Group Processes & Intergroup Relations
GPIR

Article

Lay theory of generalized prejudice moderates cardiovascular stress responses to racism for White women

Group Processes & Intergroup Relations
1–18

DOI: 10.1177/1368430220929078
journals.sagepub.com/home/gpi
SAGE

Kimberly E. Chaney,[1] Diana T. Sanchez,[1] Mary S. Himmelstein[2] and Sara K. Manuel[1]

Abstract

Research on stigma by prejudice transfer has demonstrated that White women anticipate sexism when interacting with a racist individual due to a belief that prejudices stem from an underlying ideology of group inequality. The present research proposes that individuals' lay theory of generalized prejudice (LTGP) varies across individuals and examines cardiovascular stress responses (high frequency heart rate variability [HF-HRV] and preejection period [PEP]). White women who held a lay theory of generalized prejudice and were evaluated by a White man with negative attitudes towards Black Americans demonstrated greater cardiovascular reactivity (decreases in parasympathetic activity [Studies 1 and 2] and shortened PEP [Study 2] from baseline to evaluation) than White women being evaluated by a neutral evaluator or who did not hold a lay theory of generalized prejudice. The present studies are the first to demonstrate cardiovascular stress responses to stigma by prejudice transfer and to highlight LTGP as a key individual difference in stigma by prejudice transfer.

Keywords

cardiovascular stress, lay theory, stigma

Paper received 28 May 2019; revised version accepted 30 April 2020.

In day-to-day activities, women may perceive cues signaling that their gender identity is devalued, including low representation of women in the workplace, entering domains where women are negatively stereotyped (e.g., science), or experiencing blatant sexism (e.g., Logel et al., 2009; Murphy, Steele, & Gross, 2007; Sekaquaptewa & Thompson, 2003). These identity-devaluing cues evoke identity threat, an expectation that one's stigmatized identity may be tied to negative outcomes (Abrams & Hogg, 1999), and can result in cognitive impairments, anxiety, and physiological stress (Murphy et al., 2007; Salomon, Burgess, & Bosson, 2015; Steele, 1997; Townsend, Major, Gangi, & Mendes, 2011). Critically, chronic

[1]Rutgers University, USA
[2]Kent State University, USA

Corresponding author:
Kimberly E. Chaney, Rutgers University, New Brunswick, 53 Avenue E, Piscataway, NJ 08854, USA.
Email: kimberly.chaney@rutgers.edu

experiences of physiological stress are associated with negative health outcomes (e.g., Juster & Lupien, 2012).

Stigma by Prejudice Transfer

While the literature on stigmatized identity threats has consistently demonstrated that White women anticipate and experience gender threat from cues of sexism (Major & O'Brien, 2005; Tajfel & Turner, 1986), recent research has demonstrated stigma by prejudice transfer in which positive or negative attitudes towards one stigmatized group can result in the anticipation of similar treatment for an individual with an unshared stigmatized identity (Chaney & Sanchez, 2018; Chaney, Sanchez, & Remedios, 2016; Sanchez, Chaney, Manuel, & Remedios, 2018; Sanchez, Chaney, Manuel, Wilton, & Remedios, 2017). Specifically, research on stigma by prejudice transfer proposes that the boundaries of stigma cues are not fixed, such that perceptions of prejudiced attitudes affect not only individuals with shared identities (e.g., sexism affects women), but also individuals with unshared stigmatized identities (e.g., sexism affects men of color; Sanchez et al., 2017), resulting in stigma by prejudice transfer. For example, White women reported gender stigmatization concerns from a White man who held negative attitudes towards Black Americans, due to perceptions of sexism (Sanchez et al., 2017). Such stigma by prejudice transfer is believed to occur due to individuals' lay understanding of a shared source of prejudiced attitudes, namely a belief that prejudices towards various stigmatized groups stem from a singular underlying belief system (Sanchez et al., 2018).

It has frequently been theorized that prejudices are generalized (e.g., Allport, 1954; Pratto, Sidanius, Stallworth, & Malle, 1994), such that individuals who hold prejudiced attitudes towards one stigmatized group, hold prejudiced attitudes towards multiple stigmatized groups. Research has suggested that a social dominance orientation (SDO; Pratto et al., 1994), a belief in group inequality and hierarchies, underlies prejudiced attitudes against racial minorities, women, and other devalued stigmatized groups (Pratto & Pitpitan, 2008; Pratto et al., 1994). Research on generalized prejudice has demonstrated that prejudiced attitudes towards derogated groups such as women and racial minorities stem from SDO-based motivational processes (Asbrock, Sibley, & Duckitt, 2010; Duckitt & Sibley, 2007). Notably, past research has found that individuals who are presented as holding negative attitudes towards one stigmatized group are perceived to be high in SDO, and this perception of SDO mediated perceptions of negative attitudes towards another stigmatized group (Sanchez et al., 2017), providing initial evidence that stigma by prejudice transfer occurs through a lay belief in the generalized nature of prejudices.

Yet, the extent to which individuals endorse a lay understanding of the generalized nature of prejudice may vary and affect the degree to which identity cues transfer across identity dimensions, such as the extent to which White women anticipate gender stigma from racism. Indeed, past research on identity cue transfer within an identity dimension (anticipation of anti-Asian attitudes from a perpetrator with anti-Latino attitudes) has demonstrated that individuals' lay theorizing of the generalized nature of prejudiced attitudes influenced the extent to which they anticipated stigma by prejudice transfer (Sanchez et al., 2018). The present work proposes, for the first time, that the extent to which individuals believe prejudiced attitudes are generalized will similarly influence the extent to which prejudices transfer across identity dimensions. Specifically, we propose that White women will experience stigmatized identity threat from racism due to identity cue transfers, but that these effects will be most pronounced when White women strongly endorse a lay theory of generalized prejudices (LTGP).

Anticipated Prejudice and Cardiovascular Reactivity

To date, research on identity cue transfers has primarily focused on cognitive outcomes (Chaney, Sanchez, & Remedios, 2018) and self-reported

measures of perceived ideologies, anticipated stigma, and the attribution of negative feedback to sexism (for review, see Chaney, Sanchez, & Maimon, 2019; Sanchez, Chaney, & Maimon, 2019). Thus, it is unclear the extent to which stigma by prejudice transfer may influence individuals' physiological reactivity. We propose that stigma by prejudice transfer has broader deleterious effects, including cardiovascular stress responses, which may have negative effects on physical health. Specifically, we propose that when interacting with a racist evaluator, White women may demonstrate a cardiovascular stress response.

An abundance of research has examined the link between experiences of discrimination and physiological stress responses (for review, see Harrell, Hall, & Taliaferro, 2003). For example, past research has demonstrated that when anticipating interacting with a White individual with prejudiced attitudes, people of color demonstrate a cardiovascular stress response (Sawyer, Major, Casad, Townsend, & Mendes, 2012). Additionally, women who interact with, or are anticipating interacting with, a sexist individual demonstrate greater cortisol and cardiovascular reactivity compared to women anticipating an interaction with a nonsexist evaluator (Salomon et al., 2015; Townsend et al., 2011). As such, the mere anticipation of prejudice can evoke a physiological stress response.

Past research has demonstrated that perceived discrimination evokes an ANS (autonomic nervous system) stress response (e.g., Mendes, Major, McCoy, & Blascovich, 2008). Activation of the ANS in response to such discrimination is described as an adaptive reaction to an acute stressor, aiding individuals with the demands of the threatening situation (McEwen, 1998). Yet, frequent and repeated (chronic) exposure to social stressors, such as discrimination, can lead to allostatic load, the wear and tear on the body from repeated activation of physiological systems, which can have deleterious health outcomes, evidenced by the numerous studies demonstrating a link between ANS reactivity and negative health correlates such as impaired immune functioning, poor cognitive function, metabolic syndrome, and cardiovascular disease (Juster & Lupien, 2012; Juster, McEwen, & Lupien, 2010; Juster et al., 2016; Seeman, McEwen, Rowe, & Singer, 2001). As such, ANS stress responses to discrimination or anticipated discrimination can contribute to negative health outcomes when such experiences are chronic. Yet, most, if not all, research has focused on ingroup discrimination cues (e.g., sexism cues and women). Identifying the various cues which can result in anticipated discrimination, such as outgroup prejudice cues, is critical for better understanding the frequency with which stigmatized individuals may experience ANS stress responses.

