

Physiologic Responses to Racial Rejection Images Among Young Adults from African-American Backgrounds

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Abstract Physiologic reactivity to racially rejecting images was assessed in 35 young adults (10 males, 25 female) from African-American backgrounds using the startle probe paradigm. In a laboratory setting, participants viewed 16 images depicting racial rejection, racial acceptance, nonracial negative, and nonracial positive themes. While viewing these images, startling bursts of noise were presented and the magnitude of the eyeblink responses were measured. Results supported an attentional mechanism which suggests that, while viewing both racially rejecting and nonracial positive images, individuals may be so absorbed in processing the images that they appear less distracted by the startling noise. However, these patterns were only found for participants low in racial regard. Young adults who felt positively about their racial background did not exhibit differential processing of startle stimuli as a function of slide themes. Race-rejection sensitivity did not moderate startle reactivity. Developmental implications, particularly in light of coping with racial discrimination, are discussed.

Keywords Racial rejection · Startle blink reactivity · Racial regard · Race-based rejection sensitivity

Introduction

Despite its social construction and lack of true biologic meaning (Williams 1997), race plays a profound role in development. A recent report from the National Research Council (2004) suggests that youth from ethnic minority backgrounds often develop within the context of unjust treatment, social rejection, and full-blown racism. Such discrimination or racial rejection constitutes a central source of social and ecological challenge and stress (Kessler et al. 1999). For instance, a number of psychological outcomes, including self-esteem, psychological well-being, and academic performance and motivation, have been negatively linked to adolescents' experiences of racial rejection (Sellers et al. 2003; Utsey et al. 2000; Wong et al. 2003). Although knowledge has grown on how racial rejection affects such socioemotional outcomes, there is less understanding of how threats of racial discrimination may trigger a physiologic response and thus impact broader areas of development. The goal of the current study was to examine the processes by which young adults initially respond to racial rejection, at a basic biologic level, in order to provide a more objective and standardized glimpse into how racial rejection affects individuals' lives.

To accomplish this goal, we utilized the startle probe paradigm (Vrana et al. 1988) to determine how young African-American college students differentially respond to an acoustic startle stimulus while simultaneously viewing visual images that depict racially rejecting, racially accepting, nonracial negative, and nonracial positive themes. By determining whether differential responses are made, we can obtain important information on how young adults automatically process racial rejection and ultimately handle such experiences. If, for instance, young adults exhibit a physiologically defensive response to racial

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rejection (e.g., by demonstrating a strong eyeblink reflex when a startling burst of noise is presented while viewing racially rejecting imagery), we can interpret such responses as having potential implications in individuals' emotional and stress reactivity. On the other hand, if young adults exhibit an attenuated eyeblink response while viewing racial rejection, such a reaction can be seen as being driven by an attentional mechanism. That is, when encountering racial rejection, young adults may be so absorbed in trying to understand such experiences that they are distracted from processing other incoming information (i.e., the startle stimulus). Understanding differential patterns of physiologic processing can provide helpful knowledge on the myriad of ways in which young adults may cope with racial threat. In addition, we examined whether such processing of images and the physiologic startle response were moderated by individual differences in sensitivity to racial rejection and positive feelings of racial regard.

Although adolescence is often heralded as an important time of identity development (e.g., Erikson), identity formation is a continually evolving process (Phinney 2003). In fact, recent research has suggested that adolescence merely marks the beginning of identity development, and that later transitions, such as entry into college or the work force, may actually instigate a more striking redefinition of one's identity (Ethier and Deaux 1994). Along with a renegotiation or reestablishment of who they are ethnically, many young adults entering college tend to encounter new social experiences and interactions that may be more racially accepting or rejecting than in their prior experiences in high school or in their neighborhood settings. Hence, we focused on young college students since, during the important transition to college, identity issues and experiences of racial rejection may be particularly salient. Furthermore, we utilized a sample of individuals from African-American backgrounds, as prior work has pointed to these individuals as being particularly vulnerable to, and historically subjected to, status-based rejection (Mendoza-Denton et al. 2002; Utsey et al. 2000).

