

Psychology of Violence

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Online First Publication, December 2, 2024. <https://dx.doi.org/10.1037/vio0000576>

CITATION

Gallegos, J. M., Ferguson, Z. E., McLaughlin, K. A., Dover, T. L., & Kaiser, C. R. (2024). Bearing witness to police brutality affects psychological and cardiovascular responses in Black Americans and White Americans. *Psychology of Violence*. Advance online publication. <https://dx.doi.org/10.1037/vio0000576>

Bearing Witness to Police Brutality Affects Psychological and Cardiovascular Responses in Black Americans and White Americans

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Objective: Images of police violence targeting Black Americans is widely broadcasted in the media. Drawing upon theoretical and historical perspectives on vicarious trauma and social identity, we assess whether exposure to images of racialized police violence affects Black and White Americans' cardiovascular reactivity and concerns about being victimized by police brutality. **Method:** Black ($N = 77$) and White ($N = 89$) Americans were exposed to view either five images of police violence targeting Black Americans or five control images depicting car-accident-related harm affecting Black Americans. Participants prepared and delivered a speech about the depictions and answered self-reported measures while their cardiovascular activity was recorded. **Results:** Significant Condition \times Timepoint interactions demonstrated that exposure to police brutality images (as compared to control images) increased sympathetic reactivity on the preejction period and heart rate during the speech delivery and heart rate during speech preparation. A significant Condition \times Participant Race interaction indicated that exposure to police brutality images (as compared to control images) increased parasympathetic withdrawal (reduced respiratory sinus arrhythmia) among Black (but not White) participants. A significant Condition \times Participant Race interaction revealed that police brutality images (as compared to control images) increased Black (but not White) participants' concerns about personally being victimized by police brutality. **Conclusions:** Images of police violence activate stress responses for Black and White Americans, with potential disproportionate effects for Black Americans. Implications include well-being following exposure to vicarious racial trauma and consideration for how and when to share such images.

Public Significance Statement

Exposure to images of police brutality heightened physiological stress responses in both Black and White Americans, with Black Americans also subsequently reporting greater concern about personal victimization. These findings suggest that vicarious trauma and social identity perspectives are important for understanding the broader impacts of such imagery, including potential negative effects on the health and well-being of groups beyond those directly involved.

Keywords: police brutality, racial discrimination, Black Americans, stress, trauma

Supplemental materials: <https://doi.org/10.1037/vio0000576.supp>

In the United States, police violence disproportionately affects Black Americans, with Black men and women significantly more likely to be killed by police relative to their White counterparts (Edwards et al., 2019; Schwartz & Jahn, 2020). Black Americans are

also disproportionately more likely to be targets of traffic stops (Goel et al., 2016) and pedestrian stop-and-frisks (Pierson et al., 2020). The targeting of Black Americans by police is a uniquely barbaric form of racism with a long history in the United States (slave patrols in the 1700s through 1860s, the Vagrancy Act of 1866, contemporary ambiguous “reasonable suspicion” policies, etc.). The real-time documentation and widespread dissemination of police brutality media, however, is relatively new. Depictions of police brutality targeting Black Americans across newspapers, television, and social media have been the centerpieces of recent dialogue and activism surrounding racial justice. Yet despite sparking necessary social change, the consumption of these images also represents a form of vicarious trauma—a trauma experienced by those not directly linked with the people involved in these incidents (Harrell, 2000; Heard-Garris et al., 2018). In the current experiment, we draw upon theories of vicarious trauma and social identity to assess the impacts

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The Open Science Framework project for this article can be accessed at https://osf.io/sc2z9/?view_only=cecc03b6c97174ac483dd88ef50538921. The authors declare that there were no conflicts of interest with respect to the authorship or the publication of this article. This research was funded by the University of Washington Provost Bridge Award.

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of viewing police violence on White and Black Americans' cardiovascular responses and their concerns about experiencing racism and police victimization.

Vicarious Trauma

Vicariously consuming media coverage of traumatic events (e.g., terrorism, natural disasters) produces adverse psychological consequences for perceivers similar to those who experience trauma directly: negative emotions, anxiety, somatization, and substance misuse (Busso et al., 2014). In a cross-sectional study of Black American and Latinx youth, self-reported frequency of exposure to online traumatic events, including police violence, was associated with elevated symptoms of depression and PTSD (Tynes et al., 2019). Additionally, in a large population-based, quasi-experimental study, Black Americans (but not White Americans) living in states that experienced police killings of unarmed Black Americans in the prior 3 months experienced elevated mental health problems (Bor et al., 2018). This association between state of residence and poor mental health was not evident among Black Americans who were assessed on mental health 3 months prior to their state's police killings of unarmed Black Americans, and the relationship did not generalize to killings of armed Black Americans or unarmed White Americans. In a more direct test of the impact of vicarious police brutality trauma, Black American college students experienced increased sympathetic nervous system (SNS) reactivity when exposed to images depicting police violence relative to those depicting neutral images of Black Americans. Students also experienced more negative affect after viewing police violence images relative to both the neutral images and images depicting Black Americans experiencing nonpolice violence related hardships (Sosoo et al., 2022).

