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Stress and coping in interracial contexts: The influence of race-based rejection sensitivity and cross-group friendship in daily experiences of health

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Abstract

We examined the interplay of psychosocial risk and protective factors in daily experiences of health. In Study 1, the tendency to anxiously expect rejection from racial outgroup members, termed race-based rejection sensitivity (RS-race), was cross-sectionally related to greater stress-symptoms among Black adults who reported fewer cross-race friends but not among participants who had more cross-race friends. In Study 2, we experimentally manipulated the development of a same- versus cross-race friendship among Latino/a-White dyads prior to collecting daily experiences of stress-symptoms using a diary methodology. While RS-race predicted more psychosomatic symptoms in the same-race friendship condition, RS-race was unrelated to symptomatology among participants who made a cross-race friend. These findings suggest that experiences of intergroup stress can spill over into everyday life in the absence of positive contact, but cross-race friendships may be a resource that mitigates the expression of interracial stress.

Keywords

Chronic stress; health; cross-group friendship; race-based rejection sensitivity; psychosomatic symptomatology

Despite some individuals best intentions, social psychological research shows that in general people are likely to respond with greater stress, threat and avoidance during interracial interactions (Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001; Mendes, Blascovich, Hunter, Lickel, & Jost, 2007; Mendes, Blascovich, Lickel, & Hunter, 2002; Trawalter, Richeson, & Shelton, 2009). There are, however, critical individual differences that can exacerbate or attenuate negative responses during interracial interactions, with three psychological factors reliably predicting stress at the physiological level: prejudice or concerns about appearing prejudiced (Amodio, 2009; Mendes, Gray, Mendoza-Denton,

Major, & Epel, 2007; Page-Gould et al., 2008), concerns about being rejected by outgroup members (Page-Gould et al., 2008), and the amount of experience one has interacting with outgroup members (Blascovich et al., 2001; Olsson, Ebert, Banaji, & Phelps, 2005; Page-Gould, Mendes, & Major, 2010). In this manuscript, we focus on the latter two of these factors. Specifically, people who expect rejection in intergroup settings perceive such settings as cognitively and emotionally demanding, and therefore stressful (Page-Gould et al., 2008; see Trawalter et al., 2009). However, people who have contact experience with people of other races – such as those with close cross-race friends – may perceive that they have resources to meet the demands of future interracial interactions and thus experience these interactions as less stressful (Blascovich et al., 2001; Trawalter et al., 2009).

Although a number of intergroup theorists have posited that stress reactions to relatively short, discrete interracial interactions may have implications for long-term health and longevity (Mays, Cochran, & Barnes, 2007; Mendes, Gray, et al., 2007; Page-Gould, Mendes, et al., 2010; Page-Gould et al., 2008; Trawalter et al., 2009), to our knowledge no research has yet tested whether the antecedents of such interracial stress reactions also predict more chronic outcomes.

In this manuscript, we explore the possibility that race-based rejection sensitivity (*RS-race*; Mendoza-Denton et al., 2002), operationalized as anxious expectations of discrimination, represent a risk factor for chronic stress and adverse health outcomes. This work builds on a rich literature documenting the effect of actual and perceived discrimination on the perpetuation of ethnic health disparities (Mays et al., 2007; Troxel, Matthews, Bromberger, & Sutton-Tyrrell, 2003; Williams, Neighbors, & Jackson, 2003), as well as our prior research showing greater cortisol reactivity during intergroup encounters among individuals high in *RS-race* (Page-Gould, Mendoza-Denton, & Tropp, 2008). In addition, we test the hypothesis that positive intergroup contact, operationalized through cross-race friendship, mitigates stress symptomatology associated with *RS-race*.

In Study 1 we test the prediction that *RS-race* is related to health experiences among people who do not have close cross-group friends. While Study 1 is an observational study, Study 2 directly tests the role of intergroup friendship in the relationship between *RS-race* and stress-related health outcomes by manipulating cross-race friendship and observing its effects on daily reports of physical symptoms.

Race-based Rejection Sensitivity

The construct of race-based rejection sensitivity (Mendoza-Denton et al., 2002) belongs to a family of frameworks (e.g., Steele, Aronson, & Spencer, 2000; Stephan & Stephan, 1985) that recognize the centrality of threat in interracial experiences. The *RS-race* framework, by virtue of having its roots in the interpersonal relationships and attachment literatures (e.g., Bowlby, 1969; Downey & Feldman, 1996), explicitly emphasizes the interpersonal concerns of acceptance and rejection that people bring into interracial interactions, beyond the concerns about confirming stereotypes that past research has extensively elucidated (c.f., Schmader, Johns, & Martens, 2008).

The RS-race framework posits that as a result of personal or vicarious experiences of race-based discrimination, people develop *anxious expectations* that they will be similarly socially rejected in future situations. These expectations activate a defensively motivated search for cues of discrimination in the environment, which then make the perception of discrimination more likely. The framework also proposes that people experience intense emotional and behavioral reactions to the perceived rejection. Mendoza-Denton et al. (2002) have found evidence for each of these proposed steps in the dynamic. Furthermore, consistent with this framework, Page-Gould and colleagues (2008) have found that people high in RS-race show increased cortisol reactivity in interracial settings, and Mendoza-Denton et al. (2008) have also shown that people high in RS-race tend to avoid interracial situations as a protective measure against potential negativity (see also Pinel, 1999). To the degree that not all members of a given group are exposed to discrimination to the same degree, individual differences in RS-race develop.

Relevance to both majority and minority group members

The consequences of RS-race were originally examined specifically in relation to educational outcomes among minority students in historically White educational institutions (Mendoza-Denton et al, 2002, 2008). To the degree that majority students do not carry a history of stigmatization within such institutions, RS-race was not expected to, and did not, predict educational outcomes for majority students (see Mendoza-Denton & Page-Gould, 2008). In the context of intergroup relationships, by contrast, Page-Gould and colleagues (2008) noted that the possibility of race-based rejection is applicable to *both* majority and minority group members. Accordingly, these researchers found RS-race to be predictive of negative reactions among both majority- and minority-group members of a developing friendship. Thus we examine the relationship of RS-race to chronic indexes of health among both majority and minority groups.