Defensive Versus Attentional Mechanisms in the Startle Response

When individuals encounter messages of racial rejection, do they respond emotionally and defensively with physiologically protective behaviors (e.g., flight or fight)? Or, are individuals so engaged in attempting to process and understand the often complex racial rejection themes that their full attention is consumed and they are less able to process other stimuli? Frequently used in the study of emotion and psychopathology (see Grillon and Baas 2003; Lang et al. 1990), the eyeblink startle reflex is one way to

gain insight into these basic physiologic processes. Characterized as a relatively primitive reflexive response measured by the rapid closing of the eye upon detection of a sudden stimulus, a variety of modalities have been used to induce the startle response (e.g., acoustic, visual, tactile) (Blumenthal et al. 2005). One of the most common paradigms involves pairing a series of visual images with an acoustically startling stimulus such as an unexpected burst of broadband or "white" noise. Corresponding startle responses are then quantified via electromyographic (EMG) activity of the muscles that cause the eyelids to close. Such reflexive responses to an acoustic probe are a direct index of neurologic activity that provides a window into understanding how an individual's brain stem simultaneously processes both visual and auditory stimuli and subsequently translates information into an automatic, physiologic response (Davis et al. 1999).

The magnitude of the startle eyeblink response is determined by parameters of both the eliciting stimulus (e.g., visual imagery) as well as characteristics of the participant, and includes processes involving emotion, arousal, and attention. The startle response can be affected by emotion, in that startle magnitude is generally greater if the eliciting stimulus is presented while a person is viewing an unpleasant picture compared to when he or she is viewing a pleasant picture (Vrana et al. 1988). For example, viewing negatively charged pictures of spiders or dead bodies, as compared to positively valenced imagery such as flowers or happy babies, tends to provoke a larger blink response when a burst of noise occurs (Bradley et al. 1999). The impact of image valence on startle responding can be understood in terms of a defensive motivational system, which is thought to trigger an automatic avoidance reaction that sensitizes the blink reflex in response to a startling acoustic probe (Bradley et al. 1990; Vrana et al. 1988). This automatic response is presumed to be evolutionarily adaptive, in that individuals typically shut their eyes quickly and forcefully in order to protect themselves from negative experiences and potential threat. Since racial rejection and discrimination are negative emotional experiences that can be threatening on a number of different levels (e.g., psychologic, institutional, symbolic) (Daniels and Kitano 1970), it is possible that the mere anticipation or suggestion of racial rejection, compared to racial acceptance, triggers a physiologically defensive response and thus elevates startle responding.

However, one caveat is that the defensive response to an acoustic startle stimulus while viewing negative images typically requires that such images are not only emotionally unpleasant, but also highly arousing. For instance, differential effects have been found when comparing relatively innocuous imagery (e.g., cemetery or a nature scene) with those that are highly arousing (e.g., violently

mutilated face or erotica) (Bradley et al. 1999; Cuthbert et al. 1996). As arousal increases, blink magnitude also increases across background valence categories (Flaten and Blumenthal 1999; Schächinger et al. 2008).

In the absence of high arousal, the attentional system gains precedence and can modulate the startle response. Through this attentional modulation, pleasant and unpleasant images can affect physiologic reactivity by engaging individuals' interest and interfering with their processing of auditory probes (Cuthbert et al. 1996). Directing attention towards the modality in which the startle stimulus is presented (e.g., auditory noise) results in a larger startle response, whereas directing attention away from the startle stimulus results in a smaller response (Blumenthal 2001; Hackley and Graham 1983; Schicatano and Blumenthal 1998). That is, images that fully capture an individual's interest and attention can inhibit the startle response because the individual is highly oriented to the visual stimuli (Bradley et al. 1999; Schicatano and Blumenthal 1998). In such situations, startle reactivity can be interpreted as a measure of the extent to which an acoustic startle stimulus can distract attention from the visual slide. A decreased startle response thus suggests that an individual may be so intently focused on the particular image that he or she is less able to attentively process the acoustic startle stimulus. Given the complex nature of racial rejection, individuals often exert an extensive amount of cognitive effort to try to understand such experiences (Cross et al. 1998). Hence, negative images depicting racial rejection may interfere with an individual's more automatic processing of information and thus inhibit the startle response.

The distinction between the possible affective or attentional impact of racial rejection on young adults' startle response is worth evaluating since the startle reflex is a widely-used measure that can provide information about a broad range of cognitive, emotional, personality, social, clinical, and neurologic factors (Dawson et al. 1999). If the startle response is elevated while viewing slides that depict racial rejection, then this may be evidence for a preattentive, emotion-based, limbic activation that is caused by such experiences. If startle is attenuated in the presence of racially rejecting slides, then this may be evidence for an information-gathering process that inhibits distraction by the startle stimulus, and would support a higher level of cognitive processing that is involved in coping with racially rejecting interactions. Knowing how young adults automatically and physiologically respond to racial rejection could provide a more complete picture of how race can impact individuals' development, as well as lead to some practical interventions (e.g., help with information processing) that may assist young adults in coping with discriminatory experiences.

