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Age Differences in Exposure and Reactivity to Interpersonal Tensions among Black and White Individuals across Adulthood

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Abstract The present study examined age differences in exposure and reactivity to interpersonal tensions among white and black Americans. Participants from the National Study of Daily Experiences II (NSDE II, $n = 1{,}696$ white and $n = 239$ black; ages 34–84) reported their experiences of daily interpersonal tensions and well-being (positive and negative affect) over 8 days and provided salivary cortisol samples. A total of 40% of respondents reported having an argument and 62% reported avoiding an argument. Multilevel models estimated separately for black and white respondents revealed that older people reported fewer interpersonal tensions (i.e., less exposure) than did younger people. However, age differences in reactivity to tensions (e.g., appraisals, coping strategies, implications of tensions for affect and cortisol) varied by race. Although older black respondents reported tensions were less stressful than younger black respondents, there were fewer age difference in reactivity to tensions overall among black respondents compared with white respondents. Findings are consistent with the exposure-reactivity model and gerontological theories of emotion regulation but show that the specific age differences vary by race which may indicate unique strengths and vulnerabilities among whites and blacks.

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Introduction

Gerontological research consistently shows that despite age-related declines in health and cognition, there are age-related improvements in social relationships (Carstensen et al. 2003; Birditt et al. 2009). Older people report fewer interpersonal tensions, more avoidance, fewer arguments, and they are less reactive to interpersonal tensions than younger people (Birditt et al. 2005; Blanchard-Fields et al. 1997). It is unclear, however, whether these age-related improvements vary by race. Black Americans may show different developmental patterns than white Americans due to their different life experiences. Black Americans often report experiencing more stress than do white Americans (Mujahid et al. 2011; Ross and Mirowsky 2001; Williams and Mohammed 2009). The accumulation of stress across the life span may lead to greater vulnerability among black Americans and they may thus show fewer age-related improvements (Charles 2010). In contrast, such experiences may lead to even greater age-related improvements among black Americans due to their increased resilience (Neighbors et al. 2011). Interestingly, the literature reveals racial disparities in physical health (Geronimus et al. 2006) but not mental health (Kessler et al. 2005; Neighbors et al. 2011) which shows that increased vulnerability and resilience may exist simultaneously among black Americans.

The present study examined age differences in daily experiences of arguments, avoidance of arguments, and their associations with daily self-reported well-being and diurnal cortisol among black and white Americans. We include both self-reported and physiological measures to provide a

comprehensive assessment of daily psychological and physical health. Cortisol provides an indication of the functioning of the HPA axis; chronic activation of which is linked to depression, heart disease, bone demineralization, loss of muscle mass, increased abdominal fat, and decreased hippocampal volume (Ader 2001; Heim et al. 2000; McEwen 1998; McEwen and Sapolsky 1995; Repetti et al. 2002; Sapolsky 1996).

Theoretical Framework

The stressor exposure-reactivity model provides a framework for understanding coping with daily interpersonal tensions and their implications for well-being and cortisol (Almeida 2005). We adapted the model for the purpose of this study and refer to it as the interpersonal exposure-reactivity model. Interpersonal tensions include problems and irritations in relationships. According to this model, there are variations in the number of problems people are exposed to as well as how they react to problems. Exposure and reactivity to daily stressors influence physiological systems and psychological well-being (Almeida 2005; Almeida et al. 2009a; Bolger and Zuckerman 1995). Exposure refers to the number of interpersonal tensions experienced and reactivity refers to appraisals of the tension, coping strategies used as well as the extent to which self-reported well-being or cortisol are altered by the experience of interpersonal tensions. Self-reported and biological well-being represent separate but related dimensions of well-being.

Individuals vary in their emotional appraisals of situations and their behavioral reactions. Appraisals involve the meaning and severity attributed to the situation (Lazarus and Folkman 1984). In the present study, we define appraisals as the perceived stressfulness of the situation. Coping strategies are often defined along two dimensions in terms of whether they are active or passive (Folkman et al. 1987; Lazarus 1999). We considered avoidance of arguments as a passive response and engagement in arguments as an active response to potentially tense interpersonal interactions. Avoidance of arguments involves not confronting the social partner directly, such as accepting the situation as it is, reappraising the situation, and doing nothing (Birditt et al. 2005; Blanchard-Fields et al. 2004). Engaging in arguments involves directly confronting the person regarding the problem.

