

## Race Differences in Stressor-Related Negative Affect and Daily Rumination

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**ABSTRACT.** This study investigated race differences in the within-person relationships among daily reports of rumination, stress, and negative affect (NA). Past research illustrating that the within-person relationship between stress and NA predicts long-term outcomes has emphasized the importance of early intervention for those with stronger daily relationships between stress and NA. We examined whether within-person increases in daily rumination exacerbate the relationship between daily stress and NA. Further, we explored whether the exacerbating effect of daily rumination on the relationship between daily stress and NA is greater for People of Color (POC) compared to White participants. Participants ( $N = 92$ ) completed a global questionnaire with demographic information and 2 weeks of daily questionnaires assessing daily reports of perceived stress, NA, and rumination. We analyzed the data using multilevel modeling to parse between-person effects from the within-person relationships among daily stress, NA, and daily rumination. Results revealed that within-person increases in daily rumination and daily perceived stress related to greater daily NA. Greater overall stress and rumination related to greater daily NA. POC reported greater daily NA compared to White participants. The two-way interaction model indicated that daily within-person rumination exacerbated the relationship between daily perceived stress and daily NA. Results suggest that POC may benefit from interventions and preventive strategies aimed at increasing well-being in general and decreasing NA. In addition, introducing strategies to prevent increases in daily rumination on high stress days can be particularly helpful in reducing NA.

**Keywords:** daily stress, daily negative affect, people of color, daily rumination



Diversity badge earned for conducting research focusing on aspects of diversity.

Understanding how the daily relationship between stress and negative affect (NA) fluctuates and differs depending on contextual, daily variables (e.g., rumination), and person-level variables (e.g., race) can inform preventative care and interventions aimed at uplifting and maintaining well-being among those most at risk. Studies have consistently illustrated a strong, positive relationship

between daily stress and NA (Blaxton et al., 2022; Colgan et al., 2019; Montpetit et al., 2010; Mroczek & Almedia, 2004; Stawski et al., 2008), termed *stressor related negative affect* (SRNA; Stawski et al., 2019). The strength of this relationship significantly predicts chronic physical health conditions and affective distress levels up to 10 years later (Charles et al., 2013; Piazza, 2013). The significant findings emphasize the

importance of early intervention for the well-being of those with particularly strong relationships between daily stress and NA (Montpetit et al., 2010). Moreover, stress and coping theory suggests that a person's perception of stress and the way they cope with that stress can affect their response to the stressor (Folkman & Lazarus, 1986). The physiological impact of stress depends on a variety of factors including contextual, historical, cumulative, and acute stress processes (Epel et al., 2018). Indeed, research has shown that contextual factors not only influence SRNA (Blaxton et al., 2022), but also the long-term effects of the daily SRNA (Blaxton et al., 2022; Brose et al., 2011; Charles et al., 2013; Parrish et al., 2011; Piazza, 2013). Rumination specifically results in increased perceptions of the severity of stress (Watkins & Roberts, 2020). Thus, days of greater rumination may relate to a stronger daily stress-NA relationship, which could highlight a potential pathway for reducing daily SRNA. In addition, some individuals may be particularly susceptible to experiencing greater SRNA and greater rumination due to contextual circumstances. Because People of Color (POC) experience greater discrimination than White people (Dalessandro et al., 2023), we explored whether SRNA is stronger for POC and whether the potentially exacerbating effect of daily rumination on the daily stress-NA relationship is also stronger for POC.

### Daily Rumination in Relation to Daily Stress and Negative Affect

Research has shown that greater rumination relates to greater stress (Catalino et al., 2017; Genet & Siemer, 2012; Pavani et al., 2016; Sladek et al., 2020) and greater NA (Catalino et al., 2017; Genet & Siemer, 2012; Pavani et al., 2016). Specifically, daily stress and cortisol levels increase on days when people ruminate more than usual (Sladek et al., 2020). Participants ruminated 1.5 standard deviations above their mean score on days of greater than usual stress, which related to higher waking cortisol levels the next day (Sladek et al., 2020). Thus, yesterday's daily rumination can affect tomorrow's stress, and greater rumination may exacerbate the negative effects of stress.