This link between police brutality and mental health among Black Americans, but not White Americans, is consistent with theories of social identity and collective trauma. From a social identity perspective, because the self is defined by group memberships, events that happen to one's group are experienced as if occurring to the self (Tajfel & Turner, 1979). As such, depictions of violence against ingroup members may be felt particularly strongly. Further, for Black Americans, police brutality represents a collective trauma, where continuous exposure to police violence within communities leads to vigilance and fear (Onwuachi-Willig, 2016; Waldron, 2021). For example, for many Black boys and men, this fear pervades their everyday experience, with some noting police brutality as their "number one fear" (Smith Lee & Robinson, 2019). This historical and contemporary method of subordination of Black Americans is stored as a shared mental representation of subjugation and that can be triggered by exposure to brutality incidents (Erikson, 1976; Eyerman, 2005). Though we anticipate that viewing police violence may be aversive and somewhat stressful for individuals across racial groups, the physiological and psychological impacts may be particularly robust for Black Americans (compared to White Americans).

Cardiovascular Reactivity

The autonomic nervous system (ANS) regulates an organism's response to environmental demands that require adaptation. The two branches of the ANS—the SNS and parasympathetic nervous system (PNS)—exert effects on many physiological functions simultaneously and often in opposite directions (Sapolsky, 2004).

SNS activation occurs in response to stressors and other activating events, facilitating a variety of physiological processes frequently described as the "fight or flight" response. The SNS response mobilizes physiological and cognitive resources to respond to environmental demands and results in heart rate (HR) acceleration, increased metabolic output, catecholamine release from the adrenal glands (Cacioppo et al., 1998), and a decreased pre-ejection period (PEP). Though SNS activation facilitates many physiological changes, PEP, a marker of ventricular contractility measured by the elapsed time from the beginning of ventricular depolarization to the opening of the aortic valve, is often used as a "pure" marker of SNS activation because it is dominated solely by the SNS and not the PNS (Cacioppo et al., 1994).

The parasympathetic branch of the ANS promotes growth and restoration when the organism is at rest. Following exposure to stressors when the setting is deemed safe, the PNS can dominate, facilitating a return to homeostasis and recovery (Berntson et al., 1997; Porges, 2007). Respiratory sinus arrhythmia (RSA) is a noninvasive measure of parasympathetic control of the heartbeat (Berntson et al., 1993; Grossman & Taylor, 2007). Specifically, higher levels of RSA (more variability in HR across the respiratory cycle) represent greater PNS activation and reductions in RSA (less variability in HR across the respiratory cycle) representing a withdrawal of PNS activity.

SNS activation and PNS withdrawal are adaptive responses to stressors, important for survival. However, sustained and repeated activation of the SNS without PNS can have deleterious health consequences, including cardiovascular disease (Thayer et al., 2010). Chronic exposure to prejudice and discrimination among Black Americans is thought to contribute to ANS dysregulation, which can contribute to health problems. Indeed, perceiving oneself as a target of discrimination is linked with SNS reactivity, including increased blood pressure (BP), HR, and decreased PEP (Pascoe & Smart Richman, 2009). Experimentally induced exposure to discrimination also increases SNS reactivity and PNS withdrawal (Fang & Myers, 2001; Neblett & Roberts, 2013; Sawyer et al., 2012).

Although directly experiencing prejudice increases SNS and PNS reactivity, it is unclear whether experimentally induced vicarious prejudice (e.g., exposure to police brutality) will produce similar effects. Some evidence suggests this may be the case as observing one's group being targeted by discrimination increases SNS reactivity (Eliezer et al., 2010; Sosoo et al., 2022). However, this relationship has been observed only when discrimination is compared to neutral or positive control conditions, making it difficult to disentangle the effects of observing discrimination from negative events more generally. The one study to compare discrimination to a negative control condition (Sosoo et al., 2022) observed no effects on SNS outcomes. However, because some of the negative images in Sosoo et al. (2022) depicted systemic racism, this may have prevented observation of this effect. We propose that viewing police brutality (as compared to negative non-racism-related control scenarios) will result in heightened SNS activity and PNS withdrawal and that this should be especially pronounced for Black Americans.

Prejudice Concerns

Exposure to discrimination-related stress heightens sensitivity to discrimination (Kaiser et al., 2006; Pascoe & Smart Richman, 2009). Black Americans may be especially likely to respond to

police brutality against their group with prejudice concerns as they likely vicariously experience the trauma enacted upon by members of their own group. Indeed, when exposed to police brutality images, Black Americans experience increased solidarity with and concern for other Black Americans (Leach & Allen, 2017). Thus, the consumption of police brutality images may cause worries about experiencing police brutality and racism.

Current Investigation

To explore whether the consumption of images of racialized police brutality in the media represents a vicarious trauma that is characterized by ANS activation and heightened concerns about discrimination, we conducted an experiment in which Black Americans and White Americans were randomly assigned to view images of police brutality targeting Black Americans (as compared to negative control images). After viewing the images, participants prepared and delivered a speech about these images. This experimental approach allowed for the collection of ANS reactivity across five unique phases in the experiment that are key for assessing physiological responses to stress (Mendes, 2009): baseline, stimuli presentation, speech preparation, speech delivery, and recovery, as well as self-report measures. We proposed the following hypotheses:

Hypothesis 1

We predict a main effect of condition that will be qualified by a Condition \times Participant Race interaction, such that consumption of police brutality images targeting Black Americans (as compared to negative control images) will increase SNS activation and PNS withdrawal, and that this will be especially pronounced for Black Americans. SNS activation should be reflected in elevated HR, decreased PEP, and increased BP. PNS withdrawal should be evidenced by decreased RSA. We also predict a three-way interaction involving timepoint, such that the effects described above will be strongest for the ANS anticipatory reactivity (speech preparation period) and ANS performance reactivity (speech delivery period) timepoints.