As research on stigma by prejudice transfer has demonstrated that White women report anticipating sexism when interacting with a racist individual, we propose that they will also demonstrate a cardiovascular stress response when anticipating interacting with a racist individual. As experienced sexism can evoke cardiovascular stress responses and self-reported health problems (e.g., Schneider, Tomaka, & Palacios, 2001), and stigma and discrimination are tied to deleterious health outcomes (Pascoe & Smart Richman, 2009), the demonstration of a cardiovascular stress response in anticipation of prejudice in the present studies would highlight an additional deleterious outcome of stigma by prejudice transfer and a negative consequence of vigilance to prejudice threat cues.

Current Research

The present studies sought to expand past research on stigma by prejudice transfer in two novel ways: (a) by demonstrating that stigma by prejudice transfer induces cardiovascular stress reactivity and thus carries physiological outcomes as well as self-reported outcomes, and (b) by demonstrating that stigma by prejudice transfer is greatest among White women who hold a lay theory of generalized prejudice (LTGP). As such, the present studies employed a Trier Social Stress Test (TSST) paradigm (Kirschbaum, Pirke, & Hellhammer, 1993) to examine the role of anticipated prejudice in an evaluative context, and measured White

women's cardiovascular reactivity (high frequency heart rate variability [HF-HRV], Study 1; HF-HRV and preejection period [PEP], Study 2) when interacting with a White male evaluator whose intergroup attitudes were unknown (neutral) or who espoused anti-Black attitudes (Studies 1 and 2). Participants' LTGP was assessed and examined as a moderator of self-report measures of perceived ideologies of the evaluator, self-reported anticipated identity threat, and cardiovascular reactivity (Studies 1 and 2). Cardiovascular reactivity was measured via HF-HRV (Studies 1 and 2) and PEP (Study 2), two widely used indices of reactivity to social stressors (e.g., Cacioppo, Uchino, & Berntson, 1994; Shahrestani, Stewart, Quintana, Hickie, & Guastella, 2015). All measures, manipulations, and exclusions are reported.

Study 1

To determine whether stigma by prejudice transfer was greatest among White women who perceived prejudices as generalized, we examined self-reported identity threat and physiological stress outcomes for White women who were evaluated by a racist or a neutral White male. We hypothesized that White women who were evaluated by a racist (vs. neutral) White male during a TSST (Kirschbaum et al., 1993) would experience stigma by prejudice transfer; we expected this effect to be greatest among women who perceived prejudices (e.g., racism, sexism) as generalized. We proposed that women who perceived prejudices as generalized would perceive the racist evaluator as both racist *and* sexist, as well as higher in SDO. Thus, we expected these women to report greater gender stigmatization during the TSST task. Critically, we hypothesized that women who perceived prejudices as more generalized would demonstrate a greater cardiovascular stress response when being evaluated by the racist White male, relative to women who were evaluated by a neutral White male.

In Study 1, we examined parasympathetic reactivity via HF-HRV as an indirect index of respiratory sinus arrhythmia (RSA). HF-HRV reflects the acceleration (and deceleration) of heart rate during the respiratory cycle and is determined largely by vagal influences on the heart (Berntson et al., 1997; Porges, 2007), providing a relatively pure index of parasympathetic activation. Importantly, *decreases* in HF-HRV occur during acute and chronic stress (Chandola et al., 2008; Lucini, Di Fede, Parati, & Pagani, 2005), and are associated with stressful and cognitively taxing states (Elliot, Payen, Brisswalter, Cury, & Thayer, 2011; Kreibig, 2010). Past meta-analyses have demonstrated that HF-HRV decreases during negative social interactions compared to baselines (Shahrestani et al., 2015), and low HF-HRV is associated with worse self-regulation (e.g., emotion regulation, executive function; Holzman & Bridgett, 2017). Moreover, past research has found that women demonstrate decreases in HF-HRV during a speech task in front of a sexist man compared to a neutral man (Schneider et al., 2001), and RSA has been identified as a marker of stress and health outcomes (for review, see Masi, Hawkley, Rickett, & Cacioppo, 2007; Thayer, Åhs, Fredrikson, Sollers, & Wager, 2012). As such, we anticipated a significantly greater decrease in HF-HRV from baseline to anticipated evaluation for White women who held a LTGP and anticipated interacting with a racist evaluator, compared to a neutral evaluator.

Method

Participants. Eighty-one women who identified as White during a prescreen survey, participated in the study.[1] Five participants were removed from analyses for not identifying as White during the experiment ($n = 4$) or as female during the experiment ($n = 1$), leaving a final sample of 76 participants with a mean age of 18.57 years ($SD = 1.06$). An a priori power analysis in G*Power for the proposed moderation analysis with a medium effect size ($f^2 = 0.15$, $d = 0.79$) with 80% power indicated a desired sample size of 68 participants. A sensitivity power analysis in G*Power indicated the final sample size was sufficient to capture an effect size of $f^2 = 0.13$ ($d = 0.72$). All participants received partial course credit for participating in the 1-hour session.

Procedure. Participants were recruited to an experiment ostensibly examining social interactions and met one of three White male confederates. Confederates were trained to act neutrally throughout the experiment and were unaware of condition and hypotheses. A female experimenter greeted both participants and, once consent was provided, a rigged drawing was completed such that the participant was always assigned the role of the presenter and the confederate the role of the evaluator during an upcoming task. The evaluator was then excused to another room, ostensibly to begin completing a packet of psychological measures. Participants were then connected to spot electrodes in a standard Lead II configuration and rested for 5 minutes to acquire baseline cardiovascular measures. Next, participants learned that, as the presenter, they would be giving a 5-minute speech explaining why they were the best candidate for their ideal job in front of the evaluator, and would then complete a 5-minute test that would be described later in front of the evaluator (the TSST). Participants were then incentivized to ensure engagement, learning that if they were highly evaluated, they may be invited back for a future experiment with a monetary compensation.

The participant was then presented with a packet of profile measures ostensibly completed by the evaluator (Pinel, 2002; Sanchez et al., 2017). All participants viewed a packet of information in which the evaluator ostensibly completed various psychological measures (e.g., Ten Item Personality Inventory; Gosling, Rentfrow, & Swann, 2003). Critically, participants who were assigned to the racist evaluator condition also received the evaluator's responses to the Modern Racism and Old Fashioned Racism Scale (McConahay, 1986), which was filled out with moderate scores. Names of measures were not included, and participants were presented with bubbled-in answers for the individual items. Participants in the control condition received no information about the evaluator's racial attitudes (as in Sanchez et al., 2017). While some research on stigma by prejudice transfer has used a low-racism condition as the control (e.g., Sanchez et al., 2018), we propose that this does not constitute a true, neutral control condition as information about an evaluator's positive intergroup attitudes (i.e., low racism) could instead serve as an identity *safety* cue. As such, the present research employed a neutral, no-information control condition.

Next, participants were asked to form an impression of the evaluator based on the profile and complete various measures of perceptions of the evaluator's personality and ideology (e.g., perceived SDO). Participants were then given 2 minutes to prepare for the upcoming evaluation, and then completed the TSST in front of the evaluator, including a 5-minute speech and a 5-minute numerical subtraction task (i.e., backwards counting task; Kirschbaum et al., 1993). Upon completion, the evaluator exited, and the participant completed a measure of gender stigma. The participant was then fully debriefed and thanked for their time.

Measures

Lay theory of generalized prejudice. During a prescreen survey completed at the beginning of a semester, participants completed three items indicating the extent to which they believed prejudices against various groups were related: "When someone is prejudiced against one group of people, he/she is prejudiced against many other groups of people," "When someone holds hateful beliefs against one group of people, they often hold hateful beliefs against other groups of people," and "Holding biased beliefs about one group of people tends to be a sign of holding biased beliefs about other groups of people." All items were completed on a 7-point scale (1 = *very untrue*, 7 = *very true*) and were found to be reliable ($\alpha = .93$; Sanchez et al., 2018).

HF-HRV. Mindware BioNex hardware (Model 50-3711-02; Gahanna, OH) was used to acquire HRV at a frequency of 1,000 Hz. Measures were recorded continuously throughout the session and scored using Mindware HRV module (Version 3.1.0; Gahanna, OH). Data were first cleaned offline in 1-minute bins by manually correcting software-identified inappropriately placed R-peaks and checking for normal

Table 1. ANOVA results for dependent variables by condition: Study 1.