Moderation by Race-Related Rejection Sensitivity and Racial Regard

Whether more support is found for the defensive or attentional mechanism underlying startle responses and racial rejection, it is possible that this relationship is moderated by individual differences in the tendency to interpret racial rejection cues, or in the extent to which one feels positively about one's racial group. Recent work has examined how rejection sensitivity, generally speaking, moderates startle responses to images that depict social rejection (Downey et al. 2004). In support of the defensive motivational mechanism, results revealed that, for participants high in rejection sensitivity, the acoustic startle reflex was stronger when individuals viewed images depicting social rejection as opposed to images that were negatively valenced but not specifically representative of rejection (Downey et al. 2004). Using a similar experimental paradigm, moderating effects by self-esteem also have been found, such that individuals with low self-esteem are especially reactive to startle stimuli when viewing socially rejecting scenarios (Gyurak and Ayduk 2007). Just as individual differences in self-esteem and rejection sensitivity have been found to moderate startle responses in light of general social rejection, perhaps variation in race-related rejection sensitivity differentially predicts responses to race-based social rejection themes.

Racial regard, or how positively individuals feel about their racial background (Sellers et al. 1997), may also moderate physiologic startle reactions. Prior work has found that adolescents and adults with strong levels of racial or ethnic identity tend to be more aware of racial discrimination than those with lower levels of identity (Sellers and Shelton 2003). At the same time, a strong sense of racial identity can protect individuals from negative effects of discrimination, suggesting a buffering role of racial identity despite its links with greater perceived discrimination (Brown 2006). Young adults with a positive and strong sense of racial regard may thus be more invested in race-related experiences and find such experiences to be more salient in their lives. Simultaneously, if any race-related threat is actually encountered, these individuals may be able to distance themselves from the overall threat by drawing on their positive sense of group identity as a resource (Tajfel 1981). Despite perceiving racial injustices at a more frequent level, a strong sense of racial regard may provide individuals with the security to be less distracted and consumed by racially rejecting threats and allow them to respond in a more positive and less defensive manner.

The Current Study

In an increasingly diverse society, and with the transition to college, young adults often find themselves in situations that

may be racially rejecting (e.g., segregation in social circles or in the dreaded school cafeteria) (Tatum 1997), or racially accepting. The goal of the current study was to explore how young adults differentially process images that depict these diverse, real-world themes. When young adults view images depicting racial rejection, are their defensive systems activated such that their blink reflex in response to a startling noise is particularly strong? This would suggest that the threat of rejection activates a defensive response tendency that then potentiates a subsequent startle response. Alternatively, is this eyeblink reflex decreased when viewing racially rejecting images because those images are capturing the individual's attention and distracting him or her from processing other stimuli? Support for the attentional perspective would implicate a heightened degree of salience of race-related rejection images, and suggest that such experiences are preferentially processed at the expense of reacting to other stimuli (e.g., the startle sound).

We also examined whether individual differences in race-related rejection sensitivity moderate the startle response. Consistent with prior research (e.g., Downey et al. 2004), it is possible that young adults with a heightened sensitivity to racial rejection are especially likely to exhibit defensive processing of racially rejecting images. Racial regard or positivity toward one's ethnic group was examined as an additional moderator since prior work has found racial identification to have a protective effect against stressors such as racial discrimination (Kiang et al. 2008; Wong et al. 2003). In sum, exploring the interactive associations between race-related rejection sensitivity, racial regard, and physiologic responses to racially rejecting scenarios will target areas that have yet to be examined in racial rejection research and help inform the broad and influential role that race plays in youth development.

Pilot Study: Image Selection

Participants

Pilot participants were 20 undergraduates (2 males, 18 females) from African-American backgrounds recruited through campus advertisements at a small, private university in the Southeastern U.S. Flyers requested that respondents consider themselves Black or African-American and offered \$10 for participation in an image rating study.

Procedures and Measures

In small group sessions, students viewed a series of 32 images projected on the wall of a small, private office. Images were selected by research assistants based on their depiction of racial rejection (e.g., young African-American

child against a wall surrounded by a group of European American children), racial acceptance (e.g., African-American man and European American man both smiling and shaking hands), general or nonracial positivity (e.g., brightly colored sunflower), and general or nonracial negativity (e.g., abstract, monochromatic images). Each session began and ended with a slide depicting nonracial positive imagery. Each slide was shown for approximately 60 s. Participants completed a six-item measure after viewing each slide. Five of the items were rated on a seven-point scale that assessed each slide on dimensions of "interest", "negative/positive", "calm/aroused", "racially rejecting/accepting", and "relevance to racial interactions." A sixth item was open-ended to encourage participants to record any additional thoughts or feelings regarding the image.

