98% approval rating (i.e., have performed high quality work for other requesters before entering our study). The analytic sample (n = 77) excluded participants who were ineligible for the study (n = 46) based on their responses to a demographic questionnaire. Participants were paid $1 for completing the study. Participants were randomly assigned to 1 of 4 conditions: relationship experimental (RE), relationship control (RC), classroom experimental (CE), and classroom control (CC). Participants heard an audioclip of a script read by confederates and reported their current negative affect (e.g., anxious, worried, tense, unhappy; Cella et al., 2010), perceptions of the confederates, and believability of the clips.

Participants in experimental conditions (M_{CE} = 2.71, SD_{CE} = .91; M_{RE} = 2.23, SD_{RE} = .89) reported significantly more negative affect than those in the respective control conditions (M_{CC} = 1.55, SD_{CC} = .88; M_{RC} = 1.62, SD_{RC} = .76), p values = <.001–.04. Further, our scripts were rated as believable and realistic (M values > 4; 1 = *very unbelievable/unrealistic,* 5 = *very believable/realistic*). Speakers in the experimental conditions were rated as less warm and likable than speakers in the control conditions. The classroom context elicited more negative affect and had a

larger effect size (r = .54) than the relationship context (r = .34). As such, only the classroom context scripts were used in the experiment described below.

Participants

Self-identified Latino/a emerging adults (N = 36, 66% female, age M = 19.21 and SD = 3.53 years) were recruited through flyers and the psychology department subject pool at a West Coast public university. The majority of our sample was U.S. born: 82% (n = 27) was second generation (i.e., U.S. born and at least 1 parent was foreign born), and 6.1% (n = 2) was third generation (i.e., U.S. born and parents were U.S. born). Of the four participants born abroad (two from Mexico, one from Guatemala, one from El Salvador), all arrived to the United States by 5 years old. Most of the participants self-identified as working class (39.4%) or lower-middle class (42.4%).

Participants were told that the goal of the "Stress and Health Study" was to examine how social, emotional, and cognitive processes influence health and well-being. The flyers informed potential participants that they would be asked to complete questionnaires and a cognitive performance task, provide saliva samples, and have their heart rate and blood pressure monitored. Interested participants were screened to verify eligibility with regard to the health status/behavior criteria known to influence the stress response (e.g., smoking). Participants recruited through flyers (n = 7) received $20 to an online retailer; participants recruited through subject pool (n = 29) received subject pool credit. The analytic sample (n = 32) excluded participants who were suspicious of our manipulation (n = 1) or had methodological issues (e.g., experiment interrupted by a stranger, n = 3).

Measures

Whole unstimulated saliva samples were collected four times in 2-ml cryogenic vials and frozen at −80 °C until assayed. Saliva samples were assayed for cortisol by Dresden LabService, Germany. Thawed test tubes were centrifuged at 3,000 rpm for 5 min producing a clear supernatant of low viscosity. Salivary concentrations were measured from the supernatants using commercially available chemiluminescence-immunoassay with high sensitivity (IBL International, Hamburg, Germany). Assays were performed in singlet, and intra and interassay coefficients were below 8%. HR, measured in beats per minute (bpm), and BP, measured in millimeter of mercury (mmHg), were obtained noninvasively with a Carescape V100 Dinamap Automatic Blood Pressure Machine. The researcher placed the BP cuff on the participant's nondominant arm while the participant sat upright in a chair. BP and HR were measured every 5 min during baseline, every 2 min during the 15-min stressor period, and every 5 min during recovery.

Procedures

After providing informed consent, participants were connected to the automatic BP monitor. To adequately capture reactivity and recovery for cortisol, saliva samples were obtained at four time points using the passive drool technique (Granger et al., 2007): at baseline, and at 25, 40, and 55 min poststressor. We captured reactivity by measuring total cortisol in response to the stressor (i.e., area under the curve, AUC). AUC is a summary score that captures both baseline and reactivity information and thus requires less power to detect differences (Pruessner et al., 2003). We captured recovery by testing for differences at each time point after the stressor (i.e., at 25, 40, and 55 min poststressor).

An outline of the sequence of events is presented in Figure 1. After collecting a baseline saliva sample, participants underwent the Trier Social Stress Task (TSST), a cognitive stress task involving a mental arithmetic task (i.e., count aloud backward from 2023 to zero in 17-step sequences) and a speech task (i.e., responded to why he or she would be the best candidate for his or her ideal job; Kirschbaum, Pirke, & Hellhammer, 2008) led by two phenotypically White confederates. Laboratory studies using the TSST typically measure cortisol, HR, and BP in timed intervals (e.g., Creswell et al., 2014; Taylor et al., 2003), all of which have been shown to increase in response to the TSST (Gordis, Granger, Susman, & Trickett, 2006). The stress tasks lasted a total of 15 min: after spending 5 min preparing a speech, participants had 5 min to deliver a speech in front of the two confederates. After the speech task, participants had 5 min to complete the math task. As confederates exited the room, participants overheard them conversing about a classmate. Participants were randomly assigned to the experimental (indirect ethnic discrimination) or the control condition. In the indirect ethnic discrimination condition, confederates made negative and ethnically insensitive remarks about their classmate (i.e., expressing annoyance that the classmate does not pronounce her name like a "real" American). In the control condition, confederates engaged in a negative but ethnically neutral conversation about the classmate (see "Classroom scripts" in Appendix). Finally, participants completed a