	F	Racism *M (SE)*	Control *M (SE)*
Perceived SDO	184.46***	5.41 (0.12)	3.09 (0.12)
Perceived racism	437.20***	4.49 (0.11)	1.44 (0.10)
Perceived sexism	85.31***	2.97 (0.11)	1.53 (0.11)
Gender stigma	13.80***	3.21 (0.29)	1.74 (0.27)
HF-HRV baseline	2.79	6.40 (0.15)	6.05 (0.14)
HF-HRV preparing	0.29	6.02 (0.15)	5.90 (0.15)
HF-HRV reactivity	1.39	−0.38 (0.14)	−0.15 (0.14)

Note. SDO = social dominance orientation; HF-HRV = high frequency heart rate variability.
***$p < .001$.

ranges. No outliers were identified, and incorrect R-peaks were removed in 5% of epochs. HF-HRV was then calculated through a power spectral analysis of high frequency (0.15–0.40 Hz) heart rate variability following standard guidelines from the Society for Psychophysiological Research (Berntson et al., 1997).[2] While this measure is commonly referred to as RSA in the literature (e.g., Page-Gould, Mendes, & Major, 2010), for precision we refer to it as HF-HRV throughout because it derives respiration from HRV rather than from a direct measure of respiration.

Perceived SDO. Participants completed the 16-item Social Dominance Orientation Scale (Pratto et al., 1994) as they thought the evaluator would complete the items on a 7-point scale (1 = *very negative*, 7 = *very positive*), including items such as, "All groups should be given an equal chance in life" ($\alpha = .96$).

Perceived sexism and racism. Participants indicated the extent to which they perceived the evaluator as sexist and racist on five items each, on a 5-point scale (1 = v*ery slightly or not at all*, 5 = *extremely or a lot*), including items such as "How likely is it that this person is sexist?" Racism items replaced "sexist" with "racist" and both measures were found to be reliable (αs > .93; Sanchez et al., 2017).[3]

Gender stigma. Participants indicated how concerned they were that the evaluator was judging them negatively during their performance due to their "gender," "sex," and "being a woman" on a 7-point scale (1 = *not at all*, 7 = *a great deal*; $\alpha = .99$; Sanchez et al., 2017).

Results

There was no effect of condition on participants' LTGP, $t(74) = 0.15$, $p = .88$, $d = 0.03$, ($M = 4.31$, $SD = 1.37$). Thus, hierarchical linear regressions were conducted with condition effects coded (control = −1; racist = 1), with standardized LTGP entered in Step 1 and the interaction term entered in Step 2 (for all means, see Table 1).

Perceived ideologies. Condition was a significant predictor of perceived SDO ($B = 1.16$, $SE = 0.09$, $p < .001$, 95% CI [0.99, 1.33]), such that the racist evaluator was perceived as higher in SDO than the neutral evaluator. Neither LTGP ($B = -0.01$, $SE = 0.09$, $p = .89$, 95% CI [−0.18, 0.16]) nor the interaction term ($B = 0.14$, $SE = 0.09$, $p = .11$, 95% CI [−0.03, 0.31]) were significant predictors. Condition was a significant predictor of perceived racism ($B = 1.53$, $SE = 0.07$, $p < .001$, 95% CI [1.38, 1.67]), such that the racist evaluator was associated with greater perceived racism than the neutral evaluator. Neither LTGP ($B = 0.04$, $SE = 0.08$, $p = .61$, 95% CI [−0.11, 0.19]) nor the interaction term ($B = 0.06$, $SE = 0.07$, $p = .44$, 95% CI [−0.09, 0.21]) were significant predictors of perceived racism.

Perceived sexism was significantly predicted by condition ($B = 0.72$, $SE = 0.07$, $p < .001$, 95% CI [0.58, 0.87]) and LTGP ($B = 0.18$, $SE = 0.07$,

p = .03, 95% CI [0.03, 0.32]). The interaction term was also a significant predictor of perceived sexism (B = 0.15, SE = 0.07, p = .04, 95% CI [0.01, 0.30]). While participants with a low LTGP (−1 *SD*) perceived the racist evaluator as more sexist than the neutral evaluator (B = 0.57, SE = 0.10, $p < .001$, 95% CI [0.36, 0.77]), this effect was greater for participants with a high LTGP (+1 *SD*), B = 0.88, SE = 0.10, $p < .001$, 95% CI [0.67, 1.08]. While the simple slope was not significant for the control condition (p = .85, 95% CI [−0.20, 0.24]), it was for the racism condition (p = .001, 95% CI [0.14, 0.52]).

Gender stigma. Condition was a significant predictor of gender stigma (B = 0.74, SE = 0.20, $p <$ .001, 95% CI [0.35, 1.13]), such that the racist evaluator condition was associated with greater gender stigma than the neutral evaluator condition. Neither LTGP (B = 0.31, SE = 0.20, p = .13, 95% CI [−0.09, 0.71]) nor the interaction term (B = 0.14, SE = 0.20, p = .48, 95% CI [−0.26, 0.54]) were significant predictors.

Physiological reactivity. Physiological data were not usable for two participants,[4] leaving a sample of 74 for HF-HRV analyses. HF-HRV values during the last 2 minutes of the baseline were averaged, as were HF-HRV values from the 2 minutes preparing for the TSST. Two-minute epochs or shorter have been used in past research examining HF-HRV fluctuation (e.g., Gordon, Del Rosario, Flores, Mendes, & Prather, 2019; Rottenberg, Clift, Bolden, & Salomon, 2007), and this period of anticipation before the TSST has been previously demonstrated to be a critical time to capture anticipated interpersonal stressors (Sawyer et al., 2012). Preliminary analyses confirmed that there was no effect of condition on mean baseline HF-HRV values, $t(72)$ = 1.67, p = .10, d = 0.35, 95% CI [−0.76, 0.07]. Next, the mean HF-HRV baseline value was subtracted from the anticipatory HF-HRV mean value to determine HF-HRV reactivity. A one-sample t test confirmed that HF-HRV reactivity was greater than zero, $t(73)$ = 2.67, p = .009, d = 0.31, 95% CI [−0.46, −0.07], and Shapiro–Wilk tests of normality on HF-HRV baseline, $W(74)$ = 0.99, p = .68, and HF-HRV anticipation, $W(74)$ = 0.98, p = .29, revealed these measures were normally distributed. Participant age was controlled for, though reported results do not change when not controlling for age.

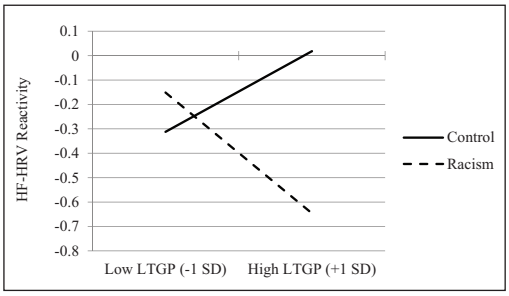

Figure 1. Effect of condition on HF-HRV reactivity moderated by LTGP.

The hierarchical regression revealed that neither condition (B = −0.01, SE = 0.10, p = .21, 95% CI [−0.03, 0.07]) nor LTGP (B = −0.04, SE = 0.10, p = .68, 95% CI [−0.25, 0.16]) were significant predictors of HF-HRV reactivity. However, the interaction term was a significant predictor of HF-HRV reactivity (B = −0.21, SE = 0.10, p = .038, 95% CI [−0.41, −0.001]). Specifically, while there was no effect of condition on HF-HRV reactivity for participants with a low LTGP (−1 *SD*), B = 0.08, SE = 0.13, p = .57, 95% CI [−0.20, 0.36], participants with a high LTGP (+1 *SD*), B = −0.34, SE = 0.14, p = .017, 95% CI [−0.61, −0.06] demonstrated significantly greater HF-HRV reactivity when performing the TSST in front of the racist evaluator than in front of the neutral evaluator (see Figure 1). The simple slope for the racism condition was significant (p = .03, 95% CI [−0.53, −0.03]), but the simple slope for the control condition was not significant (p = .29, 95% CI [−0.14, 0.47]).

Discussion

The present study demonstrated that White women who strongly endorsed a lay theory of generalized prejudice experienced a significantly greater decrease in HF-HRV from baseline to preevaluation when anticipating interacting with a

racist evaluator, compared to participants being evaluated by a neutral evaluator. Thus, Study 1 is the first study to demonstrate cardiovascular reactivity for stigma by prejudice transfer and extends past research on lay theories of generalized prejudice (Sanchez et al., 2018). Notably, the present study also demonstrated that White women perceived a racist evaluator as significantly more sexist than a neutral evaluator, especially when participants were high in LTGP. Participants also perceived the racist evaluator as significantly higher in SDO and reported greater stigma compared to participants in the control condition, though LTGP did not moderate these effects.

Critically, the present study was underpowered to detect the anticipated interaction in light of recent discussions on powering interaction analyses (Giner-Sorolla, 2018), though we present it as initial evidence of the negative effects of stigma by prejudice transfer on cardiovascular outcomes for White women who endorse a LTGP. As such, Study 2 was developed to ensure a sufficiently powered sample, as well as to expand the collected cardiovascular measures.