Hypothesis 2

We predict a main effect of condition, qualified by a Condition \times Participant Race interaction, such that consumption of police brutality (as compared to negative control images) will increase prejudice concerns (i.e., concerns with police brutality and racism), with these effects more pronounced for Black Americans.

We are agnostic with respect to whether White Americans will experience similar but muted adverse experimental effects on the dependent variables or whether they will not be responsive to the stimuli manipulation. Because White Americans can empathize with victims of brutality, experience a sense of injustice, and experience guilt from a shared connection with the perpetrator of violence (Doosje et al., 1998), they too might experience stress when they consume police brutality images targeting Black Americans. But, because they do not share a racial ingroup identity with the victims of brutality, their reactions to this manipulation should be, at most, muted (relative to Black Americans).

Method

Participants

Participants were 166 university students and university community members (77 Black, 89 White; 75 men, 90 women; one gender nonconforming; $M_{\text{age}} = 19.63$, $SD_{\text{age}} = 3.54$). To retain as many participants as possible, multiracial Black participants were coded as Black ($N = 4$) and multiracial White participants who did not report Black American background were coded as White ($N = 3$). When participants indicated only “other” racial backgrounds, we used ethnic self-descriptions, parental ethnic or racial group membership, and in-study racial identity disclosures to classify them as either Black ($N = 3$) or White ($N = 6$). Seven additional participants were excluded, one for not identifying as Black nor White and six for equipment malfunctioning or failure to follow directions.

Our goal was to recruit as many students as possible from the subject pool, where participants were compensated with course credit. Due to underrepresentation of Black participants in the subject pool, we aimed to recruit additional Black participants from campus with flyers in exchange for \$50 in compensation. White participants came primarily from the subject pool (97%) whereas Black participants came primarily from flyers on campus (94%). White participants all reported being undergraduates as did 91% of Black participants, with the remainder reporting graduate student/continuing education student status ($n = 5$) or not being students ($n = 2$). Data collection took place during 2015–2016. Limited study funds prevented an approach whereby all participants were recruited for payment (see Reinka & Leach, 2018, for a similar approach).

Procedure

Participants were recruited for a study titled “Understanding People’s Attitudes Towards Current News and Events.” They were told that if they chose to participate, they would view a set of slides describing news stories and then complete lab tasks. They were also informed that a number of disposable, painless sensors would be placed on their body (arm, leg, neck, torso) to measure their bodily responses during the study. Following informed consent and a health screening, participants were attached to cardiovascular recording equipment by an experimenter who was blind to the condition. After a 5-min baseline resting period, participants were randomly assigned to watch a 5-min set of slides describing either five cases of police brutality targeting Black Americans (*police brutality condition*) or five cases of Black Americans being killed or harmed in car accidents (*control condition*). Slides containing photos and a brief statement describing the incident appeared on screen for 1 min each. Participants learned that they would give a speech on the events depicted in the slides. Speech tasks where participants prepare and deliver a filmed speech for later review have been successfully employed in previous research to study physiological stress and threat responses (Blascovich et al., 2001; Meijen et al., 2014; Mendes et al., 2007). The police brutality cases featured high-profile cases of unarmed Black Americans being killed (Michael Brown, Eric Garner, Tamir Rice, Walter Scott) or assaulted (Dajerria Becton) by police. The car accident cases featured Black Americans who were age- and gender-matched to the police brutality victims and described as victims of another driver’s actions (e.g., texting, intoxication). Four victims were described as killed and a fifth as injured. Car accidents served as control stimuli as they described unfair death or injury incidents

affecting Black Americans. Participants rated both sets of images as equally unfair, allowing us to hold unfair harm against Black people constant across conditions.¹

After viewing the slides, participants spent 5 min preparing speeches. They then delivered the speech to a video camera and were told that it would be evaluated by experts (one participant declined to be videotaped; however, their other data were included in analyses). Participants then completed a 5-min recovery period and self-report measures. Participants were carefully debriefed. All procedures, including informed consent and debrief, were approved by the university's institutional review board in the Human Subject's Division before the start of the study, and the debriefing was carefully constructed and delivered to mitigate potential adverse reactions. In addition, research assistants were adequately trained in how to detect emotional or physical distress among participants. However, no participants reported adverse reactions or concerns, and none opted to terminate the study early. All data, methods, and materials are available on the Open Science Framework at <https://osf.io/sc2z9/> (Ferguson et al., 2024).

Measures

ANS

ANS measures were collected during five 5-min intervals throughout the study: baseline, stimulus presentation, speech preparation, speech delivery, and postspeech recovery. Electrocardiogram (ECG) recordings were obtained with a Biopac ECG amplifier using a modified Lead II configuration. Cardiac impedance cardiography (ICG) recordings were obtained with a Bio-Impedance Technology model hemodynamic impedance cardiography-2500 ICG. One pair of mylar tape bands encircled the neck and another pair encircled the torso. A continuous 500 μ A alternating current 95-kHz current was passed through the two outer electrodes, and basal thoracic impedance (z_0) and the first derivative of basal impedance (dz/dt) were measured from the inner electrodes. The ECG and ICG signals were sampled at 1.0 kHz and integrated with Acqknowledge software. Participants were connected to an oscillatory BP machine. This allowed for measurement of the SNS markers of HR, BP (systolic and diastolic), PEP, and the PNS with RSA. HR, RSA, and PEP readings were measured continuously, and values were computed in 60-s epochs (25 readings total per measure). BP readings were provided for the first and final minute of each 5-min segment of data collection (10 readings total per measure).