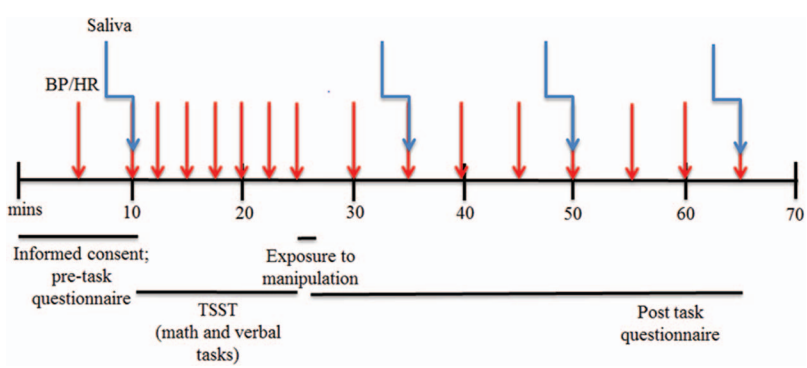

Figure 1. Sequence of events. See the online article for the color version of this figure.

posttask questionnaire about a variety of personality and cultural constructs. After the study session, participants were debriefed fully, and they were asked whether they suspected or knew that discrimination was part of the study. The study lasted an average of 90 min (range: 77–107 min).

Analyses

Participant demographic information by condition is provided in Table 1. There were marginally more women than men in the control condition compared with the experimental condition, Exp (B) = .17, p = .052. Otherwise, the groups did not statistically differ in age, socioeconomic backgrounds, and nativity status. We tested for total cortisol output (i.e., AUC) by conducting between-subjects analyses of covariance (ANCOVAs), where the between subjects factor is experimental condition (i.e., indirect ethnic discrimination and control), covarying for baseline values. AUC was calculated using the trapezoid formula (Pruessner et al., 2003) by summing the areas of the trapezoids under the plot of the cortisol level at each time point. We also tested our hypotheses conservatively by conducting mixed-subjects analysis of variance (ANOVAs), where the within-subjects factor is time (e.g., saliva samples taken at four time points) and the between subjects factor is experimental condition (i.e., indirect ethnic discrimination and control). Because acute stressors (e.g., TSST) cause a spike in cortisol about 25 min after exposure, which then decreases back to baseline approximately 40 min after exposure (i.e., during recovery period), there should be a quadratic effect on time (i.e., inverse "u"). If exposure to indirect ethnic discrimination causes differences in recovery to baseline, there should be a Time × Condition interaction, and follow up t tests would indicate a significant difference at recovery (i.e., cortisol differs by condition at Time 4). Although BP and HR were measured throughout the duration of the experiment, we averaged readings in the following way: baseline (i.e., all readings prior to stressor onset), reactivity (i.e., average of 2 min readings during stressor), and recovery (i.e., readings 5 mins after stressor. Then, mixed-subjects ANOVAs tested Time (3) × Condition (2) effects on BP and HR.

Results

We present both p values and effect sizes below and in Table 2. However, due to our small sample size, we interpret findings using only effect sizes (partial η^2 and d) that are independent of sample size, rather than p values that are dependent on sample size.

Table 1
Participant Demographic Information by Condition

	Control (n = 15)	Indirect discrimination (n = 17)
Age (*M, SD*)	18.53 (1.41)	19.47 (4.53)
Socioeconomic status (%)		
Working class	40%	35.3%
Lower middle class	40%	47.1%
Middle class	13.3%	17.6%
Upper middle class	6.7%	0%
Nativity status (% U.S. born)	80%	100%
Gender (% female)	87%	53%
Health status (*M, SD*; 1 = *poor,* 5 = *excellent*)	3.00 (.54)	2.88 (.78)

Table 2
Mixed Measures Analysis of Variance Assessing Cortisol, Blood Pressure (BP), and Heart Rate by Time (Within-Subjects) and Condition (Between-Subjects)

Dependent variable (*df*)	F	p	Partial η^2
Cortisol (1, 26)			
Time (linear)	.67	.42	.03
Time (quadratic)	13.48	.001	.34
Condition	2.03	.17	.07
Time × Condition (linear)	4.06	.05	.14
Time × Condition (quadratic)	1.86	.18	.07
Systolic BP (1, 25)			
Time (linear)	.22	.65	.01
Time (quadratic)	110.89	<.001	.82
Condition	.58	.45	.03
Time × Condition (linear)	.27	.61	.01
Time × Condition (quadratic)	.17	.69	.01
Diastolic BP (1, 25)			
Time (linear)	.37	.55	.01
Time (quadratic)	40.81	<.001	.62
Condition	.05	.83	.00
Time × Condition (linear)	.20	.66	.01
Time × Condition (quadratic)	1.18	.28	.05
Heart rate (1, 25)			
Time (linear)	.08	.78	.00
Time (quadratic)	16.94	<.001	.40
Condition	.04	.84	.00
Time × Condition (linear)	2.56	.12	.09
Time × Condition (quadratic)	1.09	.31	.04

Cortisol

As expected, participants in the experimental condition (M = 1299.26, SD = 1133.63) had moderately greater cortisol total output (AUC) than those in the control condition (M = 864.19, SD = 387.94), $F(1, 25) = 4.32$, $p = .048$, $\eta^2 = .15$. A larger AUC indicates a greater cortisol response to the stressor. Mixed-subjects ANOVA results are presented in Table 2. As shown in Figure 2, consistent with our hypothesis, there was a quadratic effect of time, and this interacted with condition. Follow up within-subjects ANOVAs examining cortisol differences from baseline for each cortisol measurement (i.e., T1 and T2 by condition, T1 and T3 by condition, and T1 and T4 by condition) indicated small interac-