Study 2

Study 2 sought to replicate and extend the findings of Study 1 by collecting impedance cardiography as well as HRV in order to examine PEP (preejection period) and HF-HRV. Specifically, while Study 1 demonstrated an effect of LTGP and stigma by prejudice transfer on HF-HRV reactivity, an indicator of parasympathetic activity, PEP is an indicator of sympathetic cardiac control, and is a measure of the time between the left ventricle contracting (ECG waveform) and the aortic valve opening ($\Delta z/\Delta t$ waveform; Cacioppo et al., 1994). PEP is responsive to changes in affective states in a short time frame (within 3 to 5 seconds; Kraus & Mendes, 2014; Mendes, 2016). PEP shortening (or PEP decreases) is indicative of increased sympathetic cardiac control, which occurs during intense or chronic stress (Porges, 2007), and occurs in instances that require effortful active coping (Kelsey, 2012). Past research has highlighted the importance of measuring both parasympathetic and sympathetic reactivity in response to social stressors in order to fully capture the ANS stress response (Berntson, Norman, Hawkley, & Cacioppo, 2008; Cacioppo et al., 1994).

In Study 2, we proposed that White women who were high in LTGP would demonstrate both a significant decrease in HF-HRV and PEP shortening from baseline to anticipated evaluation when they were anticipating an interaction with an evaluator who held anti-Black attitudes, compared to a neutral evaluator, indicative of a cardiovascular stress response. The present study included a congruent threat condition of sexism in order to demonstrate that LTGP is only critical in stigma by prejudice *transfers*, and to provide a more complete experimental design. Moreover, the present study included a self-report measure of liking of the confederate evaluator in order to account for a liking penalty as in past work on stigma by prejudice transfer (Sanchez et al., 2017), as well as to account for the use of multiple White male confederates. Lastly, the present study included a measure of sexism attribution.

Method

Participants. In all, 180 participants who identified as White women and were not taking medications that could influence cardiovascular activity and were not pregnant during a prescreen survey took part in the study for partial course credit. One participant exited the session during the TSST and nine did not identify as White during the in-lab session, leaving an analytic sample of 170 ($M_{age} = 19.11$, $SD = 2.69$) that was collected over a 2.5-year period. A power analysis for the proposed moderation analysis with 99% power and a medium effect size of $f^2 = 0.15$ ($d = 0.79$) indicated a sample size of 174.

Procedure. Study 2 was identical to Study 1 except for the following changes. Participants were randomly assigned to one of three conditions, the control or racism condition from Study 1, and a sexism condition which was identical to the racism condition except that participants received a completed Modern and Old Fashioned Sexism

Scale (Swim, Aikin, Hall, & Hunter, 1995) in place of the Modern and Old Fashioned Racism Scale. Values on the Modern and Old Fashioned Racism Scale were the same as in Study 1, and these values were applied to the Modern and Old Fashioned Sexism Scale.[5] Additionally, after the TSST, participants completed a measure of sexism attributions for the score they anticipated the evaluator would give them for their performance. Lastly, participants completed a measure of liking of the evaluator, LTGP was measured at the end of the study instead of in a prescreen survey, and participants responded yes or no to questions asking if they had exercised, smoked cigarettes, had caffeine, or felt depressed that day, to better account for factors that could influence physiological data. Four White male confederates were used throughout the data collection period.

Measures. The measures of perceived SDO ($\alpha = .97$), perceived sexism ($\alpha = .95$), perceived racism ($\alpha = .97$), gender stigma ($\alpha = .97$), and LTGP ($\alpha = .99$) were all reliable. HF-HRV was collected and scored following Study 1 methods, and incorrect R-peaks were removed in 4% of epochs.

PEP. Mindware BioNex hardware (Model 50-3711-02; Gahanna, OH) was used to acquire PEP with spot electrodes placed as specified in Qu, Zhang, Webster, and Tompkins (1986), with two source electrodes on the dorsum and two recording electrodes on the ventrum. Measures were recorded continuously throughout the session, and each participant's impedance data were ensemble averaged in 1-minute epochs to produce estimates of PEP in the Mindware IMP module (Version 3.1.3; Gahanna, OH) following standard guidelines from the Society for Psychophysiological Research (Sherwood et al., 1990). The max slope method was used to automatically place the B-point, which was later manually adjusted based on visual inspection in 6% of epochs.

Sexism attributions. After the TSST, participants completed seven items on what factors they thought would influence the evaluator's scoring of their performance, including five neutral items such as "your responses," "your abilities," and "luck," and two gender-specific items: "your gender" and "your sex." Responses were given on a 7-point scale (1 = *not at all*, 7 = *very much*), and the two gender items were positively, significantly correlated, $r(170) = 0.96, p < .001$ (Sanchez et al., 2017).

Liking. On a 9-point scale (1 = *strongly disagree*, 9 = *strongly agree*), participants indicated how much they liked the evaluator on two items: "The evaluator and I seem like we would get along outside of this study" and "I would enjoy interacting with the evaluator outside of this study." The items were positively, significantly correlated, $r(170) = 0.89, p < .001$.

Results

An ANOVA revealed that the White male confederates were rated as similarly likeable, $F(3, 166) = 1.00, p = .39$. We did find a significant main effect of condition on liking of the evaluator, $F(2, 167) = 15.61, p < .001, d = 0.87$. Fisher's Least Significant Difference (LSD) post hoc analyses indicated that participants liked the neutral evaluator ($M = 4.15, SE = 0.23$) significantly more than the sexist evaluator ($M = 2.30, SE = 0.24; p < .001, d = 1.07$) and the racist evaluator ($M = 3.13, SE = 0.24; p = .002, d = 0.55$). Additionally, participants liked the sexist evaluator significantly less than the racist evaluator ($p = .02, d = 0.48$). As such, we included liking as a covariate in all analyses, though reported results do not significantly change when not controlling for liking.

ANCOVA results for all critical outcomes and LSD post hoc analyses are presented in Table 2. For all self-report measures, the effect of condition was significant. In support of stigma by prejudice transfer, participants indicated significantly greater perceptions of SDO, racism, and sexism, and reported greater gender stigma and sexism attributions from both the racist and sexist evaluators, compared to the control evaluator. As there was no effect of condition on LTGP, $F(2, 166) = 0.04, p = .97, d = 0.05$ ($M_{\text{control}} = 4.77, SE = 0.17; M_{\text{sexist}} = 4.83, SE =$

Table 2. ANCOVA results and means for dependent variables by condition: Study 2.

	F	*p*	Control *M*	Racism *M*	Sexism *M*
Perceived SDO	86.41	< .001	$3.25\ (0.13)_{a}$	$5.60\ (0.13)_{b}$	$5.14\ (0.14)_{c}$
Perceived sexism	163.62	< .001	$1.63\ (0.11)_{a}$	$3.17\ (0.11)_{b}$	$4.48\ (0.11)_{c}$
Perceived racism	194.95	< .001	$1.60\ (0.11)_{a}$	$4.61\ (0.11)_{b}$	$2.88\ (0.11)_{c}$
Gender stigma	60.99	< .001	$2.58\ (0.21)_{a}$	$3.25\ (0.21)_{b}$	$5.58\ (0.22)_{c}$
Sexism attributions	73.65	< .001	$2.26\ (0.19)_{a}$	$3.70\ (0.19)_{b}$	$5.64\ (0.19)_{c}$
HF-HRV baseline	0.22	.80	$6.19\ (0.17)_{a}$	$6.25\ (0.17)_{a}$	$6.09\ (0.18)_{a}$
HF-HRV anticipation	0.20	.82	$5.99\ (0.15)_{a}$	$5.94\ (0.16)_{a}$	$5.84\ (0.16)_{a}$
HF-HRV reactivity	0.20	.82	$-0.20\ (0.13)_{a}$	$-0.31\ (0.13)_{a}$	$-0.24\ (0.14)_{a}$
PEP baseline	0.36	.70	$114.49\ (1.70)_{a}$	$116.54\ (1.72)_{a}$	$115.72\ (1.77)_{a}$
PEP anticipation	2.03	.14	$101.48\ (1.68)_{a}$	$98.88\ (1.70)_{a}$	$103.78\ (1.75)_{a}$
PEP reactivity	2.98	.054	$-13.02\ (1.76)_{ab}$	$-17.69\ (1.78)_{ab}$	$-11.94\ (1.83)_{a}$

Note. SDO = social dominance orientation; HF-HRV = high frequency heart rate variability; PEP = preejection period. Standard errors presented in parentheses; means with different subscripts are significantly different from each other at $p < .05$; all analyses control for liking; HF-HRV and PEP analyses also controlling for participant age, exercise, and caffeine consumption.