Cross-race Friendship as a Protective Factor

A second prediction we tested here was that cross-race friendship would mitigate long-term effects of RS-race on stress and health outcomes. There are at least three reasons to believe that cross-group friendship should moderate the predicted effects of RS-race. First, people who have cross-race friends have familiarity with interracial interactions and thus should have developed social skills specific to the interracial context (Mendoza-Denton et al., 2006). Second, cross-race friendships provide people with unambiguous evidence of interracial positivity that can erode negative expectations for future intergroup interactions (Mendoza-Denton et al., 2006; Paolini et al., 2006). As a cross-race friend should be cognitively associated with acceptance, cross-race friendship should inhibit associations between outgroup members and rejection over time. Thus, the development of a new cross-race friend has the potential to be beneficial at any stage of the development of RS-race, as old associations between outgroup members and rejection lose their potency.

Finally, cross-race friends can serve as a source of social support after negative interracial interactions. Social support is known to provide both psychological and physiological benefits (Gottlieb, 1985; Taylor, 2007). Specifically, the “buffering hypothesis” of social support posits that strong social support networks can break the link between chronic stress

and poor health (Cohen & McKay, 1984). Recent research has shown that people who have cross-race friends actively seek out social support from racial outgroup members following interracial conflict, which represents an active coping strategy that reduces the negative impact of interracial conflict on subsequent intergroup interactions (Page-Gould, in press). Cross-race friendship may provide a resource for coping with intergroup threat, because it provides people with specific tools that they can be utilized to cope with stressful interracial interactions.

A Stress and Coping Theoretical Framework

More broadly, our predictions are consistent with the stress and coping model (Lazarus & Folkman, 1984) as applied to intergroup settings by Trawalter and colleagues (2009). Building on the idea that stress responses are the result of an interaction between primary appraisals of situational demands and secondary appraisals of resources available to meet those demands, Trawalter and colleagues suggest multiple factors that affect both primary and secondary appraisals during interracial interactions. Individuals who expect rejection or danger from people of other races should perceive the demands of interracial interactions to be relatively high. However, people who have experience with people of other races (e.g., have established close cross-race friendships) should perceive that they have resources to meet the demands of an interracial interaction. Trawalter and colleagues further predicted that people who have such resources will engage with outgroup members and exhibit approach-related behavior. Past psychophysiological research on acute emotional and stress responses during interracial interactions supports these ideas (Blascovich et al., 2001; Mendes et al., 2002; Page-Gould et al., 2008; Page-Gould, Mendoza-Denton, Alegre, & Siy, 2010).

The stress and coping model (Lazarus & Folkman, 1984; Trawalter et al., 2009) predicts that RS-race should accentuate the perceived demands of an interracial interaction and elicit negative responses – but only among people who do not feel they have the resources to handle the situation. To the extent that cross-race friendship provides a sense of self-efficacy for interracial interactions, then cross-race friendship should moderate the impact of RS-race on stress-related health outcomes.

The Present Research

In two studies, we tested the hypothesis that cross-race friendship moderates the impact of RS-race on chronic stress. Because we are ultimately interested in chronic stress due to its relationship with health, we collected self-reports of various *psychosomatic symptoms* – real health symptoms that are typically associated with mental illness or stress. In Study 1, we observed this relationship cross-sectionally. Study 2 experimentally manipulated the development of closeness with someone of another race to examine whether RS-race would causally influence stress symptoms. Moreover, in Study 2, stress symptoms were measured repeatedly for 10 days to maximize both the likelihood of observing sufficient frequencies of stress symptoms and to increase the ecological validity of our measurement of daily health experiences.

Study 1

We hypothesized that: (1) RS-race would predict psychosomatic symptomatology among people with relatively few cross-race friends; but (2) people who have cross-race friends will not exhibit stress- symptomatology, regardless of their levels of RS-race. In this first study, we conducted an initial test of these hypotheses by observing naturally occurring patterns of these processes cross-sectionally.

Method

Participants—Participants ($N = 70$) were adults recruited from the greater Boston, Massachusetts area for a \$35 study. All participants self-identified as “African American” or “Black” and about half (48.6%) of the sample listed “student” as their sole occupation. This sample had an even sex distribution (35 females) and a mean age of 26 years ($SD = 10.2$ years, range 18 to 40). Sex was used as a covariate due to commonly observed sex differences in the experiences and reporting of health (Idler, Russell, & Davis, 2000; Verbrugge, 1989). Although we expected age to be an important covariate for stress symptoms, age was unrelated to stress- symptoms, $r(70) = -0.09$, $p = 0.46$, so it was not included.

Procedure and materials—Participants were recruited through local newspapers and flyers. Participants completed an online survey that included measures of RS-race, a question regarding cross-race close friendships, and two psychological covariates, intergroup contact and interpersonal rejection sensitivity (described below). At least two days after they completed the online measures, participants were scheduled for a laboratory session. Upon arriving at the lab, they reported the severity with which they had experienced a number of psychosomatic symptoms in the last 2 weeks. Participants then took part in a laboratory experiment described elsewhere (Mendes, et al., 2007; Page-Gould, et al., 2010)

RS-race—RS-race was assessed with the short version of the race-based rejection sensitivity questionnaire (Page-Gould et al., 2008). The short RSQ-race consists of 6 scenarios where race-based rejection is possible. Participants are asked to visualize each scenario, and rate how anxious they would feel and how much they would expect race-based rejection in each situation using a 7-point Likert scale. For example, one of the scenarios reads, “Imagine that you are in class one day, and the teacher asks a difficult question. A few people, including yourself, raise their hands to answer the question.” The scenario is followed by an expectation question (i.e., “I would expect that the professor might not choose me because of my race/ethnicity.”) and an anxiety question (i.e., “How concerned/anxious would you be that the professor might not choose you because of your race/ethnicity?”), which are multiplied together for each scenario to operationalize “hot cognitions” – the idea that the effect of one’s expectations are magnified by the accompanying anxiety. These products are averaged across the 6 scenarios, with scores ranging between 1 and 49. Higher values on the RSQ-race indicate anxious expectations of being rejected in intergroup contexts. The scale was internally reliable ($\alpha = .87$).