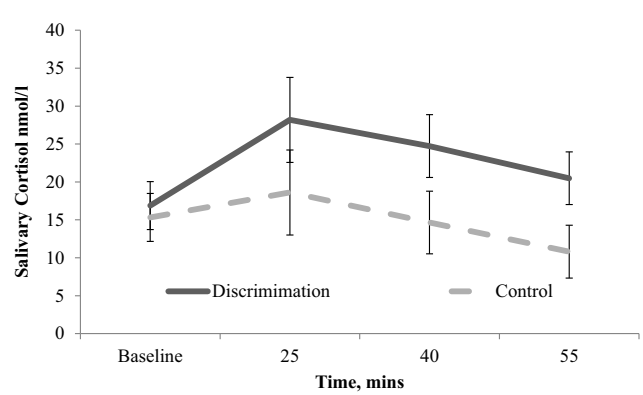

Figure 2. Cortisol reactivity to stress by condition. Discrimination n = 14; Control n = 14. Minutes in the x axis are from the beginning of the stressor, not the beginning of the study.

tions of time by condition, $F(1, 26–27) = 2.37–2.43$, p values = .13–.14, partial $\eta^2 = .08–.09$. All participants exhibited moderate-large increases in cortisol 25 mins after the stress task, $F(1, 26) = 8.09$, $p = .009$, *partial* $\eta^2 = .24$, and continued to have moderately elevated levels at 40 mins, $F(1, 27) = 5.30$, $p = .029$, partial $\eta^2 = .16$, but recovered to baseline levels by 55 min, $F(1, 27) = 0.05$, $p = .82$, partial $\eta^2 < .00$. Follow-up independent samples t tests examining condition differences at each time point indicated that the indirect ethnic discrimination condition, as compared with the control, showed moderate and consistently greater cortisol levels at 40 ($p = .09$, $d = .64$) and 55 min ($p = .07$, $d = .68$) poststressor (see Table 3).

BP and HR

There were moderate to large quadratic associations between time and measures of BP and HR (see Table 2), indicating a "u"-shaped curve consistent with increases during the exposure to the stressor and decreases after the stressor ended. However, there were no meaningful Time × Condition interactions.

Discussion

This experimental study examined the effect of indirect ethnic discrimination on physiological reactivity in Latino emerging adults. Findings indicated that exposure to indirect ethnic discrimination resulted in greater cortisol output following a stress task, which suggests a greater stress response in the presence of discrimination. We also found that exposure to indirect ethnic discrimination resulted in moderate and consistent differences in cortisol recovery, which suggests a prolonged stress response in those exposed to indirect discrimination as compared with controls.

Total cortisol output was greater for the group exposed to indirect ethnic discrimination as compared with those not exposed to discrimination, suggesting that indirect ethnic discrimination contributes to greater neuroendocrine reactivity in response to an acute social stressor. Further, participants in the indirect ethnic discrimination condition had consistently and moderately higher levels of cortisol at each time point after the stress task. Because the first poststress cortisol assessment (T2) actually reflects cortisol reactivity to our experimental manipulation, it suggests that exposure to indirect discrimination might elicit a stress response without prior exposure to a cognitive stress task.

Importantly, the data point toward indirect ethnic discrimination producing greater cortisol in response to laboratory stress. Individuals who are already stressed may be more sensitive to witnessing or overhearing discrimination. This finding is particularly significant given that we studied Latino emerging adults in a university setting. These individuals experience the typical stressors of college life (Arnett, 2000) in addition to unique ethnicity-related stressors (e.g., Cerezo, Lyda, Beristianos, Enriquez, & Connor, 2013) that may put them at greater risk for developing and maintaining physical and mental health problems. For example, chronic stress is linked to chronic activation of the HPA axis when the stressor is perceived as social in nature and is largely uncontrollable (Miller, Chen, & Zhou, 2007). Although we conceptualize indirect ethnic discrimination as a chronic stressor, our study only exposed participants to one incident of overhearing discriminatory remarks. To better capture the chronic nature of indirect ethnic discrimination, future studies should examine how previous experiences with indirect ethnic discrimination may moderate the impact of experimentally manipulated discrimination on physiology. We suspect that participants who report having experienced more indirect discrimination would take longer to recover in both control and experimental conditions because their HPA axis has been altered by previous discriminatory experiences. Future research should also examine the influence other types of stressors on various ethnic groups and whether such stressors impact these groups differently (e.g., ethnic majority vs. minority group members).

Moreover, the null finding on cardiovascular response in contrast to group differences on neuroendocrine response deserves attention. Although there were no differences on HR and BP between conditions, the pattern observed in our study is consistent with previous data showing that cardiovascular response typically peaks then decreases during the TSST, whereas cortisol peaks after the TSST (Birkett, 2011). Our null findings may reflect limitations in our methodology. Using electrocardiographic methods (see