0.18; $M_{racist} = 4.78$, $SE = 0.17$), we were able to conduct the proposed moderation analyses.

Moderation analyses. Analyses were conducted using PROCESS (Hayes, 2012) for a multicategorical moderation with condition effects coded to examine two contrasts (control [−1] vs. racism [1], and control [−1] vs. sexism [1]), a standardized LTGP as the moderator, and liking of the evaluator included as a covariate.

Self-report measures. Neither of the Condition Contrasts x LTGP interactions were significant for perceived SDO (*B*s > −0.14, *SE*s = 0.11, *p*s > .20), perceived sexism (*B*s > −0.15, *SE*s = 0.08, *p*s > .08), gender stigma (*B*s > −0.20, *SE*s = 0.17, *p*s > .25), or sexism attributions (*B*s > −0.17, *SE*s = 0.15, *p*s > .26).

Physiological outcomes. Physiological data were not collected for 12 participants (six participants did not consent to electrode placement, and data for six participants was unusable[6]), leaving an analytic sample size of 158 participants. HF-HRV at baseline, $W(158) = 0.99$, $p = .34$, and anticipation of the TSST, $W(158) = 0.98$, $p = .07$, were normally distributed; and HF-HRV reactivity was computed as in Study 1. PEP scores at baseline, $W(158) = 0.95$, $p = .07$, and anticipation of the TSST, $W(158) = 0.99$, $p = .27$, were normally distributed; and PEP reactivity was calculated by subtracting the last minute of baseline from the values of the minute prior to beginning the TSST. ANCOVAs controlling for liking of the evaluator, participant age, as well as whether the participant had exercised or consumed caffeine that day (1 = yes, 0 = no) revealed no effect of condition on mean baseline HF-HRV, $F(2, 151) = 0.22$, $p = .80$, $d = 0.11$, and no effect of condition on baseline PEP, $F(2, 151) = 0.36$, $p = .70$, $d = 0.14$. A one-sample *t* test confirmed that HF-HRV reactivity was greater than zero, $t(157) = 3.36$, $p = .001$, $d = 0.27$, 95% CI [−0.40, −0.10], as was PEP reactivity, $t(157) = 13.78$, $p < .001$, $d = 1.10$, 95% CI [−16.17, −12.11].

HF-HRV reactivity. We controlled for liking of the evaluator, participant age, as well as if participants had exercised or consumed caffeine that day (1 = yes, 0 = no). LTGP ($B = -0.09$, $SE = 0.08$, $p = .22$, 95% CI [−0.24, 0.06]) and the condition contrasts (control vs. sexism: $B = 0.03$, $SE = 0.11$, $p = .77$, 95% CI [−0.19, 0.25]; control vs. racism: $B = -0.07$, $SE = 0.11$, $p = .51$, 95%

CI [−0.28, 0.14]) were not significant predictors of HF-HRV reactivity. While the Control Versus Sexism x LTGP interaction was not significant (B = 0.05, SE = 0.11, p = .62, 95% CI [−0.16, 0.26]), the Control Versus Racism x LTGP interaction was significant (B = −0.25, SE = 0.11, p = .019, 95% CI [−0.46, −0.04]). Though there was no significant difference in HF-HRV reactivity between the control and racism conditions among participants low in LTGP (−1 *SD*), B = 0.18, SE = 0.15, p = .22, 95% CI [−0.11, 0.47], there was a significant difference among participants high in LTGP (+1 *SD*), B = −0.32, SE = 0.15, p = .036, 95% CI [−0.63, −0.02], such that participants in the racism condition demonstrated a significantly greater decrease in HF-HRV from baseline to TSST compared to participants in the control condition (see Figure 2). The simple slope was not significant for the control condition (p = .38, 95% CI [−0.13, 0.34]) nor for the sexism condition (p = .77, 95% CI [−0.30, 0.23]), but was significant for the racism condition (p = .01, 95% CI [−0.60, −0.08]).

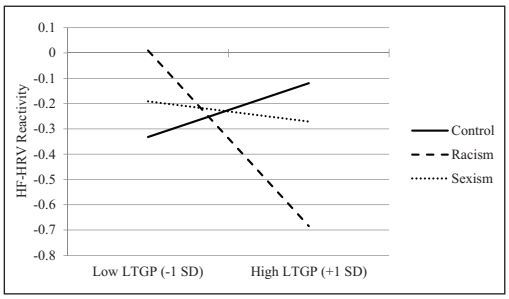

Figure 2. Effect of condition on HF-HRV reactivity moderated by LTGP.

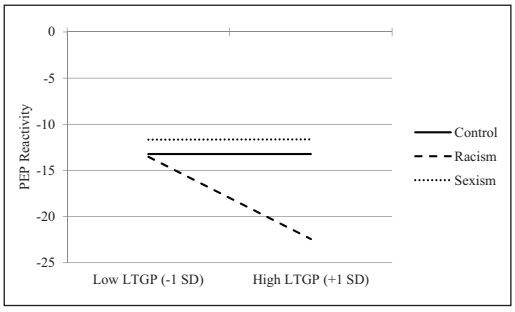

Figure 3. Effect of condition on PEP reactivity moderated by LTGP.

PEP reactivity. As with HF-HRV, liking of the evaluator, participant age, as well as if participants had exercised or consumed caffeine that day (1 = yes, 0 = no) were controlled for in analyses. LTGP (B = −1.46, SE = 1.03, p = .16, 95% CI [−3.51, 0.58]) and the condition control versus sexism contrast (B = 2.62, SE = 1.51, p = .09, 95% CI [−0.37, 5.61]) were not significant predictors of PEP reactivity, though the condition control versus racism contrast (B = −3.66, SE = 1.43, p = .012, 95% CI [−6.49, −0.83]) was a significant predictor of PEP reactivity. Participants in the racism condition demonstrated significantly greater decreases in PEP from baseline to TSST anticipation, compared to participants in the control condition. While the Control Versus Sexism x LTGP interaction was not significant (B = 1.48, SE = 1.44, p = .31, 95% CI [−1.37, 4.34]), the Control Versus Racism x LTGP interaction was significant (B = −2.95, SE = 1.44, p = .042, 95% CI [−5.79, −0.11]). Though there was no significant difference in PEP reactivity between the control and racism conditions among participants low in LTGP (−1 *SD*), B = −0.71, SE = 1.98, p = .72, 95% CI [−4.62, 3.20], there was a significant difference among participants high in LTGP (+1 *SD*), B = −6.67, SE = 2.10, p = .002, 95% CI [−10.82, −2.52], such that participants in the racism condition demonstrated a significantly shorter PEP at TSST than baseline, compared to participants in the control condition (see Figure 3). While the simple slope was not significant for the control condition (p = .99, 95% CI [−3.21, 3.22]) nor for the sexism condition (p = .99, 95% CI [−3.59, 3.62]), the simple slope was significant for the racism condition (p = .02, 95% CI [−7.96, −0.86]).

Discussion

Study 2 thus demonstrated that White female participants experienced significantly greater decreases in HF-HRV and shorter PEP from baseline to preevaluation when they held a lay theory of generalized prejudice and were being

evaluated by a racist evaluator, compared to participants in the control condition, demonstrating reciprocal sympathetic control and autonomic imbalance.[7] LTGP did not moderate participants' perceived sexism by condition, unlike in Study 1. However, as in past research, participants perceived both the racist and sexist evaluators as significantly higher in SDO and sexism, anticipated significantly more gender stigma, and were more likely to attribute negative feedback to sexism, compared to the neutral evaluator.

PEP decreases, as demonstrated among White women who strongly endorsed LTGP and anticipated an interaction with a racist evaluator, occur during intense or chronic stress (Porges, 2007) and in instances that require effortful active coping (Kelsey, 2012). Notably, the motivational intensity theory (Brehm & Self, 1989) proposes that effort is mobilized proportionally to subjective demand as long as success is possible, and past research has indicated that PEP is sensitive to task demands (Richter, Friedrich, & Gendolla, 2008) and shortens as motivated effort increases (e.g., Chatelain & Gendolla, 2015; Gendolla, Wright, & Richter, 2012). Integrating past research on PEP reactivity, the present findings further suggest that White women high in LTGP and preparing for an evaluation by a racist White man perceived the task as demanding and increased efforts in order to actively cope with the stressor.