Cross-race friendship—Cross-race friendship was assessed with the cross-group friendship item from Islam and Hewstone’s (1993) intergroup contact scale (i.e., “How much contact have you had with Caucasian Americans as close friends?”). Participants indicated their level of cross-race friendship on a 7-point Likert scale ranging from 1 (not at all) to 7 (a great deal).

Intergroup contact quantity—The other items of the contact quantity scale (e.g., “How much contact have you had with Caucasian Americans as neighbors?,” “How often do you engage in informal discussions with Caucasian Americans?”) were averaged together ($\alpha = .75$) and used as a covariate to ensure that our effects were due to *friendship* above and beyond exposure to outgroup members.

Interpersonal rejection sensitivity—Given our interest in race-based rejection sensitivity, it was important to control for interpersonal rejection sensitivity to ensure that any observed effects of RS-race were indeed driven by concerns about race-based rejection above and beyond concerns about rejection as a whole (Mendoza-Denton & Page-Gould, 2008; Mendoza-Denton et al., 2002; Page-Gould et al., 2008). Interpersonal rejection sensitivity was measured using the short version of the interpersonal rejection sensitive scale (RSQ-personal; Downey & Feldman, 1996). The RSQ-personal is measured in the same way as the RSQ-race, where participants report their anxiety and expectations about rejection in various scenarios. An example scenario from the RSQ-personal is, “You ask a friend to do you a big favor.” Participants report how much they expect rejection (reverse-coded: “He/she would willingly do this favor for me.”) and how anxious they would feel about being rejected (i.e., “How concerned or anxious would you be over whether or not your friend would do this favor?”). The scale had adequate reliability ($\alpha = 0.69$). It should be noted that RSQ-race and the RSQ-personal were uncorrelated (Table 1), suggesting that concerns about personal rejection are distinct from concerns about race-based rejection.

Psychosomatic symptomatology—Psychosomatic symptomatology was assessed in the laboratory with the somatic subscale of the Beck Depression Inventory (BDI; Beck, Steer, & Brown, 1996). The BDI is a widely-used, symptom-based measure of affective disorders that conceptualizes depression as having affective and somatic components. Some example items from the somatic subscale are, “Over the past 2 weeks, how have you been sleeping – have you been sleeping more than usual? How about less than usual – experiencing any insomnia (not being able to sleep when you want to) over the past 2 weeks?” and “Over the past 2 weeks, how much of the time did you feel exhausted, tired, like you had no energy?” Participants indicated how severely they had experienced psychosomatic symptoms within the previous two weeks using a 0 (Not at All) to 3 (Severely) 4-point Likert scale. Responses across these items were averaged together, with higher values representing more severe experiences of psychosomatic symptomatology over the past two weeks. As we were specifically interested in somatization of stress, the somatic subscale of the BDI provided an ideal measure of psychosomatic symptoms. All the same, to ensure that our results are uniquely related to variance in psychosomatic symptomatology, we measured the affective subscale to compare in our analyses. Both the somatic and affective subscale was internally reliable ($\alpha_{somatic} = .75$, $\alpha_{affective} = .81$).

Results

Analyses were conducted using the linear model (*lm*) function in R 2.14 (R Development Core, 2011), and all predictors were centered prior to being included in the model. The bivariate relationships between the variables are presented in Table 1. Missing values (i.e., 2 participants did not complete the RSQ-race or the cross-race friendship item and 1 participant only did not complete the cross-race friendship item) were replaced with the sample mean.

Psychosomatic- and psychological- symptom severity were simultaneously regressed on RS-race, cross-race friendship, and their interaction, controlling for participant sex, interpersonal rejection sensitivity, and intergroup contact. In the multivariate model, there were no main effects of RS-race, $\Lambda_{Pillai} = 0.001$, $p = 0.98$, or cross-race friendship, $\Lambda_{Pillai} = 0.07$, $p = 0.10$, and the interaction between RS-race and cross-race friendship was marginal, $\Lambda_{Pillai} = 0.08$, $p = 0.07$. However, the interaction of RS-race and cross-race friendship was reliable in the univariate models for both the somatic and affective subscales (see below), which is reflective of the strong collinearity between depressive symptoms in the affective and somatic domains.

Examining the effects for the somatic subscale, the univariate model was significant, $F(6, 63) = 2.41$, $p = 0.04$, and explained 10.9% of the total variance in psychosomatic symptomatology (Adjusted $R^2 = 0.11$). There was no significant main effect of RS-race, $\beta = 0.001$, $t(63) = 0.01$, $p = 0.99$, but there was a main effect for cross-race friendship to predict less severe psychosomatic symptomatology, $\beta = -0.35$, $t(63) = -2.22$, $p = 0.03$. As predicted, there was a significant interaction between RS-race and cross-race friendship, $\beta = -0.35$, $t(63) = -2.10$, $p = 0.04$ (Figure 1). Simple effects were tested at one standard deviation above and below the mean of RS-race and cross-race friendship (Aiken & West, 1991). Among participants high in RS-race, cross-race friendship predicted significantly fewer psychosomatic symptoms, $\beta = -0.59$, $t(63) = -3.59$, $p = 0.001$, but cross-race friendship was unrelated to symptom severity among participants who were low in RS-race, $\beta = -0.10$, $t(63) = -0.45$, $p = 0.66$. The simple slope of RS-race was not reliable for either people with few cross-race friends, $\beta = 0.25$, $t(63) = 1.43$, $p = 0.16$, nor for people with many cross-race friends, $\beta = -0.25$, $t(63) = -1.53$, $p = 0.13$. These results suggest that cross-race friendship is associated with less psychosomatic symptoms among people who anxiously expect rejection on the basis of their race.