Selection of Images

Four images were selected for each condition (i.e., racial rejection, racial acceptance, nonracial positive, nonracial negative), resulting in a total of 16 images. Key conceptual comparisons would be made between images in the two negatively valenced conditions (i.e., racial rejection and nonracial negative) and images in the two positively valenced conditions (i.e., racial acceptance and nonracial positive). For instance, if we find that young adults process racially rejecting images differently than other images, we would want to ensure that such differences are not due to the general negativity of the image. More specifically, to rule out confounding characteristics of the slides themselves that may trigger either a defensive or attentional response, images within these paired categories were chosen based on their match on arousal and interest ratings, respectively.

Paired samples *t*-tests confirmed that the racial acceptance and nonracial positive images chosen were not significantly different along dimensions of arousal or interest ($t(19) = .52-1.59$, *ns*). Despite selecting racial rejection images with the lowest arousal and interest ratings, and nonracial negative images with the highest arousal and interest ratings, paired samples *t*-tests still revealed that these two dimensions were higher among racially rejecting slides ($t(19) = 3.96-4.49$, $p < .001$). It may well be that racial rejection is, by nature, at least moderately arousing and captures a certain degree of interest. Notably, because the degree of discrepancy is similar for both arousal and interest ratings (e.g., approximately one tenth of a scale point), these overall differences should not result in any particular bias for the either the defensive or attentional hypothesis, since both effects may be elevated in the racial rejection slides relative to the nonracial negative slides.

The images were verified as appropriately relevant to racial themes and as racially accepting or rejecting as well. For instance, paired samples *t*-tests confirmed that racially

Table 1 Average ratings of selected slides from pilot participants

Slide condition	Mean (<i>SD</i>)				
	Interest	Positive	Arousal	Racial accept	Relevance
Racial rejection	5.45 (1.06)	2.04 (.56)	5.30 (.57)	1.92 (.69)	6.46 (.47)
Racial acceptance	5.06 (.76)	4.85 (.91)	3.70 (.77)	4.81 (.87)	5.63 (.67)
Nonracial negative	4.28 (1.30)	3.24 (.71)	4.38 (.65)	3.89 (.52)	3.05 (1.03)
Nonracial positive	4.55 (1.34)	5.44 (.80)	3.81 (1.17)	5.03 (.75)	2.56 (1.19)

$N = 20$

accepting slides were rated as more accepting than racially rejecting slides ($t(19) = 11.33, p < .001$), and both racially rejecting and accepting slides were rated as more relevant to racial interactions than the nonracial negative and positive slides ($t(19) = 10.32–14.59, p < .001$). Table 1 lists mean ratings from the pilot study for the four images chosen within each experimental condition.

Startle Response Study

Participants

Students from African-American backgrounds ($N = 35$; 10 males, 25 females) were recruited from a small, private university in the Southeastern U.S. Most students were lower classmen (21 freshmen, 11 sophomores, 2 juniors, 1 senior). Age ranged from 18 to 25 ($M = 20.50, SD = 1.88$). The majority of participants were recruited from undergraduate introductory psychology courses ($n = 29$) and participated in exchange for course credit. The remaining six participants responded to a campus advertisement and received \$15 for participation. All participants were told that the study focuses on their “reactions to images.” Preliminary analyses revealed no significant differences in demographic or key study variables among students recruited from classes versus campus advertisements. Of the 35 participants, three were missing race-based rejection sensitivity data. Hence, all analyses that include the race-rejection sensitivity variable are based on data from 32 participants.

Procedure

Prior to the startle paradigm, participants completed a standard measure of health behaviors in order to screen for and exclude those with self-reported hearing loss, psychiatric illness, or pacemakers. In individual sessions, participants were seated in front of a computer screen in a small room. The experimenter gently cleaned the skin below the participant’s left eye with a swab dipped in rubbing alcohol and affixed three electrodes filled with electrode paste to the skin around the eye to measure EMG activity (Blumenthal et al. 2005).

Two EMG electrodes were positioned over the orbicularis oculi muscle, the facial muscle that is directly responsible for the eyeblink response. The first was placed directly below the center of the eye, below the orbital ridge, and the second was placed 1.5 cm laterally from the first electrode. A ground electrode was positioned on the left temple.

The participant was seated approximately 1.5 feet from a 15-inch computer monitor and headphones were placed over the participant’s ears. Participants were told to focus on the monitor and remain still for the duration of the session. They also were told that they may hear short beeping noises during the session, but they were asked to ignore the noises and to remain focused on the computer monitor.