Prejudice Concerns

Prejudice concerns were assessed after the recovery period on scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*; see Supplemental Material for full items).

Concerns With Police Brutality. Participants responded to lab-generated scales assessing concerns that oneself (eight items; $\alpha = .95$) and close others (eight items; $\alpha = .97$) would experience police brutality. For example, "I am/people I care about are likely to be targeted by police brutality in the future."

Concerns With Racism. Participants responded to a four-item scale assessing perceptions that they and members of their racial group experiences discrimination ($\alpha = .96$). For example, "My racial/ethnic group is discriminated against." Participants also responded to

a four-item scale assessing perceptions that racial discrimination will impact their future ($\alpha = .94$). For example, "Racism will have a severe impact on my life." These scales were developed for this study based on prior theorizing (Major et al., 2003) and research (Kaiser et al., 2006) on perceptions of discrimination.

Data Analysis Plan

For dependent measures that were measured repeatedly (ANS reactivity), we conducted 2 (Condition: police brutality as compared to control) \times 2 (Participant Race: White as compared to Black) \times Measurement Timepoint mixed factorial analyses of variance (ANOVAs). For these analyses, Bonferroni adjustments were made to reduce risk of Type I error when comparing across more than two timepoints. For dependent measures that were only measured once (prejudice concerns), we conducted 2 (Stimuli: police brutality as compared to control) \times 2 (Participant Race: White as compared to Black) between-subjects factorial ANOVAs.

A sensitivity power analysis (ANOVA: fixed effects, special, and main effects and interactions) was conducted in G*Power. As a conservative test, we assessed the lowest detectable effect size for the primary between-subjects design, a 2 (Condition) \times 2 (Participant Race) factorial ANOVA, given an N of 166, two-sided $\alpha = .95$, and 80% power. This indicated that we should be able to reliably detect effects as small as $\eta_p^2 = .045$, a medium effect size equivalent to a Cohen's $d = .44$.

Physiological Data Cleaning

Following Mendes's (2009) guidelines, physiological files were visually inspected and edited, and reactivity measures were calculated from each of the four phases following baseline. The averaged baseline response was subtracted from the first minute (the most reactive point) of the speech preparation phase, the speech delivery phase, and the recovery phase. In contrast, the stimuli presentation phase is distinct as the manipulation gradually unfolds over 5 min. Thus, we subtracted the baseline from the average of the 5 min of the stimuli presentation period. These four assessment phases correspond to ANS stimuli reactivity (stimuli presentation phase), ANS anticipatory reactivity (speech preparation period), ANS performance reactivity (speech delivery period), and ANS recovery reactivity (postspeech period). Typically, reactivity peaks when people interact with a stressful stimulus and returns to baseline levels once the stimulus has been removed (i.e., the recovery period).

Outliers in the ANS data for reactivity measures were winsorized to bring the score to a 3- SD departure from the mean. Additionally, we controlled for respective baseline ANS assessments to address the relationship between baseline and absolute change (Mendes, 2009). Due to equipment error, 5.76% of BP responses across participants are missing; thus, degrees of freedom vary across analyses. Additionally, one participant was missing all physiological data, and another participant was missing their PEP, HR, and RSA data.

¹ At the end of the study, participants rated the degree to which the images were familiar, unfair, positive, negative, and threatening on 1 (*not at all*) to 7 (*very*) scales. See Supplemental Material for these analyses.

Table 1
Results for Condition \times Participant Race \times Timepoint Mixed ANOVA on Heart Rate Reactivity

Predictor	<i>F</i>	<i>df</i>	<i>p</i>	η_p^2	<i>M</i> (<i>SE</i>), [95% CI] for significant/marginal effects
Condition	8.24	1,160	.005	.05	Accident: <i>M</i> = 5.21 (0.62) , [3.97, 6.44] Brutality: <i>M</i> = 7.76 (0.63) , [6.51, 9.01]
Participant race	0.12	1,160	.729	.01	
Timepoint	164.08	3,158	<.001	.76	Stimulus: <i>M</i> = -0.03 (0.28), [-0.58, 0.52] _a Preparation: <i>M</i> = 5.84 (0.56), [4.73, 6.95] _b Speech: <i>M</i> = 20.22 (0.99), [18.26, 22.18] _c Recovery: <i>M</i> = -0.09 (0.43), [-0.94, 0.75] _a
Condition \times Race	0.76	1,160	.386	.01	
Condition \times Timepoint	4.64	3,158	.006	.08	Stimulus: <i>M</i> _{diff} = -0.10 (0.56), [-1.19, 1.00] Preparation: <i>M</i> _{diff} = 3.22 (1.12) , [1.00, 5.44] Speech: <i>M</i> _{diff} = 6.387 (1.98) , [2.47, 10.31] Recovery: <i>M</i> _{diff} = 0.71 (0.85), [-0.98, 2.39]
Race \times Timepoint	1.08	3,158	.361	.02	
Condition \times Race \times Timepoint ^a	2.26	3,158	.084	.04	For Black participants: Stimulus: <i>M</i> _{diff} = -0.14 (0.82), [-1.63, 1.60] Preparation: <i>M</i> _{diff} = 3.89 (1.66) , [0.62, 7.16] Speech: <i>M</i> _{diff} = 9.75 (2.92) , [3.97, 15.52] Recovery: <i>M</i> _{diff} = -0.32 (1.26), [-2.80, 2.17] For White participants: Stimulus: <i>M</i> _{diff} = -0.18 (0.75), [-1.66, 1.31] Preparation: <i>M</i> _{diff} = 2.55 (1.52), [-0.45, 5.55] Speech: <i>M</i> _{diff} = 3.03 (2.68), [-2.27, 8.33] Recovery: <i>M</i> _{diff} = 1.73 (1.15), [-0.56, 4.01]

Note. Bolded values indicate significant effects ($p < .05$). Italicized values indicate marginally significant effects ($p < .10$). Post hoc tests of Timepoint differences are adjusted using a Bonferroni correction, and significant differences are marked with different subscripts. ANOVA = analysis of variance; *SE* = standard error; CI = confidence interval.