Well-being comprises psychological and physical dimensions, and we include self-reported assessments of mood (positive affect, negative affect) and a biological indicator of well-being (diurnal cortisol). Self-reported affect provides a good indicator of daily well-being because it fluctuates on a daily basis compared with more global measures (e.g., life satisfaction) which are more stable (Diener et al. 1999; Kahneman et al. 2006). It is important to examine affect on a daily basis because retrospective reports tend to overestimate the intensity of affect (Thomas and Diener 1990).

Although self-reported well-being measures are associated with objective indicators of health such as mortality (Idler et al. 2004; Phillips et al. 2010), physiological measures of well-being such as cortisol may provide important information regarding the pathways by which daily interpersonal tensions influence overall health and well-being. Cortisol has a normal diurnal rhythm over the course of the day in which it begins to increase before waking, reaches a peak level at about 30 min after waking (cortisol awakening response[CAR]) and steadily declines thereafter until bedtime (daily decline; Fries et al. 2009; Pruessner et al. 1997). The CAR represents the anticipation of the coming day or a boost of energy to ready the person for the day (Adam et al. 2006, 2009b; Fries et al. 2009). Having a blunted CAR is associated with burnout, fatigue, and posttraumatic stress, whereas a CAR that is too steep is associated with increased job stress and other life stress (Chida and Steptoe 2009). Likewise, flatter daily declines are associated with increased stress and lower marital quality (Adam et al. 2006; Adam and Gunnar 2001; Saxbe et al. 2008) and higher mortality rates among women with breast cancer (Sephton et al. 2000). In addition, higher cortisol is associated with lower self-reported well-being. (e.g., anger, stress, and anxiety; Adam 2006; Adam et al. 2006, 2007; Evans et al. 2007; Granger et al. 2006).

According to the exposure-reactivity model, exposure and reactivity to tensions vary by individual differences. Two particularly salient individual differences that are the focus of this study include age and race. Several gerontological theories suggest that interpersonal problems decline with age. Indeed, according to Socioemotional Selectivity Theory, as people age, they become less concerned with acquiring new information and more concerned with maintaining emotionally close relationships due to a decrease in future time perspective (how much time people perceive they have left to live; Carstensen and Charles 1998). To achieve meaningful interactions, older people are more likely to regulate their emotional reactions (Gross et al. 1997; Carstensen et al. 1999). Further, experience and knowledge of social partners may lead to greater acceptance of faults and improvements in relationships and greater resilience to problems in relationships (Hess et al. 2005).

These age differences may also vary by race. According to the theory of cumulative disadvantage, because black Americans experience greater stress across the life span, they may be more vulnerable to stress (George and Lynch 2003; Thoits 2010; Turner and Avison 2003). The Strength and Vulnerability Integration model suggests that the experience of chronic stress can dampen or eliminate age-related improvements in emotion regulation. (Charles 2010). In contrast, the concept of resilience suggests that

due to the greater stress experienced, black Americans develop better coping strategies and are thus more resilient to stress (Neighbors et al. 2011; Schwartz and Meyer 2010). According to the concept of resilience, blacks may show greater age-related improvements in emotion regulation than whites. We discuss these ideas further below.

Age Differences in Exposure and Reactivity to Interpersonal Tensions

Older people report less exposure to interpersonal tensions than do younger people. For example, older people report that they have fewer problems in their relationships than do younger people (Akiyama et al. 2003; Fingerman and Birditt 2003). Older people also report fewer daily interpersonal tensions than do younger people (Birditt et al. 2005).

Older adults are also less reactive to interpersonal tensions when they do experience them. Older adults appraise interpersonal tensions as less stressful than do younger adults (Birditt et al. 2005). Older adults report more avoidant strategies and less destructive strategies (e.g., arguments) than do younger people in the spousal tie (Carstensen et al. 1995), in the parent–child tie (Fingerman 1998), in response to interpersonal vignettes (Blanchard-Fields et al. 1997; Watson and Blanchard-Fields 1998), and in retrospective reports of interpersonal problems across family and non-family relationships (Birditt and Fingerman 2005; Blanchard-Fields et al. 2004). Using the first wave of data used in the present study (NSDE I), Birditt et al. (2005) found that older adults were less likely to report arguments and more likely to report avoidance (i.e., to do nothing) in response to daily tensions than were younger adults.

Interpersonal tensions also appear to have a less detrimental effect on well-being among older adults. Charles et al. (2009) found that older adults report less negative affect on days in which they avoided arguments than younger adults (Charles et al. 2009) but that there were no age differences in negative affect on days in which they reported arguments. The majority of these studies have predominately European American samples. There is little knowledge regarding whether these age differences exist across different ethnic/racial groups.