The experimenter left the room to record the participant’s EMG responses using a Biopac MP150 recording system located in the next room. Before beginning the visual presentation, the experimenter recorded the EMG response line for approximately one minute to verify the proper placement of electrodes and the accuracy of the recording equipment. Three startle stimulus trials consisting of a sudden burst of noise were presented, with an intertrial interval of 16–20 s. The experimenter visually monitored the participant’s eye blinking through a video camera mounted two meters in front of the participant and compared the EMG measure to the participant’s eye blinks to verify that the equipment was properly recording.

Participants viewed 16 slides that depicted race-based rejection, race-based acceptance, nonracial negative imagery, and nonracial positive imagery. There were also four blank slides interspersed as controls. There were four counterbalanced orders that each included four trial blocks comprised of five slide trials: one blank control slide trial and one image from each of the four conditions. Each slide was presented for 6 s with counterbalanced interslide intervals ranging from 3 to 12 s, with a mean of 9 s, during which a blank screen was shown. Within each trial block, four of the five slides were paired with the acoustic startle stimulus which was a broadband pulse of 105 dB(A) presented with a duration of 50 msec and a rise time of less than 1 msec. The onset of the auditory stimulus was counterbalanced to begin 2.5, 4, or 5 s after slide onset. In each counterbalanced order, three of the four images from

each experimental condition were paired with the startle stimulus such that, across the four randomized orders, all images were paired with the startle stimulus. Put another way, the pairing of images with the startle stimulus was counterbalanced both within- and between-subjects.

Upon completion of the eyeblink startle paradigm, participants were shown each of the experimental slides again, and were asked to rate how “negative or positive”, “calm or aroused”, “interesting”, and “racially accepting” the image appeared to be on a 7-point scale. They then completed a series of self-report questionnaires which included the following measures.

Race-Related Rejection Sensitivity

The Rejection Sensitivity Questionnaire-Race (RSQ-Race; Mendoza-Denton et al. 2002) measured anxiety about and expectations of race-based rejection. Participants are given 12 scenarios (e.g., “Imagine that you are in a pharmacy, trying to pick up a few items. While you’re looking at the different brands, you notice one of the store clerks glancing your way.”). After each scenario, participants are first asked to indicate how concerned or anxious they would be that a negative outcome would occur because of their race (e.g., “How concerned/anxious would you be that the clerk might be looking at you because of your race/ethnicity”). They are then asked to rate the likelihood that something negative would happen because of their race (e.g., “I would expect that the clerk might continue to look at me because of my race/ethnicity”). Anxiety and expectations in each scenario are scored on a 6-point scale with higher numbers corresponding to greater concern/anxiety and greater negative expectations. For each item, anxiety and expectations ratings are multiplied, then averaged across the 12 scenarios. The internal consistency was $\alpha = .93$.

Racial Regard

The private regard subscale from the Multidimensional Inventory of Black Identity (MIBI; Sellers et al. 1997) measured racial regard. The subscale consists of four items and assesses the extent to which individuals have positive feelings toward their ethnic group. Sample items read, “I feel good about Black people,” and, “I am proud to be Black.” Items are scored on a 5-point scale ranging from *strongly disagree* to *strongly agree* with higher scores reflecting higher levels of positive regard. The internal consistency was $\alpha = .73$.

Startle Response Scoring

EMG responding from the orbicularis oculi muscle was quantified in terms of response magnitude by measuring

the difference between EMG voltage at response onset and peak for responses that began between 20 and 120 msec after startle stimulus onset (see Blumenthal et al. (2005) for a detailed description of response scoring). On trials with no response to the startle stimulus, a response magnitude of zero was assigned. Startle magnitude data were then analyzed in two different ways. First, to facilitate comparison with the results of Downey et al. (2004), startle reactivity was averaged within a slide category and within participants, and these average startle reactivity data were subjected to a series of analyses of variance and correlation analyses, as described in more detail in the Results section. However, since startle reactivity varies greatly from one participant to another (Blumenthal et al. 2004), a second set of analyses were conducted in which startle response magnitude in each slide condition was divided by participants’ reactivity in the blank-slide condition, yielding a proportional reactivity value to correct for these interpersonal differences in baseline reactivity. In this way, the relative impact of each participant’s general startle response is equated, so that the impact of slide categories on startle can be evaluated independently of baseline startle reactivity. Ratios greater than 1.00 occur when a slide potentiates the startle response. Greenhouse-Geisser corrected degrees of freedom were used when appropriate.