Table 3
Descriptive Statistics by Condition and Time

DV Condition	Time			
	Baseline *M* (*SD*)	Stress *M* (*SD*)	Recovery (mins after TSST) *M* (*SD*)	
Cortisol (nmol/l)			(40 mins)	(55 mins)
Control	15.32 (8.88)	18.61 (10.73)	14.64 (5.50)	10.81 (3.09)
Experimental	16.88 (14.20)	28.18 (27.62)	24.73 (21.16)	20.49 (18.16)
Systolic BP (mmHg)			(20 mins)	
Control	109.81 (8.77)	120.55 (12.73)	112.46 (13.70)	ND
Experimental	110.56 (10.01)	122.59 (14.30)	113.93 (10.98)	ND
Diastolic BP (mmHg)			(20 mins)	
Control	61.08 (4.92)	69.50 (7.88)	64.15 (7.82)	ND
Experimental	59.07 (3.74)	67.02 (7.58)	63.67 (5.75)	ND
Heart rate (bpm)			(20 mins)	
Control	81.00 (10.31)	92.62 (12.92)	75.62 (10.16)	ND
Experimental	75.58 (13.26)	86.77 (22.35)	82.67 (24.23)	ND

Note. BP = blood pressure; ND = not determined. Stress assessments for BP and HR were measured and averaged during the 15-min TSST period. The recovery assessments for BP and HR were measured 20 min after the beginning of the stress task (5 min after the end of stress task). The stress assessment for cortisol was 25 min after the beginning of the stress task.

Neblett & Roberts, 2013; Hoggard et al., 2015) and measuring HR and BP at more frequent intervals may allow for better detection of cardiovascular responses to indirect ethnic discrimination. It is also possible, that through repeated and persistent exposure to ethnic microaggressions and other forms of prejudice and discrimination, Latinos may have learned to manage cardiovascular responses (HR and BP) to ethnic stressors. Because HR and BP are readily perceivable during acute stress episodes, they may be altered through breathing techniques, cognitive reframing, or other means. Conversely, chronic exposure to prejudice and discrimination may alter one's neuroendocrine HPA responses (e.g., cortisol). That is, for some Latinos, the HPA axis may become overreactive to race-related stressors (e.g., Miller et al., 2007).

One important future direction for research will be to explore the moderating effects of individual differences in previous exposure to ethnic stressors, socialization about ethnicity or race-based discrimination, and coping skills gained through such experiences on various markers of physiological reactivity. It is a possibility that the associations between discrimination and BP are conditional. For example, Neblett and Carter (2012) did not find direct associations between racial discrimination and BP, but found that the association was moderated by Africentric worldview and racial identity. Thus, a future direction in examining the effect of indirect discrimination on BP is to explore potential moderators identified in studies with direct discrimination, such as place of birth, coping, trait anger, racial identity, and cultural worldviews (Krieger & Sidney, 1996; Cozier et al., 2006; Clark, 2006; Clark & Gochett, 2006).

Limitations

We are cautious in our interpretation of the data. We only collected data on Latino emerging adults attending college, and did not collect race data, and thus were unable to test for differences based on race or phenotype within this ethnic group. It is unclear whether and how a similarly indirect, race-based stressor would affect physiological responses in other ethnic/racial minority and majority group members. Future research would benefit from examining other age groups to understand life stage differences in response to such indirect ethnic bias. For example, given that more than half of adolescents report vicarious racial teasing that is associated with anxiety for some teenagers (Douglass, Mirpuri, English, & Yip, 2016), it would be important to understand whether indirect discrimination that is perceived as not being done in jest affects adolescent developmental. Finally, our small sample size is a limitation, particularly because the majority of our samples are women who demonstrate smaller salivary cortisol responses to the TSST as compared with men (Kudielka, Hellhammer, Kirschbaum, Harmon-Jones, & Winkielman, 2007). Despite being underpowered and having more conservative cortisol responses, all of our effects were consistent and in the predicted direction. A larger sample and stronger representation of men in future experiments may demonstrate that more significant and meaningful differences exist than presented here.

Conclusions

This study provides a novel methodology for assessing the effects of indirect ethnic discrimination on stress reactivity. Our results suggest that simply witnessing ethnic discrimination can impact HPA activity, but we did not find evidence for its effects on cardiovascular reactivity. That is, individuals who are already "stressed-out" may be sensitive to witnessing or overhearing discrimination in ways that are not easily detectable (e.g., cortisol levels). Everyday ethnicity-related stressors may have sustained and deleterious impact on various biological mechanisms that may be associated with the development and maintenance of chronic illness and may contribute to enduring ethnic/racial health disparities (Brondolo et al., 2011). Given that indirect discrimination is more ubiquitous compared to direct discrimination (Alvarez, Juang, & Liang, 2006; Priest et al., 2014; Tynes et al., 2008), more research attention is needed to determine how *indirect* discrimination affects biological stress and for how long. Our results indicate that the age-old idiom, "sticks and stones may break my bones, but words will never hurt me," may not apply regarding indirect ethnic discrimination. In fact, words that are not intentionally hurtful nor directed at a specific person may still "hurt"—by getting under the skin and affecting biological processes.

References

Alvarez, A. N., Juang, L., & Liang, C. T. (2006). Asian Americans and racism: When bad things happen to "model minorities." *Cultural Diversity and Ethnic Minority Psychology, 12,* 477–492. http://dx.doi.org/10.1037/1099-9809.12.3.477

Armstead, C. A., Lawler, K. A., Gorden, G., Cross, J., & Gibbons, J. (1989). Relationship of racial stressors to blood pressure responses and anger expression in black college students. *Health Psychology, 8,* 541–556. http://dx.doi.org/10.1037/0278-6133.8.5.541

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55,* 469–480.