Not only does daily rumination have a strong positive relationship with daily stress (Sladek et al., 2020), but greater rumination also influences NA (Catalino et al., 2017; Genet & Siemer, 2012; Pavani et al., 2016). For example, rumination amplifies NA with unnatural life stressors produced in lab settings (Genet & Siemer, 2012). In everyday life, individuals who tend to ruminate more on a day-to-day basis also show greater NA, and this relationship is stronger for individuals experiencing greater overall daily stress (Catalino et al., 2017). Thus,

a combination of stressful experiences and high levels of rumination relate to greater levels of NA (Catalino et al., 2017; Genet & Siemer, 2012; Pavani et al., 2016). These chronically higher levels of NA can lead to worse physiological health and less satisfaction with social relationships (Pavani et al., 2016). In addition, consistent levels of rumination predict symptoms of depression and anxiety up to a year later (Pavani et al., 2016). Thus, rumination appears to intensify and maintain NA levels in short- and long-term situations (Pavani et al., 2016). These findings indicate significant between-person relationships among rumination, stress, and NA. Although between-person findings do not necessarily relate to the within-person level (Brose et al., 2010), we hypothesized that greater daily rumination exacerbates the relationship between daily stress and NA within individuals as well.

### Racial Differences in Stress and Negative Affect

POC experience greater stress and NA, and may thus also experience greater daily SRNA (Bergeman et al., 2020; Ong et al., 2009). Indeed, among a sample of Mexican adolescents, racial discrimination reported over the course of the last year predicted daily stress levels (Zeiders, 2017). In addition, NA ratings were higher than the person's mean NA scores on days with more discriminatory acts or stressors reported and even higher on days when other stressors occurred, like work or family matters, compared to the days reported with only discrimination related stressors (Ong et al., 2009). Discrimination historically causes significantly higher levels of perceived stress in marginalized groups, including groups based on race, gender, and people with different sexual orientations (Dalessandro et al., 2023). Data show that life-long stressors of discrimination cause major depressive disorders and generalized anxiety disorders, comparable to the levels that come with traumatic events such as military combat, sexual assault, and physical assault (Ong et al., 2009). For example, African Americans report increased perceived stress compared to White Americans and are more likely to have severe, long-term, depression (Ojebuoboh et al., 2022). This chronic stress predicts more physiological health problems in the future, including cardiovascular disease (Ong et al., 2009).

Epel et al. (2018) explained that stress encompasses a complex process involving interactions between individual and environmental factors, historical and current events, and psychological and physiological reactivity. The authors provided a model to understand stress that highlights how stressor exposures across the life course and captured at difference time-scales influence habitual responding and stress reactivity. Understanding stress

as a process involves recognizing the cumulative effects of stress over time and the interaction between acute stress responses and chronic stressors. For example, chronic stressors, like discrimination, can increase the frequency and severity of daily stressors and amplify emotional and physiological responses to these stressors. This cumulative stress exposure can then lead to long-term health impacts, such as increased inflammation, accelerated aging, and higher risk of disease. Because the strength of the daily relationship between stress and NA also predicts long-term health (Charles et al., 2013; Piazza, 2013), daily SRNA may illustrate one potential pathway for increased stress perceptions among POC (Bergeman et al., 2020). Multilevel modeling allowed us to study stress as a process and compare participants to themselves, situating them within their own context (Hoffman, 2009). Thus, by focusing on the within-person relationships among daily SRNA and rumination, we examined whether POC experience greater SRNA. We furthered explore whether daily rumination amplifies SRNA more for POC compared to White participants.

### Purpose of the Current Study

The purpose of the current study was three-fold. First, we hypothesized that daily rumination exacerbates the relationship between daily stress and NA. Second, we hypothesized that POC experience an exacerbated relationship between daily stress and NA. Finally, we explored whether the exacerbating effect of daily rumination on the relationship between daily stress and NA is greater for POC compared to White participants.