Age Differences in Interpersonal Tensions by Race

Age differences in tensions and reactivity to tensions may vary by race. Black Americans tend to be exposed to more stressors across the life span than white Americans (George and Lynch 2003; Thoits 2010; Turner and Avison 2003). This may lead to two possible scenarios with regard to age differences in tensions.

First, older black Americans may have increased vulnerability because of a lifetime of repeated exposure and reactivity to stressors (George and Lynch 2003; Thoits 2010; Turner and Avison 2003). This increased vulnerability may lead to fewer age-related improvements in emotion regulation. For example, according to research on health disparities, black Americans remain at increased risk of morbidity and mortality (Williams and Jackson 2005) and appear vulnerable to a disproportionate rate of stress-related diseases, such as cardiovascular disease (Woods-Giscombé and Lobel 2008). Research also provides evidence of dysregulation in the functioning of the hypothalamic–pituitary–adrenocorticol (HPA) axis reflected in flatter diurnal cortisol rhythms among black Americans compared with white Americans (Cohen et al. 2006). Together, these racial disparities may lead to fewer age-related improvements in emotion regulation among black Americans compared with white Americans, particularly in terms of physical and physiological reactivity to all types of tensions. Indeed, according to the Strength and Vulnerability Integration model, age-related improvements in emotion regulation are hampered or even eliminated when negative events are unavoidable, when stress is chronic, and when the HPA axis is dysregulated (Charles 2010). In particular, the greater stress experienced among black Americans may lead to either no age-related improvements or age-related decreases in emotion regulation (i.e., greater reactivity with age).

Second, older black Americans may exhibit more resilience because they have been exposed to more stressors, and over the years, they have developed effective coping resources (Schwartz and Meyer 2010). Throughout life, black Americans are disproportionately exposed to economic stressors, racism, and discrimination (Mujahid et al. 2011; Ross and Mirowsky 2001; Williams and Mohammed 2009). Despite chronic stressor exposure, however, black Americans report similar rates or lower rates of depression compared with whites (Kessler et al. 2005; Williams et al. 2007). Research suggests that black Americans engage in coping behaviors that mitigate the psychological consequences of stressors (Mezuk et al. 2010; Taylor and Aspinwall 1996). Therefore, older black Americans may be particularly adept at coping with the interpersonal tensions they encounter in everyday life.

Further, there may be cultural differences in emotional expression that leads to variations in the age patterns by race. Previous research indicates that African Americans are socialized to value emotional expression, whereas white Americans are socialized to suppress anger and avoid conflict (Kochman 1981; Mackey and O'Brien 1998). Davidson (2002) found racial differences, where black Americans responded to conflict with more confrontational behaviors and greater open expression of negative affect than white Americans. These findings suggest that, even into later life, black Americans may still be more likely to

actively respond to interpersonal tensions by engaging in arguments, whereas white Americans may prefer to avoid conflicts.

Other Factors Associated with Interpersonal Tensions and Reactivity

This study also controls for factors that may lead to variations in the experience and implications of interpersonal tensions and cortisol including gender, self-rated physical health, socioeconomic status (education, financial status), and health behaviors. Women tend to be more reactive to interpersonal tensions than men (Almeida and Kessler 1998). Socioeconomic status and self-reported health are important predictors of stress and may influence daily well-being and cortisol (Almeida 2005; Grzywacz et al. 2004; Steptoe et al. 2003). We also included several variables that are known to influence cortisol including smoking, wake time, medication use, and whether the collection occurred on a weekend day (Almeida et al. 2009a, b; Schlotz et al. 2004; Thorn et al. 2006)

Present Study

In the present study, we examined the daily accounts of interpersonal tensions and well-being to examine whether there were age differences in tensions among black and white Americans. Although not a main focus of this study, we first examined whether there were race differences in exposure and reactivity to tensions followed by our focal interest which is an in-depth examination of age differences among black and white respondents. We hypothesized age differences drawing from the literature reviewed above and further explored age differences by race. Research questions and hypotheses are as follows:

(1) Are there race differences in exposure and reactivity to tensions? Because black Americans experience greater stress and may have developed greater vulnerability to those stressors than white Americans, we predicted that black Americans would report greater exposure and reactivity to tensions than white Americans.

(2) Are there age differences in the number of interpersonal tensions reported (i.e., exposure) among black and white Americans? We predicted that older people would report fewer interpersonal tensions than younger people among both black and white Americans (Birditt et al. 2005). We predicted that due to a lifetime of greater stress, there would be a smaller age difference among blacks than whites.