Berger, M., & Sarnyai, Z. (2015). "More than skin deep": Stress neurobiology and mental health consequences of racial discrimination. *Stress: The International Journal on the Biology of Stress, 18,* 1–10. http://dx.doi.org/10.3109/10253890.2014.989204

Birkett, M. A. (2011). The Trier Social Stress Test protocol for inducing psychological stress. *Journal of Visualized Experiments, 56,* 3238.

Brondolo, E., Brady, N., Libby, D., & Pencille, M. (2011). Racism as a psychosocial stressor. In R. J. Contrada & A. Baum (Eds.), *Handbook of stress science* (pp. 167–184). New York, NY: Springer.

Carter, R. T., & Forsyth, J. (2010). Reactions to racial discrimination: Emotional stress and help-seeking behaviors. *Psychological Trauma: Theory, Research, Practice, and Policy, 2,* 183–191. http://dx.doi.org/10.1037/a0020102

Cella, D., Riley, W., Stone, A., Rothrock, N., Reeve, B., Yount, S., . . . the PROMIS Cooperative Group. (2010). The Patient-Reported Outcomes Measurement Information System (PROMIS) developed and tested its first wave of adult self-reported health outcome item banks: 2005–2008. *Journal of Clinical Epidemiology, 63,* 1179–1194. http://dx.doi.org/10.1016/j.jclinepi.2010.04.011

Centers for Disease Control and Prevention. (2014). *Summary health statistics for U.S. adults: National Health Interview Survey, 2012*. Retrieved from http://www.cdc.gov/nchs/data/series/sr_10/sr10_260.pdf

Cerezo, A., Lyda, J., Beristianos, M., Enriquez, A., & Connor, M. (2013). Latino men in college: Giving voice to their struggles and triumphs. *Psychology of Men & Masculinity, 14,* 352–362. http://dx.doi.org/10.1037/a0029646

Chida, Y., & Steptoe, A. (2010). Greater cardiovascular responses to laboratory mental stress are associated with poor subsequent cardiovascular risk status: A meta-analysis of prospective evidence. *Hypertension, 55,* 1026–1032. http://dx.doi.org/10.1161/HYPERTENSIONAHA.109.146621

Clark, R. (2006). Interactive but not direct effects of perceived racism and trait anger predict resting systolic and diastolic blood pressure in black

adolescents. *Health Psychology, 25,* 580–585. http://dx.doi.org/10.1037/0278-6133.25.5.580

Clark, R., Anderson, N. B., Clark, V. R., & Williams, D. R. (1999). Racism as a stressor for African Americans. A biopsychosocial model. *American Psychologist, 54,* 805–816. http://dx.doi.org/10.1037/0003-066X.54.10.805

Clark, R., & Gochett, P. (2006). Interactive effects of perceived racism and coping responses predict a school-based assessment of blood pressure in black youth. *Annals of Behavioral Medicine, 32,* 1–9. http://dx.doi.org/10.1207/s15324796abm3201_1

Cohen, S., Schwartz, J. E., Epel, E., Kirschbaum, C., Sidney, S., & Seeman, T. (2006). Socioeconomic status, race, and diurnal cortisol decline in the Coronary Artery Risk Development in Young Adults (CARDIA) Study. *Psychosomatic Medicine, 68,* 41–50. http://dx.doi.org/10.1097/01.psy.0000195967.51768.ea

Cozier, Y., Palmer, J. R., Horton, N. J., Fredman, L., Wise, L. A., & Rosenberg, L. (2006). Racial discrimination and the incidence of hypertension in US black women. *Annals of epidemiology, 16,* 681–687.

Creswell, J. D., Pacilio, L. E., Lindsay, E. K., & Brown, K. W. (2014). Brief mindfulness meditation training alters psychological and neuroendocrine responses to social evaluative stress. *Psychoneuroendocrinology, 44,* 1–12. http://dx.doi.org/10.1016/j.psyneuen.2014.02.007

Cunningham, T. J., Seeman, T. E., Kawachi, I., Gortmaker, S. L., Jacobs, D. R., Kiefe, C. I., & Berkman, L. F. (2012). Racial/ethnic and gender differences in the association between self-reported experiences of racial/ethnic discrimination and inflammation in the CARDIA cohort of 4 US communities. *Social Science & Medicine, 75,* 922–931. http://dx.doi.org/10.1016/j.socscimed.2012.04.027

Devos, T., & Banaji, M. R. (2005). American = White? *Journal of Personality and Social Psychology, 88,* 447–466. http://dx.doi.org/10.1037/0022-3514.88.3.447

Devos, T., Gavin, K., & Quintana, F. J. (2010). Say "adios" to the American dream? The interplay between ethnic and national identity among Latino and Caucasian Americans. *Cultural Diversity and Ethnic Minority Psychology, 16,* 37–49. http://dx.doi.org/10.1037/a0015868

Devos, T., & Heng, L. (2009). Whites are granted the American identity more swiftly than Asians. *Social Psychology, 40,* 192–201. http://dx.doi.org/10.1027/1864-9335.40.4.192

Devos, T., & Ma, D. S. (2008). Is Kate Winslet more American than Lucy Liu? The impact of construal processes on the implicit ascription of a national identity. *British Journal of Social Psychology, 47,* 191–215. http://dx.doi.org/10.1348/014466607X224521

Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin, 130,* 355–391. http://dx.doi.org/10.1037/0033-2909.130.3.355

Douglass, S., Mirpuri, S., English, D., & Yip, T. (2016). "They Were Just Making Jokes": Ethnic/Racial Teasing and Discrimination Among Adolescents. *Cultural diversity & ethnic minority psychology, 22,* 69–82. http://dx.doi.org/10.1037/cdp0000041