Results

Preliminary Analyses

To ensure that our experimental design did not generate any systematic differences in startle response, we conducted a multivariate analysis of variance with presentation order entered as an independent variable and average startle responses among the four conditions entered as dependent variables. No order effects were found ($F(3, 26) = .17-2.62$, *ns*). We also examined whether startle responses could be differentiated by key demographic variables. Neither gender effects ($F(3, 84) = .68$, *ns*) nor differences in blink magnitude by class standing ($F(9, 84) = 1.03$, *ns*) were found.

Table 2 illustrates means and correlations among average raw startle responses across the four experimental conditions, average startle responses after adjusting for baseline startle, and the two potential moderating variables of race-related rejection sensitivity and racial regard. Startle reactivity in any given slide condition was highly correlated with reactivity in the other slide conditions. Startle was not correlated with race-rejection sensitivity, but proportional startle reactivity in the race-rejection and nonracial positive slide conditions were correlated with racial regard. Hence, correlations suggest that racial regard

Table 2 Means and correlations among primary study variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	Mean (SD)
<i>Raw blink magnitude</i>												
(1) Race-reject	–	.91***	.91***	.84***	.72***	.28*	.16	.13	.30*	.11	.28*	.46 (.57)
(2) Race-accept		–	.96***	.94***	.90***	.02	.08	–.16	.13	.07	.12	.55 (.59)
(3) Nonracial-neg			–	.91***	.88***	.07	.03	.01	.24	.06	.15	.55 (.58)
(4) Nonracial-pos				–	.90***	.03	–.01	.11	.13	.07	.17	.59 (.81)
(5) Baseline					–	–.18	–.19	–.15	.05	–.03	–.06	.53 (.60)
<i>Adjusted magnitude</i>												
(6) Race-reject						–	.70***	.83***	.76***	.11	.44**	1.03 (.79)
(7) Race-accept							–	.63***	.66***	.09	.28*	1.15 (.51)
(8) Nonracial-neg								–	.58***	.13	.31*	1.15 (.68)
(9) Nonracial-pos									–	.00	.51**	1.16 (.69)
<i>Personality variables</i>												
(10) Race-rejection sensitivity										–	.18	10.69 (5.32)
(11) Racial regard											–	4.49 (.52)

* $p = .10$, ** $p = .01$, *** $p = .001$

$N = 35$

is positively associated with a stronger startle response to both racially rejecting and nonracial positive images, but only after controlling for baseline reactivity. Average levels of race-rejection sensitivity suggest that young adults in our sample exhibited a slightly lower level of sensitivity to racial rejection compared to an earlier sample ($M = 12.25$ in Study 1 of Mendoza-Denton et al. 2002). Similar to prior work (Sellers et al. 1997), participants reported relatively high levels of racial regard.

Differences in Raw Startle Responses Among Experimental Conditions

A repeated-measures ANOVA was conducted on raw startle response magnitudes, with the four slide types as the within-subjects factor and mean splits of race-related rejection sensitivity and racial regard as predictors. No significant main effects or interactions were found, F s range (3, 84) = .42–2.47, ns . Contrary to the findings of Downey et al. (2004), who used a similar paradigm and participants’ raw responses to study rejection sensitivity more generally speaking, we found no evidence that racial rejection cues automatically activate individuals’ defensive motivational system.

Differences in Startle Responses after Controlling for Baseline Reactivity

A second repeated-measures ANOVA was conducted on the proportional startle magnitude data, after correcting for variation in baseline startle reactivity by dividing startle reactivity in a slide condition by startle reactivity in the

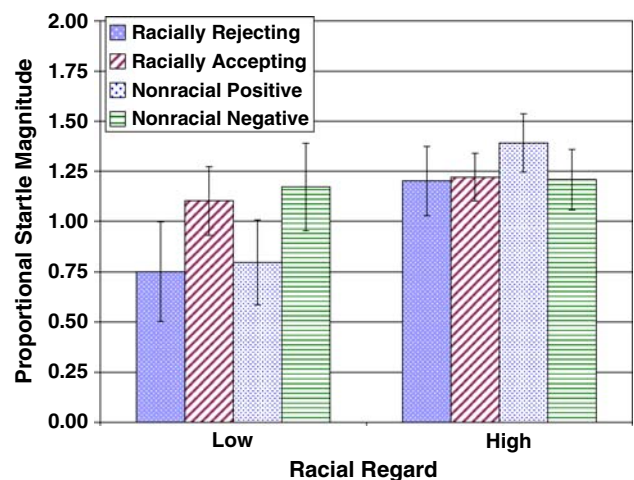


Fig. 1 Startle reactivity by racial regard across the four experimental conditions. Individuals “Low” in regard scored at or below the group mean, whereas those “High” in regard scored above the mean

no-slide condition (baseline). The four slide types were again the within-subjects factor and mean splits on race-rejection sensitivity and racial regard were predictors. A significant interaction between racial regard and slide condition was found, $F(3, 84) = 3.28, p < .05, \epsilon = .87$. As seen in Fig. 1, participants who felt highly positively about their racial group responded to the startle stimulus in a similar fashion across all slide conditions, and all slide conditions evidenced elevated reactivity relative to the no-slide condition (e.g., as shown by ratio magnitudes greater than 1.00). Compared to young adults who were high in racial regard, those who were low in racial regard showed similar startle responding when slides were either racially accepting or nonracial negative; however,

significantly reduced responding was exhibited when slides were either racially rejecting or nonracial positive.