Examining the effects for the affective subscale, the univariate model was significant, $F(6, 63) = 2.31$, $p = 0.04$, and explained 10.2% of the variance in affective symptomatology (Adjusted $R^2 = 0.10$). There were no main effects of RS-race, $\beta = -0.02$, $t(63) = -0.15$, $p = 0.88$, or cross-race friendship, $\beta = -0.21$, $t(63) = -1.35$, $p = 0.18$, for affective symptomatology, but there was an interaction of RS-race and cross-race friendship, $\beta = -0.35$, $t(63) = -2.08$, $p = 0.04$. Similar to the somatic subscale, cross-race friendship was strongly negatively related to affective symptom severity among participants who were high in RS-race, $\beta = -0.46$, $t(63) = -2.76$, $p = 0.01$, but was unrelated to affective symptomatology among participants who were low in RS-race, $\beta = 0.03$, $t(63) = 0.45$, $p = 0.66$. RS-race did not reliably predict affective symptoms when focusing on participants

with relatively many cross-race friends, $\beta = -0.26$, $t(63) = -1.64$, $p = 0.11$, or relatively few cross-race friends, $\beta = 0.23$, $t(63) = 1.31$, $p = 0.20$.

Discussion

We found within-group differences in psychosomatic symptomatology as a function of psychosocial factors that are relevant to interracial contexts. Black participants who were high in RS-race had significantly less severe psychosomatic symptomatology as a function of cross-race friendships. Among Black participants who were low in RS-race, cross-race friendship was unrelated to daily symptomatology. This general pattern was convergent across both somatic and affective symptomatology, which provides convergent evidence across the somatic and affective domains of psychosomatic symptomatology. The next steps were to determine whether cross-race friendship causally affects psychosomatic symptomatology among individuals high in RS-race and to ascertain the generalizability of these findings to other ethnic groups.

It is important to note some limitations pertaining to our measure of cross-race friendship. We used a 1-item measure of cross-race friendship for pragmatic reasons, specifically time constraints with the survey. Single-item measures are not ideal, because their reliability cannot be established and they yield a low-resolution snapshot of the construct being measured. In addition, this single item only focused on the quantity of cross-race friendships, not the quality of those friendships. Thus, some participants may have been thinking of their closest friends and other participants may have been thinking of mere acquaintances; we were unable to pick apart the variance explained by cross-race friendship quality. Perhaps our non-ideal measurement of cross-race friendship explains why we found no correlation between RS-race and cross-race friendship (Table 1), despite observing negative correlations between these constructs in past research (c.f., Mendoza-Denton & Page-Gould, 2008). We attempted to overcome these shortcomings in our measurement of cross-race friendship by manipulating closeness as our measure of friendship in Study 2.

Study 2

Although Study 1 provided suggestive evidence that cross-race friendship moderates experiences of psychosomatic symptoms among individuals who score high on RS-race, the design of the study prevents us from ruling out an alternative explanation; that is, we cannot determine if cross-race friendship actively reduces symptomatology among people who score high on RS-race, or if cross-race friendship simply covaries with less severe symptomatology. Therefore, to test whether cross-race friendship actually reduces stress symptomatology for people who are likely to appraise intergroup interactions as stressful, we randomly assigned participants to form a new cross-race or same-race friendship and measured symptoms daily after the experimental manipulation (Page-Gould et al., 2008).

Specifically, we followed participants' reports of daily psychosomatic symptoms for ten days after a closeness-building manipulation (A. Aron, Melinat, E. N. Aron, Vallone, & Bator, 1997). Prior to the diary period, half of the participants were randomly paired with a same-race or cross-race friendship partner. The same-race condition serves as a control condition that allows us to potentially disentangle effects of cross-race friendships on stress

symptomatology from effects of friendship without an intergroup component. We expected to see that RS-race would predict daily reports of stress symptoms, mirroring the individuals who had low cross-race friendship in Study 1. We also expected that participants who made a new cross-race friend would report fewer psychosomatic symptoms after the friendship manipulation, regardless of RS-race.

Method

Participants—Participants were 148 Latino/a and White university students (45.3% Latino/a) at a large public research university on the west coast of the United States. This sample was predominantly female (73% female), and had a mean age of 20 years ($SD = 2.0$ years, range 17 to 32).

Procedure and materials—Participants were recruited from flyers on campus to participate in a study for \$68 where they would “make a new friend.” Participants came to the lab for an initial information session, where they completed the RSQ-race (Mendoza-Denton et al., 2002), the contact quantity scale (Islam & Hewstone, 1993), and the RSQ-personal (Downey & Feldman, 1996) prior to condition assignment. All scales had moderate to good internal reliability ($\alpha_{\text{RSQ-race}} = 0.82$, $\alpha_{\text{Contact Quantity}} = 0.86$; $\alpha_{\text{RSQ-personal}} = 0.70$).

Friendship Induction—Within a week of the information session, participants were randomly assigned to the cross-race or same-race friendship condition and matched with an eligible partner. Participants then met with their partners three times over the next three weeks to complete a series of friendship building tasks that were an extended version of the 1-session *Fast Friends* procedure (A. Aron et al., 1997). We developed an extended, 3-meeting version of the *Fast Friends* procedure to create a strong manipulation of friendship. The first meeting followed the protocol of the original *Fast Friends* procedure (A. Aron et al., 1997), where participants asked and answered questions with their partners that escalated in self-disclosure. We pilot tested new questions for the second friendship meeting to have similar increases in self-disclosure as the original *Fast Friends* questions¹. In the third friendship meeting, partners played the game *Jenga* that was modified to have a collective monetary incentive, thus creating interdependence in the context of the final interaction. The full validation of the *Extended Fast Friends* procedure have been reported previously by Page-Gould and colleagues and materials are available online (<http://rascl.berkeley.edu/tools/>; Page-Gould et al., 2008).

Diary follow-up—Beginning the first day after their last friendship meeting, participants completed online daily diary surveys each evening for the 10 nights. The diary surveys included the 12 items of the somatization subscale of the Hopkins Symptom Checklist (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974). This measure has been shown to correlate with feeling under pressure in a variety of life domains (Lazarus, DeLongis, Folkman, & Gruen, 1985). Some example symptoms include, “headaches,” “pains in the heart and chest,” “pains in the lower part of your back,” and “feeling low in energy or slowed down.” Participants indicated whether they had experienced each symptom that day by checking a box next to the symptom, and the average number of symptoms reported each day comprised our outcome measurement of daily psychosomatic symptomatology. The

test-retest reliability was calculated by determining the scale reliability of symptom sums across the 10-day period (Cronbach's $\alpha = 0.80$). At the end of the diary period, participants came back to the lab to be debriefed and paid.