Epel, E. S. (2009). Psychological and metabolic stress: A recipe for accelerated cellular aging? *Hormones, 8,* 7–22. http://dx.doi.org/10.14310/horm.2002.1217

Fang, C. Y., & Myers, H. F. (2001). The effects of racial stressors and hostility on cardiovascular reactivity in African American and Caucasian men. *Health Psychology, 20,* 64–70. http://dx.doi.org/10.1037/0278-6133.20.1.64

Feagin, J. R. (1991). The continuing significance of race: Antiblack discrimination in public places. *American Sociological Review, 56,* 101–116. http://dx.doi.org/10.2307/2095676

Fishbein, H. D. (1996). *Peer prejudice and discrimination: Evolutionary, cultural, and developmental dynamics*. Boulder, CO: Westview Press.

Fuller-Rowell, T. E., Doan, S. N., & Eccles, J. S. (2012). Differential effects of perceived discrimination on the diurnal cortisol rhythm of African Americans and Whites. *Psychoneuroendocrinology, 37,* 107–118. http://dx.doi.org/10.1016/j.psyneuen.2011.05.011

Gordis, E. B., Granger, D. A., Susman, E. J., & Trickett, P. K. (2006). Asymmetry between salivary cortisol and α-amylase reactivity to stress: Relation to aggressive behavior in adolescents. *Psychoneuroendocrinology, 31,* 976–987. http://dx.doi.org/10.1016/j.psyneuen.2006.05.010

Granger, D. A., Kivlighan, K. T., Fortunato, C., Harmon, A. G., Hibel, L. C., Schwartz, E. B., & Whembolua, G.-L. (2007). Integration of salivary biomarkers into developmental and behaviorally-oriented research: Problems and solutions for collecting specimens. *Physiology & Behavior, 92,* 583–590. http://dx.doi.org/10.1016/j.physbeh.2007.05.004

Harrell, C. J. P., Burford, T. I., Cage, B. N., Nelson, T. M., Shearon, S., Thompson, A., & Green, S. (2011). Multiple pathways linking racism to health outcomes. *Du Bois Review, 8,* 143–157. http://dx.doi.org/10.1017/S1742058X11000178

Harrell, J. P., Hall, S., & Taliaferro, J. (2003). Physiological responses to racism and discrimination: An assessment of the evidence. *American Journal of Public Health, 93,* 243–248. http://dx.doi.org/10.2105/AJPH.93.2.243

Harrell, S. P. (2000). A multidimensional conceptualization of racism-related stress: Implications for the well-being of people of color. *American Journal of Orthopsychiatry, 70,* 42–57. http://dx.doi.org/10.1037/h0087722

Harris, R., Cormack, D., Tobias, M., Yeh, L.-C., Talamaivao, N., Minster, J., & Timutimu, R. (2012). The pervasive effects of racism: Experiences of racial discrimination in New Zealand over time and associations with multiple health domains. *Social Science & Medicine, 74,* 408–415. http://dx.doi.org/10.1016/j.socscimed.2011.11.004

Harwood, S. A., Huntt, M. B., Mendenhall, R., & Lewis, J. A. (2012). Racial microaggressions in the residence halls: Experiences of students of color at a predominantly White university. *Journal of Diversity in Higher Education, 5,* 159–173. http://dx.doi.org/10.1037/a0028956

Hoggard, L. S., Byrd, C. M., & Sellers, R. M. (2012). Comparison of African American college students' coping with racially and nonracially stressful events. *Cultural Diversity and Ethnic Minority Psychology, 18,* 329–339.

Hoggard, L. S., Byrd, C. M., & Sellers, R. M. (2015). The lagged effects of racial discrimination on depressive symptomology and interactions with racial identity. *Journal of Counseling Psychology, 62,* 216–225. http://dx.doi.org/10.1037/cou0000069

Hoggard, L. S., Hill, L. K., Gray, D. L., & Sellers, R. M. (2015). Capturing the cardiac effects of racial discrimination: Do the effects "keep going"? *International Journal of Psychophysiology, 97,* 163–170. http://dx.doi.org/10.1016/j.ijpsycho.2015.04.015

Huber, L. P., & Cueva, B. M. (2012). Chicana/Latina testimonies on effects and responses to microaggressions. *Equity & Excellence in Education, 45,* 392–410. http://dx.doi.org/10.1080/10665684.2012.698193

Huynh, Q.-L., Devos, T., & Smalarz, L. (2011). Perpetual foreigner in one's own land: Potential implications for identity and psychological adjustment. *Journal of Social and Clinical Psychology, 30,* 133–162. http://dx.doi.org/10.1521/jscp.2011.30.2.133

Huynh, V. W., & Fuligni, A. J. (2010). Discrimination hurts: The academic, psychological, and physical well being of adolescents. *Journal of Research on Adolescence, 20,* 916–941. http://dx.doi.org/10.1111/j.1532-7795.2010.00670.x

Huynh, V. W., & Fuligni, A. J. (2012). Perceived ethnic stigma across the transition to college. *Journal of Youth and Adolescence, 41,* 817–830. http://dx.doi.org/10.1007/s10964-011-9731-x

Huynh, V. W., & Gillen-O'Neel, C. (2016). Discrimination and sleep: The protective role of school belonging. *Youth & Society, 48,* 649–672. http://dx.doi.org/10.1177/0044118X13506720