^aWe provide full analysis of this three-way interaction in the Supplemental Material.

Results

Main Analyses

Tables 1–4 describe the means, *F* values, *p* values, effect sizes and 95% confidence intervals for primary analyses. See Supplemental Material for additional omnibus statistics and exploratory dependent variables.²

ANS

Analyses on the baseline period revealed no significant effects on HR and RSA. There were, however, unanticipated differences in baseline PEP and systolic and diastolic BP. As such, we included average baseline values as covariates for both PEP and BP analyses.

Hypothesis 1A: SNS

HR Reactivity. Complete statistics for HR reactivity analyses are presented in Table 1. The Condition \times Participant Race \times Timepoint mixed ANOVA was significant, with main effects of Condition ($p = .005$) and Timepoint ($p < .001$), as well as a significant Condition \times Timepoint interaction ($p = .006$). Counter to Hypothesis 1, the predicted Condition \times Participant Race interaction was not significant nor were other effects (see Table 1).

The main effect of condition indicated that when averaging across all timepoints, participants in the Police Brutality Condition had higher HR reactivity ($M = 7.76$) than participants in the control condition ($M = 5.21$). The main effect of Timepoint indicated that HR reactivity increased, from almost zero, at the stimulus presentation ($M = -0.03$), through the speech preparation ($M = 5.84$) and speech

delivery periods ($M = 20.22$), before decreasing back to almost zero in the recovery period ($M = -0.09$). The Condition \times Timepoint interaction qualified those effects, indicating that there were significant effects of condition during the speech preparation ($p = .005$) and speech delivery ($p = .002$) periods but not during the stimulus presentation or recovery periods.

PEP Reactivity. Complete statistics for the PEP reactivity are presented in Table 2. Greater decreases in PEP are associated with greater sympathetic activation, so lower values indicate greater sympathetic activation. Controlling for baseline PEP, the Condition \times Participant Race \times Timepoint mixed ANOVA demonstrated a significant main effect of timepoint ($p < .001$), as well as a significant Condition \times Timepoint interaction ($p = .009$). Counter to Hypothesis 1, the predicted main effect of Condition \times Participant Race interaction was not significant, nor were other effects (see Table 2).

The main effect of timepoint indicated that PEP decreased most during the speech delivery period ($M = -12.62$). The significant interaction effect of Condition \times Timepoint indicated a significant simple effect of condition during the speech delivery period (larger PEP reductions in the police brutality vs. control condition, $p = .011$) and a marginally significant simple effect of condition during the stimulus presentation ($p = .051$) and speech preparation ($p = .061$) periods. There was no effect of condition during the recovery period ($p = .997$).

BP Reactivity. Complete statistics for both systolic and diastolic BP, reactivity analyses are presented in Table 3. Controlling for baseline values, the Condition \times Participant Race \times Timepoint mixed

²The gender distribution was equivalent for both groups, $\chi^2(1) = 2.24$, $p = .134$. Covarying age and gender did not eliminate any significant effects, nor did this produce new significant effects (see Supplemental Material).

Table 2
Results for Condition \times Participant Race \times Timepoint Mixed ANOVA on Preejection Reactivity

Predictor	<i>F</i>	<i>df</i>	<i>p</i>	η_p^2	<i>M</i> (<i>SE</i>), [95% CI] for significant/marginal effects
Condition	2.76	1,153	.099	.02	Accident: <i>M</i> = -4.14 (0.52), [-5.17, -3.11] Brutality: <i>M</i> = -5.38 (0.53), [-6.43, -4.32]
Participant race	2.50	1,153	.116	.02	
Timepoint	108.69	3,151	<.001	.68	Stimulus: <i>M</i> = 0.54 (0.20), [0.15, 0.94] _a Preparation: <i>M</i> = -3.69 (0.47), [-4.62, -2.76] _b Speech: <i>M</i> = -12.62 (0.77), [-14.15, -11.09] _c Recovery: <i>M</i> = -3.26 (0.35), [-3.96, -2.57] _b
Condition \times Race	0.19	1,153	.662	.00	
Condition \times Timepoint	3.97	3,151	.009	.07	Stimulus: <i>M</i> _{diff} = 0.79 (0.40), [-0.01, 1.58] Preparation: <i>M</i> _{diff} = -1.78 (0.94), [-3.65, 0.08] Speech: <i>M</i> _{diff} = -3.96 (1.55) , [-7.02, -0.91] Recovery: <i>M</i> _{diff} = -0.01 (0.71), [-1.39, 1.40]
Race \times Timepoint	1.08	3,151	.359	.02	
Condition \times Race \times Timepoint	1.68	3,151	.173	.03	For Black participants: Stimulus: <i>M</i> _{diff} = 1.17 (0.60), [-0.01, 2.35] Preparation: <i>M</i> _{diff} = -0.94 (1.41), [-3.72, 1.84] Speech: <i>M</i> _{diff} = -4.94 (2.38) , [-9.50, -0.38] Recovery: <i>M</i> _{diff} = 1.06 (1.05), [-1.02, 3.14] For White participants: Stimulus: <i>M</i> _{diff} = 0.41 (0.54), [-0.65, 1.47] Preparation: <i>M</i> _{diff} = -2.63 (1.26) , [-5.11, -0.14] Speech: <i>M</i> _{diff} = -3.00 (2.07), [-7.07, 1.09] Recovery: <i>M</i> _{diff} = -1.06 (0.94), [-2.92, 0.81]