## Method

### Participants and Procedure

Descriptive statistics and intercorrelations among the measured variables are presented in Table 1. The participants included 92 individuals from a convenience sample at Metropolitan State University in St. Paul, Minnesota. After the study was approved by the

Institute's Human Subjects Review Board, participants were recruited from psychology classes and provided informed consent via Qualtrics. Participants completed a global data questionnaire, identifying race and ethnicity for the current study. Participants then completed nightly questionnaires over the course of 14 days, which assessed daily stress, daily NA, and daily rumination. The dataset included a total of 776 days out of the possible 1,288 days. Consequently, 40% of the data were missing. We do control for the total number of missing days for each participant in the analyses.

### Measures

#### Positive and Negative Affect Schedule (PANAS)

Participants reported NA using the NA subscale from the Positive and Negative Affect Schedule (Watson et al., 1988). The questions used displayed 14 NA items that participants rated on a 5-point scale containing the response items *not at all*, *a little*, *moderately*, *quite a bit*, and *extremely*. For example, participants were asked to respond to, "Today I felt guilty," using the 5-point scale. If more than two responses were missing from the reported questionnaire, the total NA score was coded as missing. If fewer than two questions were missing from the reported questionnaire, the missing data point was substituted with the mean score of NA for the participant for that day. Individual-level reliability across the 14 days of the study was .86 (see Bonito et al., 2012; Nezlek, 2017, for computational details).

#### Perceived Stress Scale

Participants reported answers for stress each night using the 10-item Perceived Stress Scale (Cohen & Williamson, 1988). The questions were modified to reflect their perceived stress over the course of the day they reported. Specifically, the original Perceived Stress Scale asks participants to report their feelings of stress over the last month, but we asked participants to report their feelings of stress over the course of that day, which is consistent with previous research using the Perceived Stress Scale to assess daily SRNA (Blaxton et al., 2023). The questionnaire was rated on a 4-point scale containing the response options *strongly disagree*, *disagree*, *agree*, and *strongly agree*. For example, participants responded to, "I was upset today because of something that happened unexpectedly," using the 4-point scale. If more than two questions were missing from the reported questionnaire, the participant's stress score was coded as missing for that day. Questionnaires missing fewer than 20% substituted the mean score for the missing day. Individual-level reliability across the 14 days of the study was .74 (see Bonito et al., 2012; Nezlek, 2017 for computational details).

TABLE 1

#### Description of Person Means of Variables, Average Interindividual (Lower Half), and Average Intraindividual (Upper Half) Correlations

	Descriptive Statistics				Correlations		
	<i>M</i>	<i>SD</i>	Min	Max	Daily Negative Affect	Daily Stress	Daily Rumination
Daily Negative Affect	28.42	12.02	14.00	60.00	-	.63	.62
Daily Stress	18.97	5.65	6.00	32.00	.72	-	.56
Daily Rumination	55.52	25.87	2.67	100.00	.69	.62	-

### Daily Rumination Measure

Participants reported their levels of rumination by answering four questions and rating them on a scale of 0–100 (Slavish et al., 2018). For example, participants responded to “Today, how often did you experience a train of thought that was difficult to get out of your head?” If only one question was missing from the reported answers, the mean for the other three scores was substituted for the missing item. If more than one question was missing, the daily rumination score was coded as missing. Individual-level reliability across the 14 days of the study was .79 (see Bonito et al., 2012; Nezlek, 2017, for computational details).