Results

Manipulation check—As a manipulation check of the friendship manipulation, we assessed self-reported interpersonal closeness among partners at the end of each interaction. As we originally reported in Page-Gould and colleagues (2008), there was a strong linear increase in closeness felt towards study partners over the 3 friendship meetings, $b = 0.689$, $SE = 0.049$, $t(294) = 14.14$, $p < 0.0001$, and this increase in closeness was not moderated by cross-race or same-race friendship conditions, $b = -0.028$, $SE = 0.049$, $t(294) = -0.57$, $p = 0.572$. This analysis suggests that the friendship manipulation was successful.

Primary analyses—All analyses were conducted by fitting a multilevel model to the data using the linear mixed effects (lme) function of R 2.14, with all predictors centered prior to analysis and missing values (i.e., 6 missing values for RSQ-race and RSQ-personal) were replaced with the sample mean. We used a 2-level multilevel model to analyze these data with participants nested within friendship pairs. We calculated pseudo R^2 for effect size (Snijders & Bosker, 1999). We used the same covariates as in Study 1. The bivariate relationships between the variables are presented in the second panel of Table 1. In general, this was a young and healthy sample, so the average daily incidence of stress symptoms across the entire diary period was low ($M = 0.49$, $SD = 0.72$).

Average stress symptoms were modeled as a function of RS-race, friendship condition, and their interaction, controlling for participant sex and ethnicity, prior contact, and interpersonal rejection sensitivity¹. The model reduced the prediction error in psychosomatic symptoms by a moderate amount, $R^2_1 = 0.07$. This model revealed a main effect for RS-race to predict more daily psychosomatic symptoms, $b = 0.12$, $SE = 0.06$, $t(140) = 1.99$, $p = 0.05$, but no main effect of friendship condition, $b = -0.003$, $SE = 0.07$, $t(140) = -0.05$, $p = 0.96$. As shown in Figure 2, there was a significant interaction of friendship condition and RS-race, $b = -0.13$, $SE = 0.06$, $t(140) = -2.23$, $p = 0.03$. Supporting the hypothesis that making a new cross-race friend in the laboratory would provide a coping resource for participants who were high in RS-race, RS-race only predicted more psychosomatic symptoms among participants in the same-race condition, $b = 0.25$, $SE = 0.09$, $t(140) = 3.05$, $p = 0.003$, and was unrelated to psychosomatic symptoms among participants in the cross-race condition, $b = -0.01$, $SE = 0.09$, $t(140) = -0.16$, $p = 0.87$. Among participants high in RS-race, being assigned to the cross-race condition predicted fewer symptoms, $b = -0.12$, $SE = 0.06$, $t(140) = -1.99$, $p = 0.05$, but experimental condition was not predictive of symptomatology among participants low in RS-race, $b = 0.13$, $SE = 0.09$, $t(140) = 1.42$, $p = 0.16$. When we repeated the analysis with ethnicity as a third moderator, participant ethnicity did not moderate the interaction effect between condition and RS-race, $b = 0.06$, $SE = 0.06$, $t(137) = 0.99$, $p = 0.32$. That is, making a new cross-race friend in the lab had similar effects on the stress symptoms of minority- and majority-group participants who anxiously expected race-based rejection.

Discussion

Study 2 provided experimental evidence that cross-race friendship moderates the effect of RS-race on psychosomatic symptomatology. In the control condition, RS-race predicted more frequent psychosomatic symptoms over a 10-day period. This pattern of results is consistent with the findings for participants who did not have cross-race friends in Study 1. For participants who were randomly assigned to make a cross-race friend, however, RS-race was unrelated to daily psychosomatic symptomatology. Thus, cross-race friendship improves stress symptomatology among individuals who anxiously expect race-based rejection.

General Discussion

Prior theory and research has shown that people who anxiously expect race-based rejection are more likely to perceive interracial interactions as stressful (Mendoza-Denton et al., 2006; Page-Gould et al., 2008; Trawalter et al., 2009). The present research extended these findings to show that discrete experiences of stress in interracial interactions may have implications for correlates of chronic stress in daily life. The current findings also suggest that cross-race friendship provides a resource to cope with the health sequelae of this chronic stress. By manipulating cross-race friendship in Study 2, we were able to disentangle the beneficial effects of cross-race friendship from the individual differences that might covary with naturally occurring friendships. The primary conclusion we draw from this work is that cross-race friendship improves the mental and physical health of people who would otherwise be threatened in interracial interactions.

Why might cross-race friendship have this effect? By its definition, cross-race friendship involves intimate, cooperative interracial interactions (Pettigrew, 1998; Wright, Brody, & A. Aron, 2005), which, when repeated over time, should extinguish learned associations between outgroup members and race-based rejection (Mendoza-Denton et al., 2006). As such, any given interracial interaction would be less likely to be perceived as stressful, and the social environment would seem that much less chronically threatening. Moreover, recent work has shown that people who have close cross-race friends seek more social support from their cross-race friends following an interracial conflict, whereas people who do not have close cross-race friends avoid outgroup members after interracial conflicts (Page-Gould, in press). Integrating these findings with the present research, cross-race friends may provide an ongoing source of social support that can be drawn upon when new experiences of discrimination occur, thus providing an additional resource for people who are high in RS-race to actively cope with negative interracial experiences.

The research presented here took a multifaceted approach to studying the relationship of race-based rejection sensitivity and cross-race friendship on psychosomatic symptomatology. Study 1 examined the somaticization of disturbances in mental health whereas Study 2 focused more specifically on health correlates of stress. While we found remarkable convergence across the patterns of results, there were also some notable differences as well. In Study 1, RS-race did not directly predict somatic or affective depressive symptom severity, as people who were high in RS-race only reported more severe depressive symptoms when they did not have many cross-race friends. However, in Study 2, RS-race predicted experiencing more stress symptoms among people in the same-

race condition, which is similar to a main effect of RS-race. We explain this pattern of results in two ways. Firstly, in Study 2, we controlled for past contact so we could examine the effects of making a new friend above and beyond participants' prior interracial experiences. Secondly, the dependent variable of Study 2 was quite different from Study 1, both in the construct it measures (i.e., depressive versus stress symptoms) and its method of assessment (i.e., Likert scale versus checklist). Nonetheless, this pattern of results could also be understood as suggesting that the construct of RS-race is more directly related to physical manifestations of stress than psychological health outcomes. This latter proposition is supported by repeated findings that African Americans have high self-esteem (Twenge & Crocker, 2002) yet tend to score the highest on RS-race (Mendoza-Denton et al., 2002).