Discussion

Experiences of discrimination and full-blown racism continue to plague individuals' development, particularly in an increasingly diverse society that allows opportunities for racial experiences that are potentially rejecting (National Research Council 2004). Although there is a growing abundance of research that highlights the varied social and psychologic effects of racial rejection (e.g., Kessler et al. 1999), there is little known about how individuals react to such negative experiences at a basic physiologic level. The startle reflex is not only an index of individuals' defensive motivational and attentional systems, but it also offers insight into how youth may develop patterns of physical and emotional reactivity to racially rejecting scenarios.

When faced with race-related rejection, our results suggest that an attentional mechanism may be most appropriate in explaining how young adults cope with and process the information and potential threat, at least for those with low levels of racial regard. That is, differences in startle responding appear to be moderated by racial regard. Young adults who felt more positively about their racial group (i.e., those high in racial regard) appeared less affected by racial rejection, as their magnitude of startle was similar across racial rejection and racial acceptance conditions. Feeling positively about one's racial background thus appears to decrease the attentional effect that may be involved in the processing of race-related rejection. These African-American young adults, with stronger levels of racial regard, seemed to find racially rejecting slides no more or less interesting or relevant than any other slide category, at the brainstem level. However, for participants low in racial regard, the weaker reactivity found in both the racial rejection and nonracial positive slide conditions provides evidence for an attentional modulation of startle. Slides in these two categories appeared to command young adults' cognitive processing resources to such an extent that the acoustic stimuli were not as effective in producing startle responses as they were in the other two slide categories.

Notably, it is only with highly arousing slides that the defensive motivational system has been found to trump the attentional effect (Bradley et al. 1999). The fact that the arousal ratings for the slides used in the current study were relatively moderate and not in the very high range (see Table 1) provide further support that these data may be better explained by an attentional effect rather than by a valence effect, since affective modulation of startle requires fairly high arousal levels of images (Cuthbert et al. 1996). It is possible that, with more arousing images that

depict racial rejection, we would have found greater evidence for a defensive, rather than attentional, modulation of startle. However, it may also be that less arousing racial rejection interactions, such as those that our study tapped into, reflect experiences with "everyday" racism and thus speak to African-Americans' reactivity to more relevant real-world interactions.

One explanation for the attentional modulation found is that individuals with a positive sense of racial regard may be able to draw on their positive feelings as a resource and be less fixated on potentially threatening scenarios, perhaps because they know that they have the psychologic and group strength to be able to withstand such experiences (Tajfel 1981). Their ability to not be so entrenched in the threat of racial discrimination may allow them to have more processing capabilities to handle the acoustic startle stimulus (a biologically imperative stimulus in its own right) and other areas of their lives. Consistent with prior work on racial identity as a buffer of some of the psychologic consequences of racial discrimination (e.g., Sellers and Shelton 2003; Wong et al. 2003), individuals with a strong sense of racial regard appear to have an immunity to being affected by (or have their attention captured by) racially rejecting stimuli.

Understanding youths' reactivity to racial rejection, at a basic brainstem level, can have broader implications in terms of their overall coping and reactivity. For instance, prior work has found that Mexican and Chinese adolescents who report a strong sense of ethnic identity exhibit less daily reactivity to stressful experiences (Kiang et al. 2006). Although it is yet unclear what specific mechanisms may be driving these positive effects, our results suggest that one possible explanation is that having a strong sense of racial regard may shield individuals from exerting too much cognitive effort in trying to process stressful situations. With a layer of physiologic protection, individuals' overall resources may be better applied and their well-being may be enhanced, or at least buffered, in the face of threat.