### Analytic Approach

We analyzed the data with multilevel modeling, where Level 1 included daily scores (*i*) for each participant, which were nested in Level 2 average scores (*j*). To effectively parse the within-person effects from the between-person effects, we person mean centered each Level 1 variable (Wang & Maxwell, 2015). The main effects equation was:

$$\begin{aligned} \text{NA}_{ij} &= b_{0j} + b_{1j}(\text{day}-1) + b_{2j}(\text{stress}_{ij} - \text{stress}_j) + b_{3j}(\text{rumination}_{ij} - \text{rumination}_j) + e_{ij} \\ b_{0j} &= g_{00} + g_{01}(\text{POC}) + g_{02}(\text{stress}_j) + g_{03}(\text{rumination}_j) + u_{0j} \\ b_{1j} &= g_{10} + u_{1j} \\ b_{2j} &= g_{20} + u_{2j} \\ b_{3j} &= g_{30} + u_{3j} \end{aligned}$$

Level 1 includes the effect of time (day) to control for its effect on daily NA as well as within-person fluctuations in daily stress ( $\gamma_{20}$ ) and daily rumination ( $\gamma_{30}$ ). Level 2 includes the between-person effects of whether the participant was a POC ( $\gamma_{10}$ ), average stress levels ( $\gamma_{20}$ ), and average rumination levels ( $\gamma_{30}$ ) over the 14 days of data collection. Although we do not show it in the equation for the sake of simplicity, we also controlled for total number of missing days and age at Level 2. The SAS Proc Mixed procedure with maximum likelihood allowed us to analyze the data to test the aims of our study. We first examined the main effects model (Model 1) to test whether greater daily stress relates to greater daily NA among the participants. Next, we added the possible Level 1 and cross-level two-way interactions to the model between daily stress and daily rumination ( $\gamma_{40}$ ), POC and daily stress ( $\gamma_{21}$ ), and POC and daily rumination ( $\gamma_{31}$ ) to examine whether daily rumination exacerbates the relationship between daily stress and daily NA as well as whether POC experience an exacerbated relationship between daily stress and daily NA compared to White participants. Finally, we created the three-way interaction model by including the cross-level interaction between daily stress, daily rumination, and POC ( $\gamma_{41}$ ) to examine whether the exacerbating effect of

daily rumination on the daily stress-NA relationship is greater for POC compared to White participants.

## Results

### Demographic Results

The participants ( $N = 92$ ) ranged in age from 17–65 ( $M = 31.71$ ;  $SD = 11.93$ ). Seventy-three participants reported their gender with 12 reporting a gender identity of man, 58 of women, and three of “Another Gender Identity.” The participants ( $N = 76$ ) who reported their race/ethnicity included 43 people who identified as White and 33 that identified as a POC. More specifically, 54% of the participants identified as White, 20% identified as Black, 18% identified as Asian, 4% identified as Hispanic, 3% identified as Middle Eastern, and 1% identified as American Indian/Alaskan Native. The 72 participants who reported income included 45 participants with above \$25,000 a year. The other 27 participants reported an income of \$25,000 or less. Among the 92 participants, there were 512 days missing in total, causing 39.75% of the possible data to be missing.

We analyzed whether there were demographic differences in any of the variables of interest. Results revealed that older adults reported less NA ( $\beta = -0.23$ ,  $p = .02$ ), less overall stress ( $\beta = -0.10$ ,  $p = .03$ ), and less rumination ( $\beta = -0.61$ ,  $p = .007$ ) compared to younger adults. There were also differences in age between POC and White participants ( $t = 2.78$ ;  $p = .007$ ), with more White participants being older ( $n = 42$ ;  $M_{\text{age}} = 34.81$ ;  $SD_{\text{age}} = 12.73$ ) compared to POC ( $n = 28$ ;  $M_{\text{age}} = 27.07$ ;  $SD_{\text{age}} = 8.98$ ). Finally, a greater amount of missing data among the participants did predict greater perceived stress ( $\beta = 0.35$ ,  $p < .001$ ), greater NA ( $\beta = 0.48$ ,  $p = .02$ ), and greater rumination ( $\beta = 1.09$ ,  $p = .03$ ). Because age and number of missing days related to both the independent and dependent variables, we controlled for age and number of missing days in the multilevel models.