While not the primary goal of this study, we notably did not demonstrate greater cardiovascular reactivity for women in the sexism condition compared to the neutral condition, and found significantly shorter PEP in the control condition compared to the sexism condition at preevaluation compared to control. Although this finding was unexpected, it is not entirely inconsistent with prior research. The present studies used a blatant manipulation of sexism, which may have been so heavy-handed that participants disengaged and withheld effort (see Wright & Kirby, 2001). When past work has shown a physiological link with acute sexism exposure, perceptions of sexism were relatively low, unlike the present study where perceptions of sexism were high. Specifically, in Salomon et al. (2015), they manipulated hostile sexism (by having a researcher make a negative comment about women being whiny and unintelligent in front of the participant) and found decreases in PEP, yet participants' perceptions of sexism were still relatively low ($M = 3.31$, $SD = 2.82$ on a 1–9 scale; Salomon et al., 2015). In the present research, participants in the sexism condition reported high levels of sexism ($M = 4.51$, $SD = 0.77$ on a 1–5 scale), suggesting the present manipulation of sexism with an anticipated interaction partner was very strong. As such, it is possible the present manipulation was so strong that participants disengaged (Wright & Kirby, 2001). Alternatively, it is possible that White women are simply accustomed to anticipating sexism as it is the form of bias which directly targets them, whereas they are less often aware of the potential for an individual to endorse negative racial biases. As such, the present null effect between the sexism and control conditions could reflect that White women are already, at least on a physiological level, preparing to deal with sexism.

In contrast, White women may have less experience being evaluated by someone who has made such explicit negative racial attitudes known. Indeed, endorsement of negative racial attitudes can be evaluated as less acceptable compared to the endorsement of negative attitudes towards feminists (e.g., Crandall, Eshleman, & O'Brien, 2002), perhaps making the explicit endorsement of anti-Black attitudes more threatening even for White women (this is partially supported by the effect of condition on threat reported in the supplemental material for Study 1). Indeed, the present sample identified as politically liberal ($M = 3.36$, $SD = 2.83$; 1 = *very liberal*, 10 = *very conservative*). Lastly, it is worth noting that participants generally did not like the evaluator, regardless of condition ($M_{overall} = 3.21$, $SD = 1.93$ on a 1–9 scale), suggesting participants were apprehensive of the evaluator across conditions. We encourage future research to replicate and explore such effects.

General Discussion

The present studies provide the first evidence that stigma by prejudice transfer results in cardiovascular reactivity when White women strongly

endorse LTGP. Specifically, White women who endorsed LTGP demonstrated parasympathetic nervous system withdrawal (HF-HRV decreases, Studies 1 and 2) and sympathetic nervous system activation (PEP shortening, Study 2) when anticipating an evaluation from a White man who held anti-Black attitudes, compared to a White man whose attitudes were unknown, indicating a cardiovascular stress response. Moreover, the present research is the first to identify the effect of individuals' endorsement of a lay theory of generalized prejudice on stigma by prejudice transfer across identity dimensions (anticipating a gender identity threat from a racial identity threat), and to highlight the critical role of LTGP on the cardiovascular stress response. Lastly, the present studies replicated past research on stigma by prejudice transfer (Sanchez et al., 2017), such that White women who were evaluated by a White man who held negative attitudes towards Black Americans perceived him to be more sexist (Studies 1 and 2), resulting in greater reported gender stigma (Studies 1 and 2) and attribution of negative feedback to sexism (Study 2).

These findings are integral in furthering present understandings of the boundaries of stigma and of lay theories of prejudice. Critically, the present findings demonstrate that stigma by prejudice transfer results in not only self-reports of anticipated identity threat, but also cardiovascular stress outcomes for individuals who perceive prejudices as generalized. The present findings of parasympathetic withdrawal and sympathetic activation (Study 2) indicate reciprocal sympathetic control, a characterization of autonomic imbalance (Berntson et al., 2008), which is associated with various negative health outcomes, including cardiovascular disease (Thayer et al., 2010) and diabetes (Berntson et al., 2008). Moreover, numerous studies have demonstrated a link between HF-HRV and PEP reactivity and negative health correlates such as impaired immune functioning (Juster et al., 2010). Lastly, decreases in HF-HRV during stress, as found in the present work (Studies 1 and 2), may have downstream negative outcomes, as RSA tends to overshoot baseline levels during recovery (i.e., vagal rebound), a key component in chronic hypertension (Mezzacappa, Kelsey, Katkin, & Sloan, 2001). Thus, while the present demonstration of a singular instance of cardiovascular reactivity is unlikely to negatively affect an individual's health, frequent experiences of anticipated stigma, whether from cues of ingroup prejudice or, as demonstrated in the present research, outgroup prejudice, may accumulate over time and could result in excessive demands on the ANS.

As such, the present studies demonstrate that for women who endorse a lay theory of generalized prejudice, anticipating an interaction with a racist evaluator results in greater cardiovascular stress. Although the present research did not examine cardiovascular recovery, we encourage future research to do so, as we propose that stigma by prejudice transfer may be a subtle cue for ingroup prejudice, and thus we propose that some individuals, such as those who do not endorse a lay theory of generalized prejudice as strongly, may ultimately experience deficits in cardiovascular recovery, not necessarily cardiovascular reactivity. Moreover, we encourage future research to further examine cardiovascular reactivity in response to stigma by prejudice transfer and LTGP endorsement with alternative cardiovascular measures (e.g., blood pressure). In doing so, future research may better be able to assess the psychological states of individuals, including their appraisals of challenge versus threat in response to stigma by prejudice transfer (e.g., biopsychosocial model of challenge and threat; see Seery, 2013).

While the present findings illustrate that the extent to which White women perceive prejudices as generalized affects perceptions of sexism and cardiovascular reactivity from a racial identity threat, the present research only examined one stigmatized group (i.e., White women), limiting current understandings of LTGP and the psychophysiological effects of stigma by prejudice transfer. Future work employing other samples (e.g., women of color; Chaney, Sanchez, & Remedios, 2020) is thus needed to provide a more complete understanding of cardiovascular reactivity after outgroup threat cues. Moreover, the

present work only examined the role of LTGP in promoting stigma by prejudice transfer from racism to sexism. We encourage future work to examine LTGP more broadly, including examining which prejudiced attitudes are perceived as overlapping (e.g., do lay individuals perceive anti-fat attitudes and racism as sharing a common underlying ideology?). Similarly, the present research examined high levels of racism compared to no information and did not employ a condition in which the evaluator was presented as *not* endorsing anti-Black attitudes. We propose that learning that an individual does not endorse anti-Black attitudes would signal identity safety, or evoke the belief that one's stigmatized identity is less likely to be tied to negative outcomes, and thus may ameliorate cardiovascular stress. While past research has demonstrated that White women perceive racial identity safety cues as indicative of gender identity safety, resulting in a greater sense of belonging (e.g., Chaney et al., 2016), we encourage future research to explore the effects of identity safety cue transfer on cardiovascular stress. Lastly, participants' LTGP endorsement only moderated the effect of condition on cardiovascular outcomes (Studies 1 and 2) and perceptions of sexism (Study 1) but did not moderate other self-reported measures. While the present samples endorsed LTGP relatively strongly and condition effects were large, we still expected LTGP endorsement to have moderated other gender-specific threat outcomes, and encourage future work to further explore more specifically the role of LTGP endorsement in stigma by prejudice transfer outcomes.

The present studies are the first to demonstrate a cardiovascular stress response indexed by decreased parasympathetic reactivity and greater sympathetic reactivity in anticipation of interacting with a racist White man among White women who hold a lay understanding of generalized prejudice. Thus, the present research expands previous knowledge on the boundaries of stigma by demonstrating that stigma by prejudice transfer results in not only psychological outcomes, but also cardiovascular stress outcomes. Further, the present studies expand past research on lay understandings of a generalized nature of prejudices and highlight a new avenue through which to understand stigmatized individuals' varying experiences of stigma by prejudice transfer.

Author note

All data and materials can be found at https://osf.io/8j67k/

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iDs

Kimberly E. Chaney https://orcid.org/0000-0001-6450-9488
Diana T. Sanchez https://orcid.org/0000-0002-8684-6183

Supplemental material

Supplemental material for this article is available online.

Notes

1. Across studies, participants were only eligible to participate if they indicated they (a) do not smoke cigarettes, (b) do not take any medication, prescription or otherwise that affects the cardiovascular system such as blood thinners, tranquilizers, antihypertensives, or stimulants, (c) have not had any serious psychiatric conditions such as schizophrenia, anxiety disorders, or psychotic or personality disorders, (d) do not have a history of heart problems, and (e) were not pregnant. The night before the session, participants received an email instructing them not to exercise, drink caffeine, drink alcohol, or smoke at least 4 hours before the session.
2. Past work has demonstrated that correcting for changes in respiration rate results in RSA reactivity that is nearly equivalent to uncorrected RSA reactivity, including when examining RSA via HF-HRV during a mental stressor (Houtveen, Rietveld, & De Geus, 2002). As the present research relied on a resting baseline and preparation period (not speaking) to calculate reactivity, we chose HF-HRV a priori as a close approximate of parasympathetic activity.