Note. Bolded values indicate significant effects ($p < .05$). Italicized values indicate marginally significant effects ($p < .10$). Post hoc tests of Timepoint differences are adjusted using a Bonferroni correction, and significant differences are marked with different subscripts. ANOVA = analysis of variance; *SE* = standard error; CI = confidence interval.

ANOVA was significant, with a marginal main effect of condition ($p = .073$) and significant main effect of timepoint ($p < .001$) for systolic BP reactivity. There was a significant main effect of timepoint ($p < .001$) and a Participant Race \times Timepoint interaction ($p = .038$) for diastolic BP reactivity. All other effects were not significant (see Table 3).

The marginal effect of condition on systolic BP was in the expected direction, such that reactivity was (significantly) higher in the police brutality condition than in the control condition. The effects of timepoint for both diastolic and systolic BP indicated that reactivity was highest during the speech delivery period and lowest during the stimulus presentation period. The interaction between race and timepoint on diastolic BP was not theoretically relevant and not discussed further.

Hypothesis 1B: PNS

RSA Reactivity. Complete statistics for RSA reactivity analyses are presented in Table 4. Greater decreases in RSA are associated with greater parasympathetic withdrawal, so lower reactivity values indicate more parasympathetic withdrawal. The Condition \times Participant Race \times Timepoint mixed ANOVA was significant, with significant main effects of condition ($p = .002$) and timepoint ($p < .001$). Consistent with Hypothesis 1, the Condition \times Participant Race interaction was also significant ($p = .032$). All other effects were not significant (see Table 4).

The main effect of condition indicated that averaging across timepoints, RSA decreased more in the police brutality condition ($M = -0.20$) than in the control condition ($M = 0.09$). This main effect was qualified by the predicted Condition \times Participant Race interaction, such that the conditional effect was significant for Black

participants ($p < .001$) and not significant for White participants ($p = .484$).

The main effect of timepoint indicated that RSA reactivity was close to zero during the stimulus delivery ($M = 0.03$) and speech preparation ($M = 0.01$) periods, had the largest decreases during the speech delivery period ($M = -0.51$), and was positive during the recovery period ($M = 0.25$).

Hypothesis 2: Prejudice Concerns

Concerns About Police Brutality for Self. A Condition \times Participant Race ANOVA was significant for both condition, $F(1, 165) = 4.22$, $p = .041$, $\eta_p^2 = .03$, and participant race, $F(1, 165) = 192.62$, $p < .001$, $\eta_p^2 = .54$, with concerns higher in the police brutality (as compared to the control) condition and among Black (as compared to White) participants. These main effects were qualified by the predicted significant Condition \times Participant Race interaction, $F(1, 165) = 5.29$, $p = .023$, $\eta_p^2 = .02$, with a significant effect of condition for Black participants ($p = .003$) but not White participants ($p = .857$).

Concerns About Police Brutality for Close Others. The ANOVA was significant for both condition, $F(1, 165) = 5.67$, $p = .018$, $\eta_p^2 = .03$, and participant race, $F(1, 165) = 160.69$, $p < .001$, $\eta_p^2 = .50$, with concerns about close others higher in the police brutality (as compared to the control) condition and among Black (as compared to White) participants. These main effects were not qualified by a two-way interaction, $F(1, 165) = 1.77$, $p = .186$, $\eta_p^2 = .01$.

Belief That Racism Affects Oneself. Only the main effect of participant race was significant in the ANOVA on the belief that racism affects oneself ($F(1, 165) = 343.95$, $p < .001$, $\eta_p^2 = .68$), with

Table 3*Results for Condition × Participant Race × Timepoint Mixed ANOVA on Diastolic and Systolic Blood Pressure Reactivity*