### Results From Analytic Models

Results revealed that 58% of the variance in daily NA exists between participants ( $\tau_{00} = 73.07$ ,  $z = 6.00$ ,  $p < .001$ ) and within-person fluctuations explain 42% of the variance in daily NA ( $\sigma^2 = 53.66$ ,  $z = 18.49$ ,  $p < .001$ ; Nezlek, 2001). The main effects model revealed that within-person increases in daily rumination ( $\gamma_{30} = 0.18$ ,  $p < .001$ ) and daily perceived stress ( $\gamma_{20} = 0.72$ ,  $p < .001$ ) related to greater daily NA. Greater overall stress ( $\gamma_{02} = 0.80$ ,  $p < .001$ ) and rumination ( $\gamma_{03} = 0.19$ ,  $p < .001$ ) related to greater daily NA. In addition, POC reported greater daily NA ( $M = 28.49$ ,  $SD = 12.46$ ) compared to White individuals ( $\gamma_{01} = 2.83$ ,  $p = .02$ ;  $M = 24.09$ ,  $SD = 5.90$ ). The two-way interaction model that included three interactions between



daily stress and daily rumination, POC status and daily stress, and POC status and daily rumination indicated that daily within-person rumination exacerbated the relationship between daily perceived stress and daily NA ( $\gamma_{40} = 0.01$ ,  $p < .001$ ; see Figure 1). The two-way interactions between POC and daily stress ( $\gamma_{21}$ ) as well as POC and daily rumination ( $\gamma_{31}$ ) were not significant. The three-way interaction between POC, daily stress, and daily rumination ( $\gamma_{41}$ ) was also not significant.

## Discussion

Results from the study emphasized the importance of situating SRNA in the context of the individual experiencing that SRNA to best inform interventions and preventative care strategies. Specifically, the results expanded upon previous SRNA research (Blaxton et al., 2022; Colgan et al., 2019; Montpetit et al., 2010; Mroczek & Almedia, 2004; Stawski et al., 2008), indicating that college students also experience significant SRNA. Moreover, they illustrated that days of greater rumination are also days of greater SRNA, suggesting that targeting rumination may be one pathway to reduce stress reactivity. Finally, results indicated that POC experience greater daily NA overall compared to White participants. Although many individuals would likely benefit from interventions and preventative care strategies aimed at developing resilience to stress, lowering NA, and promoting well-being, our study indicated that POC experience greater daily NA than White individuals. This finding adds to the literature that highlights differences in daily well-being between POC and White individuals (Dalessandro et al., 2023; Ong et al., 2009). Previous

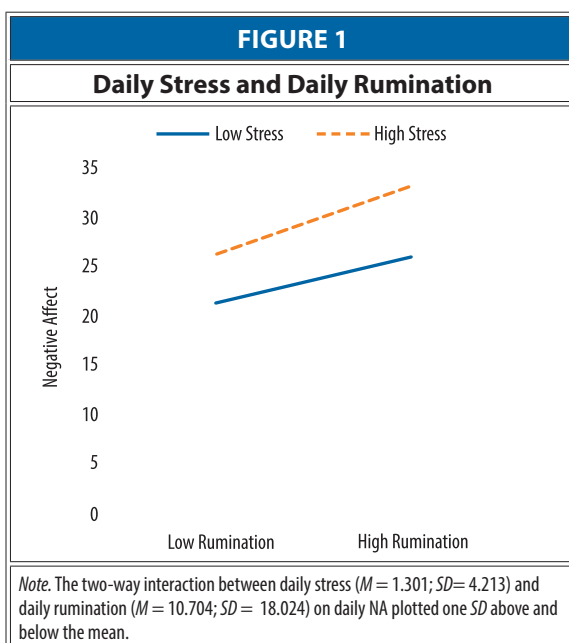
research has indicated that greater discrimination relates to poorer daily well-being (Ong et al., 2009; Zeiders, 2017). Epel et al. (2018) explained that stress results from an interplay of a variety of contextual factors both within and outside the individual. Experiencing greater daily NA compared to White individuals may reflect the negative effects from long-term, historical discrimination. Interventions and preventive care strategies focusing on increasing well-being in general among POC, including reducing social discrimination, may be particularly beneficial.