It should be noted that cross-race friendship was not predictive of stress-symptoms among individuals who did not have negative expectations of outgroup members (i.e., participants who scored low in RS-race). For people who did not anxiously expect race-based rejection, cross-race friendship was unrelated to psychosomatic symptoms and the overall prevalence and severity of psychosomatic symptoms was low. Overall, then, the pattern of findings suggest that cross-race friendship is especially beneficial for people who have negative expectations of outgroup members. As such, studies that examine the effects of cross-race friendship in the absence of considering individual differences in intergroup threat (e.g., RS-race or stigma consciousness; Pinel, 1999), prejudice, or intergroup anxiety (W. G. Stephan & C. W. Stephan, 1985) may underestimate the effects of cross-race friendship as a coping resource for interracial stress.

In addition, the present research always compared cross-race friendship between minority- and majority-group members. However, different patterns of results may be expected among minority group members with many cross-race friends from other minority ethnic groups (e.g., a Mexican man with a Vietnamese best friend). Based on other research that examined minority-minority friendship (Page-Gould, in press), we expect that many of the processes observed among majority-minority cross-race friendships generalize to minority-minority cross-race friendship. That being said, of course there will be some differences. Although future research will need to test this question directly, we suspect that one key way minority-minority and majority-minority cross-race friendships diverge is at the stages of friendship formation and early relationship stability. Among children, new majority-minority cross-race friendships are less stable than new same-race friendships during the first 6 weeks of the friendship (Hallinan & Williams, 1987). If other minority group members are viewed as less rejecting than majority group members, then people who are high in RS-race may be less vigilant for cues of rejection during interracial interactions with a minority-group member than a majority-group member.

The present research is the first to find that people who are more likely to feel anxious about interracial interactions show signs of more chronic burdens of stress (i.e., stress symptoms) when they have fewer coping resources, such as social support from different race friends. As with the work on acute stress, the present findings also speak to the power of close relationships that cross racial boundaries. People who were predisposed to experience stress in interracial contexts exhibited fewer daily psychosomatic symptoms after making a cross-race friend in the lab. Altogether, this work shows that psychosocial factors related to stress

and coping in interracial contexts affect daily psychosomatic symptomatology in nuanced ways.

Limitations and Future Directions

An unanswered question in this research is whether RS-race causes greater incidence of reporting psychosomatic symptoms. We did not have a method for manipulating RS-race, and thus relied on individual differences in the RSQ-race to test our hypotheses. Fundamentally, we suspect that RS-race influences psychosomatic symptomatology because these expectations predict acute stress responses during intergroup interactions (Page-Gould et al., 2008) and intergroup interactions are a regular part of daily life in diverse societies. Thus, if an individual had repeated, acute stress responses over the course of the day, this regular acute stress may translate into chronic stress (Norris & Uhl, 1993). As such, we expect that RS-race indirectly causes daily psychosomatic symptomatology through repeated, unpredictable experiences of acute stress during interracial interactions. Without manipulating expectations of race-based rejection, however, we are unable to determine its causal role. The application of paradigms that prime prejudice concerns (Shelton, Richeson, & Salvatore, 2005) may provide a fruitful area of future research.

We also employed a purely between-subjects design in Study 2 because we only measured symptoms after the experimental manipulation instead of also measuring symptoms before the manipulation. Due to this design choice, we cannot speak as to how symptoms change within a person before and after they experienced a small change in the diversity of their friendship networks. However, participants were randomly assigned to one of the conditions, which should distribute participants with differing degrees of symptoms evenly across the conditions, and our experimental design allows us to infer causality. One final limitation to note for Study 2 is that participants were recruited knowing they would “make a friend,” and thus we suspect our participants were more likely to be high in sociability or extraversion.

Another potential limitation is that we focused specifically on psychosomatic symptomatology. It is possible that if we focused on a broader set of daily health outcomes and symptoms, including symptoms that are thought to be unrelated to psychological stress, then we would have found a different pattern of results. Thus, we have only linked stress symptoms to race-based rejection, and not provided a link between prejudice concerns and health, more broadly defined. We would expect that testing these hypotheses with non-stress symptoms would weaken the effect, as we originally theorized that the threat of race-based rejection poses a chronic stressor for some individuals. However, given the pervasive impact of stress on health and longevity (Epel, McEwen, & Ickovics, 1998), we suspect that health problems in one stress-related domain (e.g., muscle fatigue, stomach pains) would spill over into other health symptoms that are not directly caused by stress (e.g., influenza). Consistent with the literature demonstrating a profound impact of stress on immunity (Cohen, 1995) and cell longevity (Epel, 2009; Epel et al., 2004, 2006; Sapolsky, 2004), we suspect that RS-race will also predict symptoms that are not directly stress-related. All the same, future research will need to establish the extent to which RS-race affects disease and health more broadly.

Implications for Public Health Policy

According to public data collected as a part of the General Social Survey (GSS; Smith, Marsden, Hout, & Kim, 2011), 5.2% (95% CI [4.2, 6.3]) of Americans experienced discrimination in the last year (GSS variable: "OTH1"). Although this number may seem low, it translates into close to 20 million Americans experiencing discrimination in the last year. By comparison, only 1.9% (95% CI [1.7, 2.2]) of Americans reported being robbed in the previous year (GSS variable: "ROBBRY").

Given that so many Americans perceive discrimination in their environment, it becomes all the more important to identify the pathways through which these concerns translate to chronic stress and disease. It is notable that the diseases for which ethnic health disparities exist (e.g., cancer, heart disease, Type II diabetes) are also associated with chronic stress (c.f., Chrousos & Gold, 1992; McEwen & Seeman, 2006; Wei, MacDonald, & Walker, 2004). Reviews of the literature on discrimination, chronic stress, and health consistently find that the health burden of ethnic health disparities is primarily borne by those who perceive or experience more discrimination in their social environment (Mays et al., 2007; Pascoe & Smart Richman, 2009; Troxel et al., 2003; Williams et al., 2003). Moreover, perceived discrimination has been shown to impact functioning across a broad spectrum of domains, spanning both mental and physical health (Paradies, 2006). Our findings take these conclusions one step further by making the poignant point that the seemingly subtle residue of negative race relations reflected in RS-race has potentially profound implications for people who have come to expect rejection from outgroup members. However, this is only the case for people who exclude outgroup members from their friendship networks; being *accepted* by an outgroup member appears to buffer people high in RS-race from exhibiting psychosomatic symptoms.