(3) Are there age differences in stressor appraisals and coping strategies used (avoidance, arguments) among black and white Americans? We predicted that older people would report less stress and greater avoidance and fewer arguments than younger people among both white and black Americans (Birditt et al. 2005). We predicted that there would be fewer age differences among blacks due to the greater stress over the life course.

(4) Are there age differences in the implications of tensions (avoidance, arguments) for daily well-being (positive affect, negative affect, cortisol) among black and white Americans?
Because researchers have found variations in well-being depending on the coping strategy used, we examined variations in reactivity to arguments and avoidance of arguments. We predicted that older people would be less reactive to avoidance days (reporting lower negative affect, higher positive affect, and having a lower CAR, steeper daily decline, and lower cortisol levels) compared with non-tension days than younger people (Charles et al. 2009). We predicted that there would be fewer age differences in reactivity among blacks due to the greater experience of stress among blacks than whites.

Method

Participants

Participants were from the second wave of the National Study of Daily Experiences (Almeida et al. 2009b). The NSDE was conducted as part of the Midlife Development in the United States survey (MIDUS). The MIDUS is a national study of initially 7,108 Americans in 1995 (aged 25–75; response rate of 70; 87.3% white, 6.1% black) and another wave of data were collected in 2004–2006 ($n = 4{,}963$ aged 28–84; 90.1% white and 4.6% black). A comparison of MIDUS I population to the Current Population Survey revealed that African Americans were underrepresented in the MIDUS sample (see MIDUS 1995). Thus, the MIDUS Milwaukee African American ($n = 592$, aged 34–85) study was conducted in 2005 to increase the sample of African Americans and to examine health disparities. The sample was selected from Milwaukee because the city is highly racially segregated and blacks in Milwaukee report lower levels of education, lower income, poorer health, and higher unemployment than blacks nationally (Levine 2007; Massey and Denton 1993; Farley and Frey 1994). In addition, it was cost prohibitive to conduct oversampling in multiple cities around the US and the location facilitated inclusion of African Americans into other MIDUS II satellite studies, including biomarker and neuroscience assessments collected

in Madison, WI. Using area probability sampling methods, participants were selected from areas with high concentrations of African Americans (based on the 2000 census). The sampling was stratified by age, gender, and SES.

Participants in the MIDUS II and the Milwaukee MIDUS were asked to participate in the NSDE II and received $25 compensation. A total of 1,755 participants from the MIDUS II ($n = 1{,}696$ white; 59 black) and 180 black participants from the Milwaukee MIDUS participated in the NSDE II. Thus, 38% of the whites and 26% of the blacks from the national sample and 30% of the Milwaukee sample participated in the NSDE II. We removed the 87 participants who were a race other than white or black. Participants ranged in age from 34 to 84. See Table 1 for a description of the participants.

In order to conduct multivariate analyses examining black and white differences, we combined the black national and Milwaukee samples to create a black participant group ($n = 239$). The lower percentages of black respondents who participated in the NSDE II may have been due to the recruitment procedures. A concentrated effort was made to recruit participants who had also participated in an extensive biomarker assessment conducted at a clinic which involved a 2-day visit including an overnight stay (for more information see: Love et al. 2010). Because this time intensive protocol required respondents to take time off work and other family duties, it may have been more challenging for the black respondents. We acknowledge that this recruitment strategy may limit the representativeness of the sample.

Procedure

The MIDUS II questionnaires involved phone interviews and leave behind questionnaires, and the Milwaukee MIDUS was conducted via face-to-face interviews and leave behind questionnaires. In the NSDE II, participants completed phone interviews every night for eight consecutive nights. White participants completed an average of 7.47 daily interviews, and the black participants completed an average of 6.74 interviews.

Participants were sent a Home Saliva Collection Kit a week before the study which included 16 salivette collection devices with small absorbent wads and an instruction sheet. Participants were asked to provide salivary samples four times a day: at waking, 30 min after waking, before lunch time, and bedtime for four of the diary days (days 2 through 5). After all tubes were ready to send, participants mailed the samples to the MIDUS biological core at the University of Wisconsin where they were stored in a −60°C freezer for analysis.

Salivettes were thawed and centrifuged at 3,000 rpm. The cortisol was measured with luminescence immunoassays (IBL, Hamburg, Germany); intra assay and inter assay coefficients were below 5 percent. Salivary cortisol can be affected by pH levels and the samples were tested and corrected if outside the normal range (pH 4–9). Participants were asked to provide saliva at least an hour after having a meal and to avoid dairy products at least 20 min before providing saliva. A total 88% of the white respondents and 73% of the black respondents provided saliva.