Immigration Policy Center. (2008). *U.S. Latinos slammed by immigration debate gone ugly*. Retrieved from http://www.immigrationpolicy.org/just-facts/us-latinos-slammed-immigration-debate-gone-ugly

Juster, R.-P., McEwen, B. S., & Lupien, S. J. (2010). Allostatic load biomarkers of chronic stress and impact on health and cognition. *Neuroscience and Biobehavioral Reviews, 35,* 2–16. http://dx.doi.org/10.1016/j.neubiorev.2009.10.002

Kaholokula, J. K., Grandinetti, A., Keller, S., Nacapoy, A. H., Kingi, T. K., & Mau, M. K. (2012). Association between perceived racism and physiological stress indices in Native Hawaiians. *Journal of Behavioral Medicine, 35,* 27–37. http://dx.doi.org/10.1007/s10865-011-9330-z

Kirschbaum, C., Pirke, K.-M., & Hellhammer, D. H. (2008). The "Trier Social Stress Test"—A tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology, 28,* 76–81. http://dx.doi.org/10.1159/000119004

Kudielka, B. M., Hellhammer, D. H., Kirschbaum, C., Harmon-Jones, E., & Winkielman, P. (2007). Ten years of research with the Trier Social Stress Test—revisited. In E. Harmon-Jones & P. Winkielman (Eds.), *Social neuroscience: Integrating biological and psychological explanations of social behavior* (pp. 56–83). New York, NY: Guilford Press.

Krieger, N., & Sidney, S. (1996). Racial discrimination and blood pressure: The CARDIA Study of young black and white adults. *American Journal of Public Health, 86,* 1370–1378. http://dx.doi.org/10.2105/ajph.86.10.1370

Kyrou, I., Chrousos, G. P., & Tsigos, C. (2006). Stress, visceral obesity, and metabolic complications. *Annals of the New York Academy of Sciences, 1083,* 77–110. http://dx.doi.org/10.1196/annals.1367.008

Lucas, T., Lumley, M. A., Flack, J. M., Wegner, R., Pierce, J., & Goetz, S. (2016). A preliminary experimental examination of worldview verification, perceived racism, and stress reactivity in African Americans. *Health Psychology, 35,* 366–375. http://dx.doi.org/10.1037/hea0000284

McDonald, J. A., Terry, M. B., & Tehranifar, P. (2014). Racial and gender discrimination, early life factors, and chronic physical health conditions in midlife. *Women's Health Issues, 24,* e53–e59. http://dx.doi.org/10.1016/j.whi.2013.09.006

Miller, G. E., Chen, E., & Zhou, E. S. (2007). If it goes up, must it come down? Chronic stress and the hypothalamic-pituitary-adrenocortical axis in humans. *Psychological Bulletin, 133,* 25–45.

Minikel-Lacocque, J. (2013). Racism, college, and the power of words: Racial microaggressions reconsidered. *American Educational Research Journal, 50,* 432–465. http://dx.doi.org/10.3102/0002831212468048

Neblett, E. W., Jr., & Carter, S. E. (2012). The protective role of racial identity and Africentric worldview in the association between racial discrimination and blood pressure. *Psychosomatic Medicine, 74,* 509–516. http://dx.doi.org/10.1097/psy.0b013e3182583a50

Neblett, E. W., Jr., & Roberts, S. O. (2013). Racial identity and autonomic responses to racial discrimination. *Psychophysiology, 50,* 943–953.

Page-Gould, E., Mendes, W. B., & Major, B. (2010). Intergroup contact facilitates physiological recovery following stressful intergroup interactions. *Journal of Experimental Social Psychology, 46,* 854–858. http://dx.doi.org/10.1016/j.jesp.2010.04.006

Paradies, Y., Ben, J., Denson, N., Elias, A., Priest, N., Pieterse, A., . . . Gee, G. (2015). Racism as a determinant of health: A systematic review and meta-analysis. *PLoS ONE, 10,* e0138511. http://dx.doi.org/10.1371/journal.pone.0138511

Pascoe, E. A., & Smart Richman, L. (2009). Perceived discrimination and health: A meta-analytic review. *Psychological Bulletin, 135,* 531–554. http://dx.doi.org/10.1037/a0016059

Priest, N., Perry, R., Ferdinand, A., Paradies, Y., & Kelaher, M. (2014). Experiences of racism, racial/ethnic attitudes, motivated fairness and mental health outcomes among primary and secondary school students. *Journal of Youth and Adolescence, 43,* 1672–1687. http://dx.doi.org/10.1007/s10964-014-0140-9

Pruessner, J. C., Kirschbaum, C., Meinlschmid, G., & Hellhammer, D. H. (2003). Two formulas for computation of the area under the curve represent measures of total hormone concentration versus time-dependent change. *Psychoneuroendocrinology, 28,* 916–931. http://dx.doi.org/10.1016/S0306-4530(02)00108-7

Quintana, S. M., & McKown, C. (2008). *Handbook of race, racism, and the developing child*. Hoboken, NJ: Wiley.