Thus, public policy that encourages the formation of cross-race friendships may also provide access to a relational buffer for people who have negative intergroup expectations. Past research on cross-race romantic relationships shows that attending diverse schools and growing up in diverse neighborhoods was a strong predictor of cross-race relationships across ethnic groups (Yancey, 2002). Within the education system, structural initiatives such as having students learn in diverse, cooperative teams appears to foster both cross-race friendships and academic achievement (Slavin & Cooper, 1999). Altogether, policies that encourage cooperative interaction on top of integration are most likely to yield strong, diverse communities.

It is important to clarify why we expect these results to inform our understanding of the psychosocial factors that contribute to ethnic health disparities given that race did not moderate the results of Study 2. We view these processes as being general to anyone who is concerned about status-based rejection, which is why we expected RS-race to predict stress symptoms among both racial minority- and majority-group members. However, the more stigmatized a group is, the more frequently members of that group should find themselves in potentially stigmatizing situations. Indeed, reports of discrimination in the GSS were not uniform across racial groups, such that more Black respondents (12.2%, 95% CI [8.8, 16.8]) and other ethnic minorities (6.8%, 95% CI [3.5, 13.0]) reported experiencing discrimination

than White respondents (4.0%, 95% CI [3.2, 5.0]). That is, members of lower-status racial groups have more opportunity for race-based rejection. So, although members of majority groups can develop concerns about being rejected in interracial contexts – and are more likely to report experiencing discrimination than other forms of victimization – the processes that we studied here should be more readily applicable to the daily lives of lower-status group members. Furthermore, although both minority- and majority-group members can be concerned that outgroup members will reject them, the specific *reasons* for which they expect race-based rejection to occur appear quite divergent (Bergsieker, Shelton, & Richeson, 2010; Tropp & Bianchi, 2006).

Conclusion

The chronic, uncontrollable possibility of race-based rejection in diverse societies may predispose some people to appraise diverse contexts as stressful, but only when resources for coping with this stress are low. Our work extends work on the contact hypothesis (Allport, 1954) by examining the roles that *expectations about* intergroup contact play in shaping those intergroup experiences. In contexts where interracial interaction is a normal part of everyday life, individuals who respond with healthy physiological reactions (Mendes, Gray, et al., 2007; Page-Gould, Mendoza-Denton, et al., 2010), will have an advantage over those who respond with physiological stress (Dienstbier, 1989; Epel, McEwen, & Ickovics, 1998). We present cross-race friendship as a pathway through which diversity can lead to physiological thriving.

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Biographies

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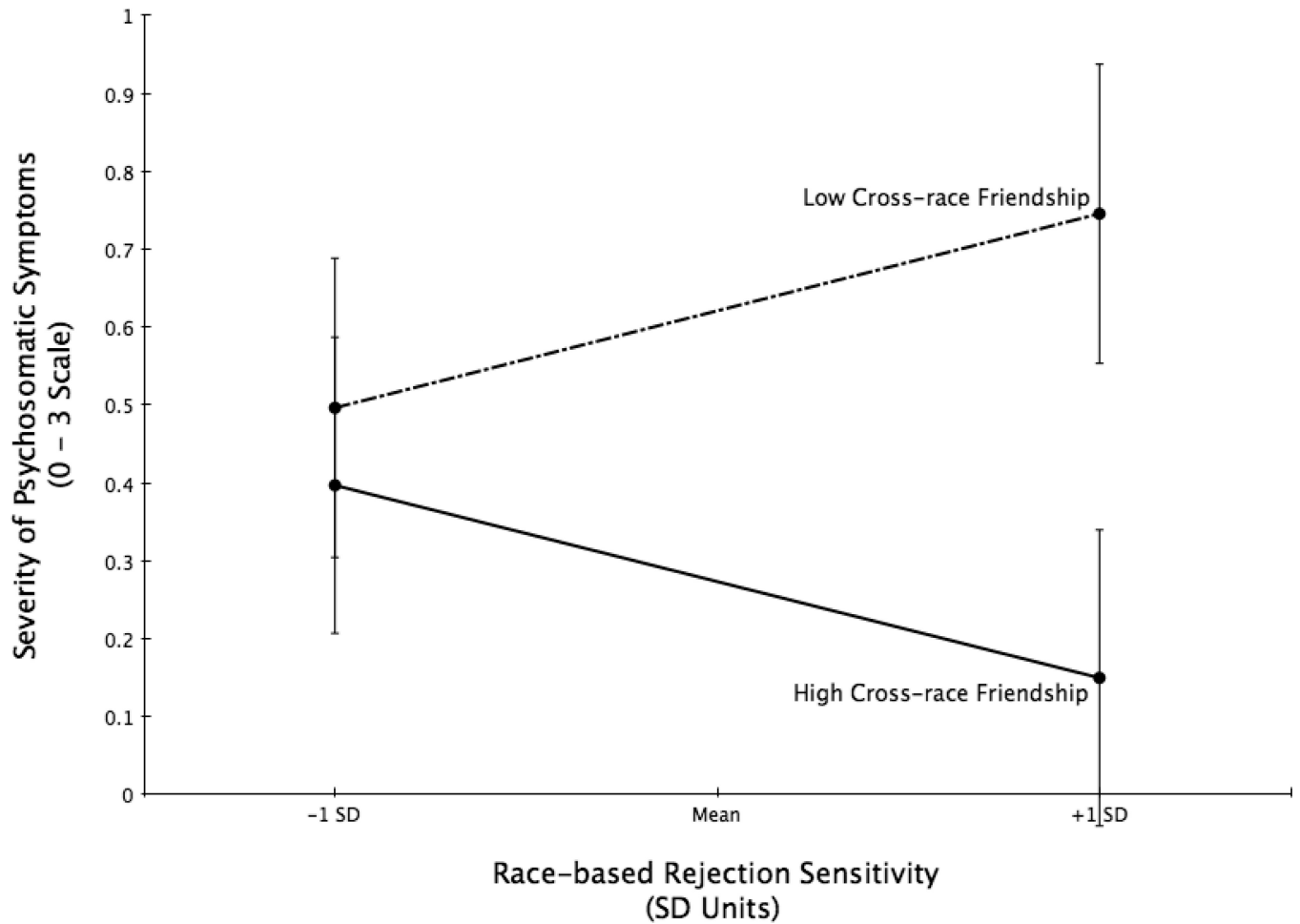


Figure 1.