Table 1 Sample description

Variable	White ($n = 1{,}696$)	Black ($n = 239$)	
Age (M, SD)	56.65 (12.22)	54.10 (11.78)	$t = 3.09$, $p < 0.01$
Women (%)	56	68	$\chi^2 = 11.87$, $p < 0.01$
Education (M, SD)	7.41 (2.47)	6.19 (2.55)	$t = 7.11$, $p < 0.01$
Financial status (M, SD)	6.62 (2.05)	5.05 (2.54)	$t = 10.50$, $p < 0.01$
Self-rated health (M, SD)	3.64 (0.98)	3.09 (1.08)	$t = 8.07$, $p < 0.01$
Number of tensions each day	0.24 (0.26)	0.29 (0.33)	$t = -2.57$, $p < 0.05$
Appraised stress of arguments	1.97 (0.70)	2.12 (0.93)	$t = -1.82$, $p = 0.07$
Appraised stress avoidance	1.49 (0.80)	1.57 (0.92)	$t = -1.10$, $p = 0.27$
Proportion of days with avoidance	0.13 (0.14)	0.15 (0.20)	$t = -2.28$, $p < 0.05$
Proportion of days with arguments	0.07 (0.12)	0.07 (0.11)	$t = 0.60$, $p = 0.55$
Proportion of days with both avoidance and arguments	0.02 (0.07)	0.03 (0.12)	$t = -2.75$, $p < 0.01$
Positive affect	2.72 (0.70)	2.70 (0.83)	$t = 0.58$, $p = 0.57$
Negative affect	0.20 (0.26)	0.30 (0.39)	$t = -5.53$, $p < 0.01$
Waking cortisol	2.59 (0.69)	2.11 (0.91)	$t = 12.12$, $p < 0.01$
30 min after wake cortisol	2.95 (0.66)	2.55 (0.86)	$t = 10.65$, $p < 0.01$
Lunch cortisol	1.75 (0.67)	1.62 (0.70)	$t = 3.41$, $p < 0.01$
Bedtime cortisol	0.61 (1.00)	1.09 (0.98)	$t = -8.51$, $p < 0.01$

Education included 12 categories in which 1 = (*no school*), 6 = (*1–2 years of college*), and 12 = (*Ph.D.*). Financial situation rated from 0 (*the worst possible financial situation*) to 10 (*the best possible financial situation*). Self-rated health rated from 1 (*poor*) to 5 (*excellent*). All data were aggregated before calculating the descriptive statistics with the exception of cortisol. The cortisol scores are natural logged transformed and were calculated using the multilevel dataset after omitting the flagged scores

Measures

Predictors

Race and age Race was coded as 0 (white) or 1 (black). Participants reported their birth date. Age was included as a continuous variable.

Outcomes

Engagement and avoidance of arguments Participants were asked two questions each day regarding interpersonal tensions which included: Did you have an argument or disagreement with anyone since we spoke yesterday? And did anything happen that you could have argued about but you decided to let it pass in order to avoid a disagreement? These were coded as 0 (*no*) and 1 (*yes*). We computed a sum of these two variables to create a **number of tensions** variable for each day (range 0–2). We also created a **coping strategy variable** and categorized each day into one of four categories: 1 (*argument*), 2 (*avoidance*), 3 (*argue and avoid*), or 4 (*no interpersonal tension* on that day). Having no interpersonal tensions on that day was the reference category.

Participants then rated how stressful the experience of arguments and the experience of avoiding arguments were from 1 (*very stressful*) to 4 (*not at all stressful*) which we recoded so that higher scores reflected greater stress. The two **stressor appraisal** variables were examined separately.

Self-reported affect Participants completed 13 negative affect and 13 positive affect items derived from the Positive and Negative Affect Schedule (PANAS) and the Non Specific Psychological Distress Scale (Kessler et al. 2002; Watson et al. 1988). Negative affect included items such as restless or fidgety, nervous, hopeless, ashamed, upset, angry, and frustrated. Positive items included emotions such as in good spirits, cheerful, extremely happy, calm and peaceful, active, and confident. Participants rated each item from 0 (*none of the time*) to 4 (*all of the time*). The negative and positive affect items were averaged to create two separate scales for each day. Alphas ranged from 0.83 to 0.85 across days for negative affect and 0.92–0.95 across days for positive affect.