Ratner, K. G., Halim, M. L., & Amodio, D. M. (2013). Perceived stigmatization, ingroup pride, and immune and endocrine activity evidence from a community sample of Black and Latina Women. *Social Psychological and Personality Science, 4,* 82–91. http://dx.doi.org/10.1177/1948550612443715

Richman, L. S., & Jonassaint, C. (2008). The effects of race-related stress on cortisol reactivity in the laboratory: Implications of the Duke lacrosse scandal. *Annals of Behavioral Medicine, 35,* 105–110. http://dx.doi.org/10.1007/s12160-007-9013-8

Rydell, R. J., Hamilton, D. L., & Devos, T. (2010). Now they are American, now they are not: Valence as a determinant of the inclusion of African Americans in the American identity. *Social Cognition, 28,* 161–179. http://dx.doi.org/10.1521/soco.2010.28.2.161

Sawyer, P. J., Major, B., Casad, B. J., Townsend, S. S., & Mendes, W. B. (2012). Discrimination and the stress response: Psychological and physiological consequences of anticipating prejudice in interethnic interactions. *American Journal of Public Health, 102,* 1020–1026. http://dx.doi.org/10.2105/AJPH.2011.300620

Schmitt, M. T., Branscombe, N. R., Postmes, T., & Garcia, A. (2014). The consequences of perceived discrimination for psychological well-being: A meta-analytic review. *Psychological Bulletin, 140,* 921–948. http://dx.doi.org/10.1037/a0035754

Taylor, S. E., Lerner, J. S., Sherman, D. K., Sage, R. M., & McDowell, N. K. (2003). Are self-enhancing cognitions associated with healthy or unhealthy biological profiles? *Journal of Personality and Social Psychology, 85,* 605–615. http://dx.doi.org/10.1037/0022-3514.85.4.605

Townsend, S. S. M., Eliezer, D., Major, B., & Mendes, W. B. (2014). Influencing the world versus adjusting to constraints social class moderates responses to discrimination. *Social Psychological and Personality Science, 5,* 226–234. http://dx.doi.org/10.1177/1948550613490968

Tynes, B. M., Giang, M. T., Williams, D. R., & Thompson, G. N. (2008). Online racial discrimination and psychological adjustment among adolescents. *Journal of Adolescent Health, 43,* 565–569. http://dx.doi.org/10.1016/j.jadohealth.2008.08.021

Van Marle, H. J., Hermans, E. J., Qin, S., & Fernández, G. (2010). Enhanced resting-state connectivity of amygdala in the immediate aftermath of acute psychological stress. *NeuroImage, 53,* 348–354. http://dx.doi.org/10.1016/j.neuroimage.2010.05.070

Weinstein, A. A., Termini, A., Kazman, J. B., Zeno, S. A., Abraham, P., & Deuster, P. A. (2013). Racial provocation induces cortisol responses in African-Americans. *Open Journal of Medical Psychology, 2,* 151–157. http://dx.doi.org/10.4236/ojmp.2013.24023

Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: Evidence and needed research. *Journal of Behavioral Medicine, 32,* 20–47. http://dx.doi.org/10.1007/s10865-008-9185-0

(*Appendix follows*)

Appendix

Experimental Conditions

Relationship scripts

Experimental condition

Speaker 1: Whatcha up to this weekend?
Speaker 2: Not much. Studying. You?
Speaker 1: I might go home. My parents want to meet my sister's new boyfriend.
Speaker 2: Oh, have you met him?
Speaker 1: Yea, a few weeks ago. He's supposed to be Mexican, but I swear he's white.
Speaker 2: What do you mean?
Speaker 1: He dresses really nice.
Speaker 2: I know some Mexicans who dress nice.
Speaker 1: Yeah but this guy also had really light skin and didn't have an accent.
Speaker 2: Does he speak Spanish?
Speaker 1: No.
Speaker 2: What kind of Mexican doesn't speak Spanish?
Speaker 1: I know, right? Anyways, now anytime I see him I call him Whitey.
Speaker 2: Haha. Well let me know how it goes.
Speaker 1: I will.

Control condition

Speaker 1: Whatcha up to this weekend?
Speaker 2: Not much. Studying. You?
Speaker 1: I might go home. My parents want to meet my sister's new boyfriend.
Speaker 2: Oh, have you met him?
Speaker 1: Yea, a few weeks ago.
Speaker 2: What's he like?
Speaker 1: He dresses really nice.
Speaker 2: Cool.
Speaker 1: Yeah. When I met him he spilled a red Slurpee over his white shirt.
Speaker 2: Ha! How bad was it?
Speaker 1: All over. But he had a change of clothes in his car.
Speaker 2: What kind of person has a change of clothes in their car?
Speaker 1: I know, right? Anyways, now anytime I see him I call him Slurpee.
Speaker 2: Haha. Well let me know how it goes.
Speaker 1: I will.

Classroom scripts

Experimental condition

Speaker 1: Hey was there any homework for 150 today?
Speaker 2: Just reading the chapter.
Speaker 1: Cool. OK. Do you find Pah-tree-see-ah (Patricia) super annoying?
Speaker 2: Yes! I can't believe she keeps on correcting the professor on how to pronounce her name. **Sigh.** Why doesn't she just pronounce it Patricia, like a normal American?
Speaker 1: Yeah, I hate it when Mexicans do that.
Speaker 2: I don't think she's Mexican, she's like Salvadoran or something.
Speaker 1: Whatever, they're all the same.
Speaker 2: That's true.

Control condition

Speaker 1: Hey was there any homework for 150 today?
Speaker 2: Just reading the chapter.
Speaker 1: Cool. OK. Do you find Patricia super annoying?
Speaker 2: Yes! I can't believe she always has her hand up. **Sigh.** I like never talk in that class because she's always talking.
Speaker 1: Yeah, I hate people like that.
Speaker 2: Do you think she cares she's taking up class time?
Speaker 1: Whatever, it's still annoying.
Speaker 2: That's true.