Psychosomatic symptomatology over the last two weeks is plotted at one standard deviation above and below the means of race-based rejection sensitivity and cross-race friendship. Error bars represent the standard errors of the estimates.

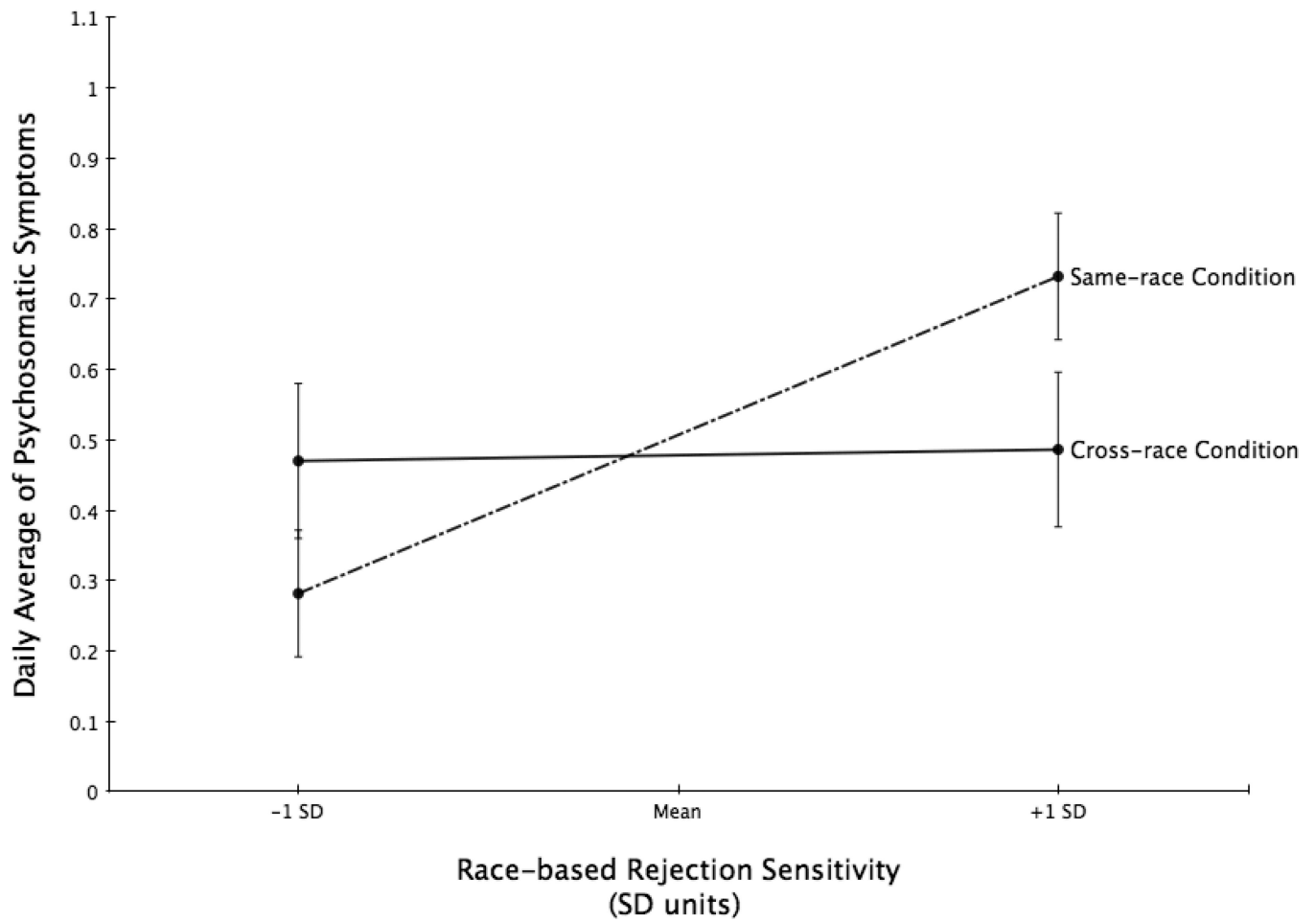


Figure 2. Post-experiment, daily psychosomatic symptomatology is plotted as a function of race-based rejection sensitivity and experimental friendship condition. Error bars represent the standard errors of the estimates.

Table 1

<i>Bivariate Relationships Among Study 1 Variables</i>							
	RSQ-personal	Intergroup Contact	RSQ-race	Cross-race Friendship	Somatic BDI	Affective BDI	
Sex	-0.14	0.11	-0.11	0.01	0.1	-0.02	
RSQ-personal	--	0.1	-0.04	0.05	-0.04	0.26*	
Intergroup Contact		--	0.11	0.62***	-0.03	0.01	
RSQ-race			--	-0.08	0.04	0	
Cross-race Friendship				--	-0.29*	-0.18	
Somatic BDI					--	0.58***	
<i>Bivariate Relationships Among Study 2 Variables</i>							
	Sex	RSQ-personal	Intergroup Contact	RSQ-race	Ethnicity	Daily Symptoms	
Sex	--	-0.14	0.11	-0.11	0.01	0.04	
RSQ-personal		--	0.1	-0.04	0.05	-0.1	
Intergroup Contact			--	0.11	0.62***	0.06	
RSQ-race				--	-0.08	-0.14	
Ethnicity					--	0.38**	

Note:

* $p < 0.05$,

** $p < 0.01$,

*** $p < 0.001$