The lack of support for all hypotheses may be due to the high amount of missing data; however, we do control for missingness in the analyses. Notably, individuals with a greater amount of missingness tended to report greater stress, NA, and rumination. Including more participants in the sample might increase the power of the study and increase the likelihood of capturing participants with higher scores on the variables of interest. In addition, future research can examine whether SRNA and rumination differ based on specific racial differences, rather than just POC compared to White participants. Finally, because past research has indicated that individuals higher in trait acceptance show less overall daily rumination, one potential pathway for reducing the relationship between daily rumination and SRNA may be through increasing acceptance (Catalino et al., 2017). Thus, future research can examine how a Just-In-Time intervention, aimed at increasing acceptance in response to a momentary increase in daily stress, may reduce the exacerbating effect of daily rumination on daily SRNA.

In sum, results from the current study showed that POC do illustrate greater daily NA compared to White participants; however, we do not have evidence that POC experience the relationship between SRNA and rumination differently than White participants. We do see that increases in daily rumination relate to an exacerbated relationship between daily stress and NA, suggesting that targeting daily rumination may be an effective way to reduce SRNA.


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Sydney Dobrzynski is now in the Psychology Department at Augsburg University.

**Positionality Statement:** Jessica identifies as a heterosexual, cisgender White woman. Jessica is nondisabled. Sydney identifies as a nonheterosexual cisgender White woman, who is disabled according to the Americans with Disabilities Act. The authors acknowledge that their identities influence their perspectives.

**Public Significance Statement:** This research indicates that People of Color experience greater daily NA compared to White participants. In addition, people experience greater stressor related NA when they ruminate more than they typically do, suggesting that targeting daily rumination may be one way to reduce the long-term ramifications of daily stress reactivity.

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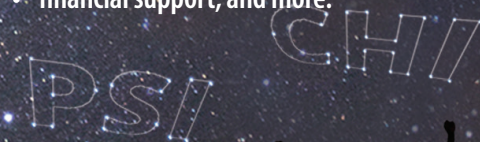
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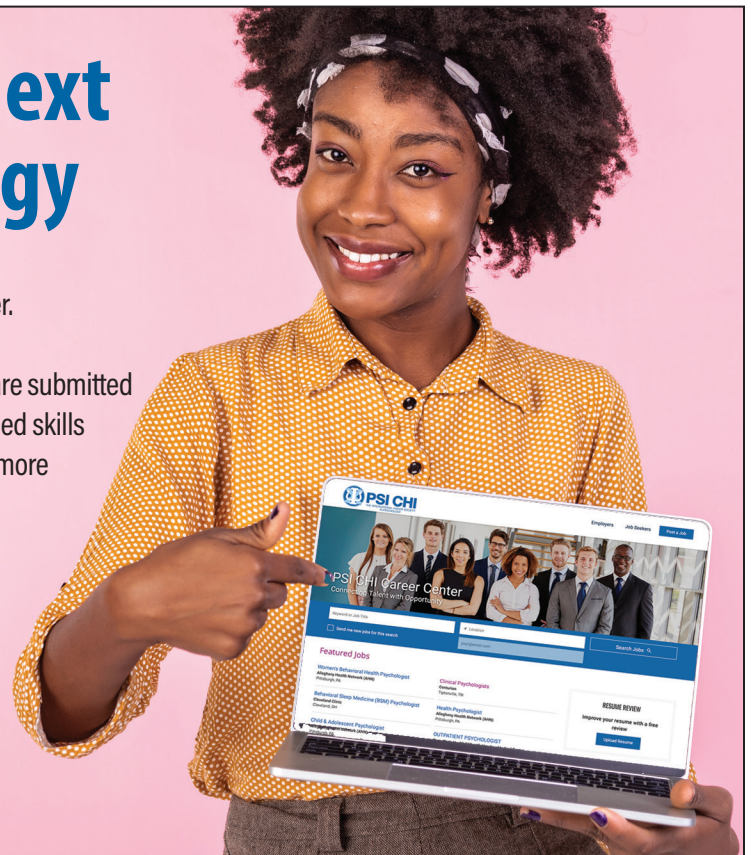


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