3. See supplemental material for self-reported measures of threat and vigilance, which were also collected.
4. Key event markers were not indicated in the cardiovascular data for these participants.
5. See supplemental material for a previously reported pilot test of the profile materials from Sanchez et al. (2017).
6. Four had artifacts over 50% of their data, and two had no key event indicators in the data.
7. See supplemental material for reported results of LTGP moderating the effect of condition on cardiovascular autonomic balance, computed as an index of PEP and HF-HRV based on Berntson et al. (2008).

References

Abrams, D., & Hogg, M. A. (Eds.). (1999). *Social identity and social cognition*. Oxford, UK: Blackwell.

Allport, G. W. (1954). *The nature of prejudice*. Reading, MA: Addison-Wesley.

Asbrock, F., Sibley, C. G., & Duckitt, J. (2010). Right-wing authoritarianism and social dominance orientation and the dimensions of generalized prejudice: A longitudinal test. *European Journal of Personality*, *24*, 324–340. https://doi.org/10.1002/per.746

Berntson, G. G., Bigger, J. T., Eckberg, D. L., Grossman, P., Kaufmann, P. G., Malik, M., . . . van der Molen, M. W. (1997). Heart rate variability: Origins, methods, and interpretive caveats. *Psychophysiology*, *34*, 623–648. https://doi.org/10.1111/j.1469-8986.1997.tb02140.x

Berntson, G. G., Norman, G. J., Hawkley, L. C., & Cacioppo, J. T. (2008). Cardiac autonomic balance versus cardiac regulatory capacity. *Psychophysiology*, *45*, 643–652. https://doi.org/10.1111/j.1469-8986.2008.00652.x

Brehm, J. W., & Self, E. A. (1989). The intensity of motivation. *Annual Review of Psychology*, *40*, 109–131. https://doi.org/10.1146/annurev.ps.40.020189.000545

Cacioppo, J. T., Uchino, B. N., & Berntson, G. G. (1994). Individual differences in the autonomic origins of heart rate reactivity: The psychometrics of respiratory sinus arrhythmia and preejection period. *Psychophysiology*, *31*, 412–419. https://doi.org/10.1111/j.1469-8986.1994.tb02449.x

Chandola, T., Britton, A., Brunner, E., Hemingway, H., Malik, M., Kumari, M., . . . Marmot, M. (2008). Work stress and coronary heart disease: What are the mechanisms? *European Heart Journal*, *29*, 640–648. https://doi.org/10.1093/eurheartj/ehm584

Chaney, K. E., & Sanchez, D. T. (2018). Gender-inclusive bathrooms signal fairness across identity dimensions. *Social Psychological and Personality Science*, *9*, 245–253. https://doi.org/10.1177/1948550617737601

Chaney, K. E., Sanchez, D. T., & Maimon, M. (2019). Stigmatized-identity cues in consumer spaces. *Journal of Consumer Psychology*, *29*, 130–141. https://doi.org/10.1002/jcpy.1075

Chaney, K. E., Sanchez, D. T., & Remedios, J. D. (2016). Organizational identity safety cue transfers. *Personality and Social Psychology Bulletin*, *42*, 1564–1576. https://doi.org/10.1177/0146167216665096

Chaney, K. E., Sanchez, D. T., & Remedios, J. D. (2018). We are in this together: How the presence of similarly stereotyped allies buffer against identity threats. *Journal of Experimental Social Psychology*, *79*, 410–422. https://doi.org/10.1016/j.jesp.2018.09.005

Chaney, K. E., Sanchez, D. T., & Remedios, J. D. (2020). *Dual threats: Women of color experience both gender and racial stigma in the face of a single identity threat*. Manuscript in revision.

Chatelain, M., & Gendolla, G. H. (2015). Implicit fear and effort-related cardiac response. *Biological Psychology*, *111*, 73–82. https://doi.org/10.1016/j.biopsycho.2015.08.009

Crandall, C. S., Eshleman, A., & O'Brien, L. (2002). Social norms and the expression and suppression of prejudice: The struggle for internalization. *Journal of Personality and Social Psychology*, *82*(3), 359–378. https://doi.org/10.1037//0022-3514.82.3.359

Duckitt, J., & Sibley, C. G. (2007). Right wing authoritarianism, social dominance orientation and the dimensions of generalized prejudice. *European Journal of Personality*, *21*, 113–130. https://doi.org/10.1002/per.614

Elliot, A. J., Payen, V., Brisswalter, J., Cury, F., & Thayer, J. F. (2011). A subtle threat cue, heart rate variability, and cognitive performance. *Psychophysiology*, *48*, 1340–1345. https://doi.org/10.1111/j.1469-8986.2011.01216.x

Gendolla, G. H. E., Wright, R. A., & Richter, M. (2012). Effort intensity: Some insights from the cardiovascular system. In R. M. Ryan (Ed.), *The Oxford handbook of motivation* (pp. 420–438). New York, NY: Oxford University Press.

Giner-Sorolla, R. (2018, January 24). Powering your interaction [Web log message]. Retrieved from

https://approachingblog.wordpress.com/2018/01/24/powering-your-interaction-2/

Gordon, A. M., Del Rosario, K., Flores, A. J., Mendes, W. B., & Prather, A. A. (2019). Bidirectional links between social rejection and sleep. *Psychosomatic Medicine*, *81*, 739–748. https://doi.org/10.1097/PSY.0000000000000669

Gosling, S. D., Rentfrow, P. J., & Swann, W. B., Jr. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, *37*, 504–528. https://doi.org/10.1016/S0092-6566(03)00046-1

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. https://doi.org/10.2105/AJPH.93.2.243

Hayes, A. F. (2012). *PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling* [White paper]. Retrieved from http://www.afhayes.com/public/process2012.pdf

Holzman, J. B., & Bridgett, D. J. (2017). Heart rate variability indices as bio-markers of top-down self-regulatory mechanisms: A meta-analytic review. *Neuroscience & Biobehavioral Reviews*, *74*, 233–255. https://doi.org/10.1016/j.neubiorev.2016.12.032

Houtveen, J. H., Rietveld, S., & De Geus, E. J. (2002). Contribution of tonic vagal modulation of heart rate, central respiratory drive, respiratory depth, and respiratory frequency to respiratory sinus arrhythmia during mental stress and physical exercise. *Psychophysiology*, *39*(4), 427–436. https://doi.org/10.1017.S0048577202394022

Juster, R. P., & Lupien, S. (2012). A sex- and gender-based analysis of allostatic load and physical complaints. *Gender Medicine*, *9*, 511–523. https://doi.org/10.1016/j.genm.2012.10.008

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

Juster, R. P., Pruessner, J. C., Desrochers, A. B., Bourdon, O., Durand, N., Wan, N., . . . Lupien, S. J. (2016). Sex and gender roles in relation to mental health and allostatic load. *Psychosomatic Medicine*, *78*, 788–804. https://doi.org/10.1097/PSY.0000000000000351

Kelsey, R. M. (2012). Beta-adrenergic cardiovascular reactivity and adaptation to stress: The cardiac pre-ejection period as an index of effort. In R. A. Wright & G. H. E. Gendolla (Eds.), *How motivation affects cardiovascular response: Mechanisms and applications* (pp. 43–60). Washington, DC: American Psychological Association.