Predictor	<i>F</i>	<i>df</i>	<i>p</i>	η_p^2	<i>M</i> (<i>SE</i>), [95% <i>CI</i>] for significant/marginal effects
Diastolic blood pressure					
Condition	0.06	1,133	.813	.00	
Participant race	2.45	1,133	.120	.01	
Timepoint	43.46	3,131	<.001	.49	Stimulus: <i>M</i> = −0.41 (0.44), [−1.27, 0.46] _a Preparation: <i>M</i> = 5.67 (0.75), [4.18, 7.15] _b Speech: <i>M</i> = 9.21 (1.22), [6.80, 11.62] _c Recovery: <i>M</i> = 3.55 (0.67), [2.22, 4.88] _b
Condition × Race	0.02	1,133	.893	.00	
Condition × Timepoint	0.73	3,131	.535	.02	
Race × Timepoint	2.90	3,131	.038	.06	Stimulus: <i>M</i> _{diff} = −0.04 (0.91), [−1.84, 1.76] Preparation: <i>M</i> _{diff} = 2.86 (1.51), [−0.14, 5.85] Speech: <i>M</i> _{diff} = 4.65 (2.55), [−0.39, 9.70] Recovery: <i>M</i> _{diff} = −0.29 (10.83), [−2.97, 2.39]
Race × Condition × Timepoint	0.49	3,131	.688	.01	
Systolic blood pressure					
Condition	3.27	1,134	.073	.03	Accident: <i>M</i> = 7.67 (0.90), [5.90, 9.44] Brutality: <i>M</i> = 10.05 (0.97), [8.14, 11.96]
Participant race	0.12	1,134	.725	.00	
Timepoint	98.11	3,132	<.001	.69	Stimulus: <i>M</i> = −0.43 (0.55), [−1.52, 0.65] _a Preparation: <i>M</i> = 8.33 (0.82), [6.70, 9.96] _b Speech: <i>M</i> = 20.77 (1.42), [18.00, 23.58] _c Recovery: <i>M</i> = 6.78 (0.81), [5.18, 8.28] _b
Condition × Race	0.01	1,134	.976	.00	
Condition × Timepoint	1.70	3,132	.170	.04	
Race × Timepoint	1.64	3,132	.184	.04	
Condition × Race × Timepoint	0.52	3,132	.670	.01	

Note. Bolded values indicate significant effects ($p < .05$). Italicized values indicate marginally significant effects ($p < .10$). Post hoc tests of Timepoint differences are adjusted using a Bonferroni correction, and significant differences are marked with different subscripts. ANOVA = analysis of variance; *SE* = standard error; *CI* = confidence interval.

Black participants reporting being more affected by racism than White participants.

Concerns About Future Racism. Only the main effect of participant race was significant in the ANOVA on concerns about future racism, $F(1, 165) = 143.65$, $p < .001$, $\eta_p^2 = .47$, with Black participants more concerned with future racism than White participants.

Discussion

Police violence pervades everyday life through newspapers, television, and social media, exposing people to images of violence, often with deadly outcomes for Black Americans. The current research investigated whether media consumption of these police brutality events represents a form of vicarious trauma, manifesting in elevated physiological reactivity and concerns with police brutality and racism. We randomly assigned Black and White Americans to view images of police brutality or car accidents (serving as a control) targeting Black Americans, predicting that the police violence (as compared to control images) stimuli would elicit higher levels of physiological reactivity and concerns about brutality and racism. However, responses were expected to be larger in magnitude for Black participants.

In partial support of Hypothesis 1, the main effect of condition was significant for most SNS measures (except for BP). Relative to witnessing control images with Black American victims, witnessing police brutality targeting Black Americans engendered greater sympathetic activation on HR reactivity and PEP for both Black

Americans and White Americans when they were preparing (HR) and delivering (HR and PEP) a speech on this topic. The predicted Condition × Participant Race interaction was only significant for the parasympathetic activation measure (RSA), such that Black (but not White) Americans exposed to police brutality images (as compared to control images) showed greater parasympathetic withdrawal. As such, exposure to police violence imagery had a cardiovascular impact on both Black and White Americans, with some evidence that this effect was more impactful on Black Americans.

In support of Hypothesis 2, with respect to prejudice concerns, both Black Americans and White Americans who viewed police brutality (as compared to control images) reported increased concern about close others experiencing police brutality. However, for Black participants (but not White participants), consuming police brutality images (as compared to control images) also increased concerns about oneself experiencing police brutality. There were no effects of the manipulation on more generalized concerns about experiencing racism or stigma. Thus, witnessing police brutality had a disproportionate effect on personal concerns specific to police brutality (and not generalized racism) for Black Americans.

Limitations

This study took place during 2015–2016, a time when the Black Lives Matter movement was gaining momentum and subsequent media following the deaths of Trayvon Martin and Michael Brown. The death of Brown also contributed to the widely broadcast Ferguson protests that spanned August to September 2014. These events were

Table 4*Results for Condition × Participant Race × Timepoint Mixed ANOVA on Respiratory Sinus Arrhythmia Reactivity*

Predictor	<i>F</i>	<i>df</i>	<i>p</i>	η_p^2	<i>M</i> (<i>SE</i>), [95% CI] for significant/marginal effects
Condition	9.68	1,160	.002	.06	Accident: <i>M</i> = 0.09 (0.07), [−0.04, 0.22] Brutality: <i>M</i> = −0.20 (0.07), [−0.33, −0.07]
Participant race	0.35	1,160	.553	.00	
Timepoint	21.32	3,158	<.001	.29	Stimulus: <i>M</i> = 0.03 (0.05), [−0.06, 0.12] _a Preparation: <i>M</i> = 0.01 (0.06), [−0.12, 0.13] _a Speech: <i>M</i> = −0.51 (0.10), [−0.70, −0.31] _b Recovery: <i>M</i> = 0.25 (0.05), [0.14, 0.35] _c
Condition × Race	4.67	1,160	.032	.03	For Black participants: <i>M</i> _{diff} = −0.49 (0.14) , [−0.76, −0.22] For White participants: <i>M</i> _{diff} = −0.09 (0.13), [−0.34, 0.16]
Condition × Timepoint	2.12	3,158	.100	.04	
Race × Timepoint	1.56	3,158	.201	.03	
Condition × Race × Timepoint ^a	2.13	3,158	.099	.04	For Black participants: Stimulus: <i>M</i> _{diff} = −0.18 (0.13), [−0.44, 0.08] Preparation: <i>M</i> _{diff} = −0.46 (0.19) , [−0.82, −0.09] Speech: <i>M</i> _{diff} = −1.05 (0.29) , [−1.62, −0.49] Recovery: <i>M</i> _{diff} = −0.27 (0.16) , [−0.58, 0.04] For White participants Stimulus: <i>M</i> _{diff} = −0.19 (0.12), [−0.43, 0.05] Preparation: <i>M</i> _{diff} = −0.10 (0.17), [−0.44, 0.23] Speech: <i>M</i> _{diff} = −0.13 (0.26), [−0.65, 0.39] Recovery: <i>M</i> _{diff} = −0.08 (0.15), [−0.21, 0.37]