Similarly, our findings have implications in terms of achievement and stereotype threat as well. For instance, one reason why prior research has found African-Americans to "choke" on achievement tests when their race is made salient to them (Steele and Aronson 1995) could be due to their directing too much attention towards the threat of the stereotype and not enough attention towards the task at hand. Our results support such reactivity and further suggest that racial identification could potentially moderate the negative effects of stereotype threat. Notably, our measure of racial identification focused on one positive dimension, namely, racial pride or regard. Given that racial or ethnic identity is a multidimensional phenomenon (Phinney 2003), it would be informative for future work to examine additional dimensions of identity as potential

moderators of physiologic reactivity. For instance, it may be that centrality, or the degree of importance that individuals attribute to their race, is an equally or even more powerful moderator of how young adults respond to racial rejection (Rowley et al. 1998).

One caveat to our results is that it is not entirely clear why nearly identical patterns were found when comparing racially rejecting and nonracial positive slide conditions, after correcting for baseline startle reactivity. In both slide categories, low regard subjects were less distracted by the startle stimulus than were high regard subjects. Hence, young adults with low racial regard appeared to find these two categories of slides more interesting, but not necessarily for the same reason. For example, recent research has demonstrated that individuals with a positive sense of ethnic identity may exhibit a “positivity bias” which may allow them to easily pick up on and potentially process generally positive themes in their lives (Pfeifer et al. 2007). Perhaps young adults with less positive ethnic identification may find positive images, in general, out of the ordinary and, as a result, become particularly absorbed by such imagery. Further use of the startle probe paradigm and potential follow-up questionnaires to gauge individuals’ more detailed reactions toward these images could be helpful in better understanding these results.

In contrast to recent work using the startle probe paradigm which has found that rejection sensitivity, more generally speaking, activates the defensive motivational system when individuals view images depicting social rejection (Downey et al. 2004), our data did not find evidence for defensive processing nor for moderation by race-rejection sensitivity. Beyond the idea that racial rejection may simply take a different form than more general social rejection, one explanation for these empirical differences is that our data differ from those of prior work in that we utilized a more stringent quantification of blink magnitude that controls for individual differences in baseline reactivity. In addition, prior work that has supported the defensive processing perspective (e.g., Downey et al. 2004; Gyurak and Ayduk 2007) utilized college student samples with a broader age range and higher mean (e.g., M age = 23.6, SD = 5.5 in Downey et al. (2004)) than found in our study. Although these age differences appear rather small, the period of emerging adulthood involves such dramatic developmental changes (Arnett 2000) that even a few additional years of life experience could meaningfully shift individuals’ patterns of reactivity.

Indeed, one limitation of the current research is that we do not have longitudinal data. Although our results can provide insight into potential developmental processes related to reactivity to racial rejection, we are unable to make definitive conclusions about specific directions of effects without true developmental data. Future research

could extend this work by attempting to manipulate racial regard to examine whether, over time, the attentional suppression of the startle response might change with changes in racial regard. Longitudinal work could also be used to potentially reconcile the discrepant findings between the present study and prior work on social rejection (e.g., Downey et al. 2004).

We focused on individuals from African-American backgrounds since prior work has suggested that these youth are particularly susceptible to experiencing racially motivated rejection (Mendoza-Denton et al. 2002; Utsey et al. 2000). Furthermore, focusing on the period of young adulthood allowed us to examine racial identity processes after adolescents enter college and are thought to renegotiate or reestablish who they are, ethnically (Ethier and Deaux 1994). However, recent work has demonstrated that children as young as preschoolers are not only capable of ethnic labeling and questioning the ethnic categories to which they belong, but they also are aware of ethnic disparities and discrimination (Brown and Bigler 2005; Quintana and Vera 1999). Extending the use of the startle probe paradigm to examine developmental differences in children and younger adolescents’ reactivity to racial rejection could thus shed important light on how individuals’ reactions to rejection and their processing of these types of complex racial interactions are initially formed.

Another limitation is that our sample was drawn from a small, private university with predominantly European American students from middle to high socioeconomic backgrounds. It is possible that our findings are generalizable only to African-American youth who are in these types of contexts. It would be important in future research to explore whether young adults from predominantly same-ethnic settings might exhibit a greater or weaker startle response across the experimental conditions examined in this study. Similarly, perhaps moderation by race-rejection sensitivity and racial regard may vary according to contextual factors as well.

Despite some of the limitations of this study, our use of the startle probe paradigm to explore young adults’ physiologic reactivity to racially rejecting situations offers an initial step in attempting to understand the diverse ways in which race can play a primary role in youth development. Encounters with racism and discrimination are indeed complex (Cross et al. 1998), and our results suggest that young adults call upon their cognitive resources in processing and perhaps trying to decipher such negative messages. However, feeling positively about one’s racial background appears to protect the amount of resources that youth use to understand such experiences. In the long run, such patterns of reactivity may help to explain how young adults cope with racial discrimination and preserve their well-being in the process.

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