Kirschbaum, C., Pirke, K. M., & Hellhammer, D. H. (1993). The "Trier Social Stress Test": A tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology*, *28*, 76–81. https://doi.org/10.1159/000119004

Kraus, M. W., & Mendes, W. B. (2014). Sartorial symbols of social class elicit class-consistent behavioral and physiological responses: A dyadic approach. *Journal of Experimental Psychology: General*, *143*, 2330–2340. https://doi.org/10.1037/xge0000023

Kreibig, S. D. (2010). Autonomic nervous system activity in emotion: A review. *Biological Psychology*, *84*, 394–421. https://doi.org/10.1016/j.biopsycho.2010.03.010

Logel, C., Walton, G. M., Spencer, S. J., Iserman, E. C., von Hippel, W., & Bell, A. E. (2009). Interacting with sexist men triggers social identity threat among female engineers. *Journal of Personality and Social Psychology*, *96*, 1089–1103. https://doi.org/10.1037/a0015703

Lucini, D., Di Fede, G., Parati, G., & Pagani, M. (2005). Impact of chronic psychosocial stress on autonomic cardiovascular regulation in otherwise healthy subjects. *Hypertension*, *46*, 1201–1206. https://doi.org/10.1161/01.HYP.0000185147.32385.4b

Major, B., & O'Brien, L. T. (2005). The social psychology of stigma. *Annual Review of Psychology*, *56*, 393–421. https://doi.org/10.1146/annurev.psych.56.091103.070137

Masi, C. M., Hawkley, L. C., Rickett, E. M., & Cacioppo, J. T. (2007). Respiratory sinus arrhythmia and diseases of aging: Obesity, diabetes mellitus, and hypertension. *Biological Psychology*, *74*, 212–223. https://doi.org/10.1016/j.biopsycho.2006.07.006

McConahay, J. B. (1986). Modern racism, ambivalence, and the Modern Racism Scale. In J. F. Dovidio & S. L. Gaertner (Eds.), *Prejudice, discrimination, and racism* (pp. 91–126). Orlando, FL: Academic Press.

McEwen, B. S. (1998). Stress, adaptation, and disease: Allostasis and allostatic load. *Annals of the New York Academy of Sciences*, *840*, 33–44. https://doi.org/10.1111/j.1749-6632.1998.tb09546.x

Mendes, W. B. (2016). Emotion and the autonomic nervous system. In L. E. Barrett, M. Lewis, & J. Haviland-Jones (Eds.), *Handbook of emotions* (4th ed., pp. 166–181). New York, NY: Guilford Press.

Mendes, W. B., Major, B., McCoy, S., & Blascovich, J. (2008). How attributional ambiguity shapes physiological and emotional responses to social rejection and acceptance. *Journal of Personality and Social Psychology*, *94*, 278–291. https://doi.org/10.1037/0022-3514.94.2.278

Mezzacappa, E. S., Kelsey, R. M., Katkin, E. S., & Sloan, R. P. (2001). Vagal rebound and recovery from psychological stress. *Psychosomatic Medicine*, *63*, 650–657. https://doi.org/10.1097/00006842-200107000-00018

Murphy, M. C., Steele, C. M., & Gross, J. J. (2007). Signaling threat: How situational cues affect women in math, science, and engineering settings. *Psychological Science*, *18*, 879–885. https://doi.org/10.1111/j.1467-9280.2007.01995.x

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. https://doi.org/10.1016/j.jesp.2010.04.006

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

Pinel, E. C. (2002). Stigma consciousness in intergroup contexts: The power of conviction. *Journal of Experimental Social Psychology*, *38*, 178–185. https://doi.org/10.1006/jesp.2001.1498

Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology*, *74*(2), 116–143. https://doi.org/10.1016/j.biopsycho.2006.06.009

Pratto, F., & Pitpitan, E. V. (2008). Ethnocentrism and sexism: How stereotypes legitimize six types of power. *Social & Personality Psychology Compass*, *2*, 2159–2176. https://doi.org/10.1111/j.1751-9004.2008.00148.x

Pratto, F., Sidanius, J., Stallworth, L. M., & Malle, B. F. (1994). Social dominance orientation: A personality variable predicting social and political attitudes. *Journal of Personality and Social Psychology*, *67*, 741–763. https://doi.org/10.1037/0022-3514.67.4.741

Qu, M., Zhang, Y., Webster, J. G., & Tompkins, W. J. (1986). Motion artifact from spot and band electrodes during impedance cardiography. *IEEE Transactions on Biomedical Engineering*, *11*, 1029–1036. https://doi.org/10.1109/TBME.1986.325869

Richter, M., Friedrich, A., & Gendolla, G. H. E. (2008). Task difficulty effects on cardiac activity. *Psychophysiology*, *45*, 869–875. https://doi.org/10.1111/j.1469-8986.2008.00688.x

Rottenberg, J., Clift, A., Bolden, S., & Salomon, K. (2007). RSA fluctuation in major depressive disorder. *Psychophysiology*, *44*, 450–458. https://doi.org/10.1111/j.1469-8986.2007.00509.x

Salomon, K., Burgess, K. D., & Bosson, J. K. (2015). Flash fire and slow burn: Women's cardiovascular reactivity and recovery following hostile and benevolent sexism. *Journal of Experimental Psychology: General*, *144*, 469–479. https://doi.org/10.1037/xge0000061

Sanchez, D. T., Chaney, K. E., & Maimon, M. (2019). Stigmatized-identity cues and consumer applications revisited. *Journal of Consumer Psychology*, *29*, 160–164. https://doi.org/10.1002/jcpy.1078

Sanchez, D. T., Chaney, K. E., Manuel, S. K., & Remedios, J. D. (2018). Theory of prejudice and American identity threat transfer for Latino and Asian Americans. *Personality and Social Psychology Bulletin*, *44*, 972–983. https://doi.org/10.1177/0146167218759288

Sanchez, D. T., Chaney, K. E., Manuel, S. K., Wilton, L. S., & Remedios, J. D. (2017). Stigma by prejudice transfer: Why racism threatens White women and sexism threatens men of color. *Psychological Science*, *28*, 445–461. https://doi.org/10.1177/0956797616686218

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. https://doi.org/10.2105/AJPH.2011.300620

Schneider, K. T., Tomaka, J., & Palacios, R. (2001). Women's cognitive, affective, and physiological reactions to a male coworker's sexist behavior. *Journal of Applied Social Psychology*, *31*, 1995–2018. https://doi.org/10.1111/j.1559-1816.2001.tb00161.x

Seeman, T. E., McEwen, B. S., Rowe, J. W., & Singer, B. H. (2001). Allostatic load as a marker of cumulative biological risk: MacArthur studies of successful aging. *Proceedings of the National Academy of Sciences*, *98*, 4770–4775. https://doi.org/10.1073/pnas.081072698

Seery, M. D. (2013). The biopsychosocial model of challenge and threat: Using the heart to measure the mind. *Social and Personality Psychology Compass, 7, 637–653*. https://doi.org/10.1111/spc3.12052

Sekaquaptewa, D., & Thompson, M. (2003). Solo status, stereotype threat, and performance expectancies: Their effects on women's performance. *Journal of Experimental Social Psychology*, *39*, 68–74. https://doi.org/10.1016/S0022-1031(02)00508-5

Shahrestani, S., Stewart, E. M., Quintana, D. S., Hickie, I. B., & Guastella, A. J. (2015). Heart rate variability during adolescent and adult social interactions: A meta-analysis. *Biological Psychology*, *105*, 43–50. https://doi.org/10.1016/j.biopsycho.2014.12.012

Sherwood, A., Allen, M. T., Fahrenberg, J., Kelsey, R. M., Lovallo, W. R., & van Doornen, L. J. (1990). Methodological guidelines for impedance cardiography. *Psychophysiology*, *27*, 1–23. https://doi.org/10.1111/j.1469-8986.1990.tb02171.x

Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist*, *52*, 613–629. https://doi.org/10.1037/0003-066X.52.6.613

Swim, J. K., Aikin, K. J., Hall, W. S., & Hunter, B. A. (1995). Sexism and racism: Old-fashioned and modern prejudices. *Journal of Personality and Social Psychology*, *68*, 199–214. https://doi.org/10.1037/0022-3514.68.2.199

Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behavior. In S. Worchel & W. G. Austin (Eds.), *Psychology of intergroup relations* (pp. 7–24). Chicago, IL: Nelson-Hall.

Thayer, J. F., Åhs, F., Fredrikson, M., Sollers, J. J., III, & Wager, T. D. (2012). A meta-analysis of heart rate variability and neuroimaging studies: Implications for heart rate variability as a marker of stress and health. *Neuroscience & Biobehavioral Reviews*, *36*, 747–756. https://doi.org/10.1016/j.neubiorev.2011.11.009

Thayer, J. F., Yamamoto, S. S., & Brosschot, J. F. (2010). The relationship of autonomic imbalance, heart rate variability and cardiovascular disease risk factors. *International Journal of Cardiology*, *141*, 122–131. https://doi.org/10.1016/j.ijcard.2009.09.543

Townsend, S. S., Major, B., Gangi, C. E., & Mendes, W. B. (2011). From "in the air" to "under the skin": Cortisol responses to social identity threat. *Personality and Social Psychology Bulletin*, *37*, 151–164. https://doi.org/10.1177/0146167210392384

Wright, R. A., & Kirby, L. D. (2001). Effort determination of cardiovascular response: An integrative analysis with applications in social psychology. *Advances in Experimental Social Psychology*, *33*, 255–307. https://doi.org/10.1016/S0065-2601(01)80007-1