Note. Bolded values indicate significant effects ($p < .05$). Italicized values indicate marginally significant effects ($p < .10$). Post hoc tests of Timepoint differences are adjusted using a Bonferroni correction, and significant differences are marked with different subscripts. ANOVA = analysis of variance; *SE* = standard error; CI = confidence interval.

^aWe provide full analysis of this three-way interaction in the Supplemental Material.

highly salient in society when our study was conducted. Our results may be most likely to generalize to time periods when the Black Lives Matter movement is salient in society, such as following the deaths of George Floyd and Breonna Taylor in 2020 and the death of Sonya Massey in 2024.

Our sample was recruited from a single location, in an educational setting in a liberal city, with largely young adult participants, and may not generalize beyond this context. Additionally, to successfully recruit underrepresented African American participants, recruitment methods and compensation varied nonrandomly across racial groups.

Likewise, these effects must be considered in the context of the control condition, car accidents harming or killing Black Americans. We chose this control condition because it involved unfair, negative, and uncontrollable death or injury experiences directed at Black Americans, but other controls could be used (e.g., police brutality directed at White Americans; see Reinka & Leech, 2018). Finally, the *concerns with police brutality* measures were generated for this study and have not yet been thoroughly examined for reliability and validity.

Future Research Direction

Future work would benefit from using a more powerful research design, especially to explore the three-way interactions that were not significant in this research. Although we designed this study so that the manipulation was powerful—by (a) using stimuli that was perceived as depicting highly unfair, threatening, and negative situations (particularly by Black Americans) and (b) by using a control condition that disambiguates effects of vicarious trauma events from effects of generally negative events targeting the ingroup—we were limited with respect to participant-based power

due to small numbers of Black Americans in the campus community.

Future research should explore these questions among larger samples beyond the university context and increase the diversity of participants (Roberts et al., 2020). Age diversity could be a useful future direction as the present study was restricted in age, and there were minor demographic differences between the samples of White and Black participants.³ Likewise, future studies could be better powered to explore potential gender interactions.

Future research could also explore how police brutality is stressful to White Americans. For example, White participants may have experienced guilt when exposed to police brutality perpetuated by their racial group (Doosje et al., 1998). White participants might also have experienced intergroup empathy when exposed to news media of someone suffering (Behler & Berry, 2022; Fourie et al., 2017). Assessing discrete measures of guilt and empathy could further help identify psychological processes that operate when exposed to police brutality.

An important question stemming from the current research involves the consideration of the role of vicarious trauma as a source of chronic stress. When the physical, emotional, and cognitive stress responses engendered by vicarious trauma are activated repeatedly, these stress responses generate wear on regulatory systems (McEwen & Gianaros, 2010) and ultimately contribute to poor physical and mental health (Seeman et al., 2001). Measuring downstream physical health outcomes was beyond the scope of this project as the effects of chronic stress on health unfold over a longer time course. Further, because the media facilitates the vicarious experience of traumatic events, making

³ On average, Black participants ($M = 20.25$ years, $SD = 4.80$) were slightly older than White participants ($M = 19.09$ years, $SD = 1.71$), $F(1,164) = 4.51$, $p = .035$, though each group had a median age of 19 years.

it recurrent, we may longitudinally observe mental health problems for groups who are targeted by racist brutality (e.g., symptoms of depression and anxiety) and adverse health behaviors used to cope with stress (e.g., smoking and alcohol use).

Prevention and Clinical Implications

Physically observing what has long been the reality for Black Americans can further open (White) people's eyes to the reality of the historical and contemporary brutality that Black Americans experience in the police system. However, sharing these images (including in research like ours) comes at a cost to health and well-being of members of society and, perhaps particularly, of Black Americans. Members of racial minoritized groups may more frequently encounter these images of police brutality relative to White Americans, leading to repeated exposure of those most vulnerable to these stressors. Indeed, police brutality in the community has been tied to Black Americans' (but not White Americans') enhanced longitudinal risk for mental health issues (Bor et al., 2018). The larger goals of activism and justice might be better served by sharing these images sparingly and by sharing images of the victims of these events when they were alive rather than when they were killed.

Conclusions

The study findings deepen our understanding of vicarious trauma in the context of police brutality. Specifically, police brutality is stressful for both Black Americans and White Americans, with some evidence that certain stress reactions (RSA and concerns about personally being victimized by police brutality), are enhanced among Black Americans. These findings indicate that vicarious trauma and social identity perspectives are important to better understand the impact of consuming images of police brutality, suggesting that the effects of brutality extend beyond the experiences of those directly involved in the event, and may have negative implications for the health and well-being of Black Americans and White Americans.

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Received November 2, 2023

Revision received September 10, 2024

Accepted September 27, 2024 ■