Cortisol Participants provided saliva at four time points: waking, 30 min after waking, before lunch and bedtime. Of the people who provided saliva samples, 98.8% provided samples on all four of the days. The cortisol scores were transformed with the natural log transformation. Days in which the cortisol data had errors were not included in the analysis. Errors included days in which 30 min samples were provided at the wrong time (either less than 15 min or more than 60 min after waking), days in which participants were awake too long (more than 20 h) or not awake long enough (less than 12 h), days in which samples were above 120 nmol/l, days in which participants lunch scores were higher than their 30 min scores by 10 nmol/l, days in which participants woke up before 4 a.m. or after 12 noon, participants who did not follow instructions and provided saliva samples on non-saliva sampling days, and days in which participants did not record times of saliva sample collection.

A total of 1,903 days received error flags which included 27% of the daily diary days that included cortisol (for reliability and validity of this protocol see Almeida et al. 2009b).

Because omitting flagged data may have removed individuals who experienced more stress, we examined whether there were variations in cortisol between the flagged and non-flagged individuals. We found that flagged individuals had lower waking and 30 min cortisol and higher lunch and bedtime cortisol than non-flagged individuals. Thus, the data may be biased by excluding individuals with higher or lower cortisol; however, it is impossible to know whether the variations are due to errors in collection and/or greater stress.

Covariates

Covariates included gender, socioeconomic status (education, financial status), self-rated health, smoking, medication use, wake time, and whether the cortisol was collected on a weekend day. Gender was coded as 0 (*man*) or 1 (*woman*). Education included 12 categories in which 1 = (*no school*), 6 = (*1–2 years of college*), and 12 = (*Ph.D.*). Due to missing data regarding income, we used a financial status variable in which participants rated their financial situation from 0 (*the worst possible financial situation*) to 10 (*the best possible financial situation*). Self-rated health included how well the participant rated their overall health from 1 (*poor*) to 5 (*excellent*). Smoking included a combination of two variables: the number of cigarettes smoked during the 8-day diary period and whether the participant reported being a regular smoker (0 = *non-smoker*, 1 = smoker). We also included whether the participant was taking any of the following medications: steroid inhaler, steroid medications, medications including cortisone, birth control pills, other hormones, and antidepressants and anxiety medications (0 = *no medication*, 1 = *at least one medication*). Wake time included the time the first cortisol measurement was taken in military time. Weekend was coded as 0 (*Monday thru Friday*) or 1 (*Saturday or Sunday*).

Analysis Strategy

First, to describe the samples, we examined whether all predictors, outcomes, and covariates varied by race (white vs. black). We used *t*-tests to examine the continuous variables and chi-square tests to examine the categorical variables. We then calculated correlations among the outcome variables (number of tensions, appraisals, coping strategies, affect, and cortisol) separately by race.

Two types of multilevel models were estimated using SAS PROC MIXED to examine race and age differences in exposure and reactivity to interpersonal tensions. Two level models were estimated to examine the variables that varied by day but not within day including number of tensions, stress appraisals, coping strategy type, positive affect, and negative affect. Participants were the upper level and the days were the lower level. Models included a random intercept and an unstructured covariance matrix. Models examining race differences were conducted in two steps: (1) with race as the predictor and (2) with race and the covariates including age, gender, education, self-rated health, and financial status. Analyses examining age differences were conducted separately for each racial group (white, black) with age as a predictor and the covariates included gender, education, self-rated health, and income.

Three level piecewise multilevel models were estimated to assess cortisol in which the lowest level referred to the cortisol measurement within day, the second level referred to the day, and the upper level referred to the participant (Almeida et al. 2009b; Stawski et al. 2011). These piecewise models captured the within day patterns of cortisol with two predictors (aka pieces) that represented the cortisol awakening response (CAR) and the daily decline (DEC) centered on the 30 min collection. Several models were estimated to determine which model had the best fit including random intercepts and pieces. The model with the best fit included a random intercept and two random slopes for CAR and DEC between participants and a random intercept and random daily decline slope within participant across days. To examine whether avoidance and arguments predicted variations in these scores, we entered interactions between CAR and DEC and coping strategy type. To examine whether the associations between tensions and cortisol varied by age, we entered three-way interactions among the CAR or DEC, age, and coping strategy type. Cortisol analyses controlled for between person variables including smoking, medicine use, gender, self-rated health, education, and day-level variables including wake time and whether the collection occurred on a weekend.

For each model estimated, we calculated pseudo R^2s in order to estimate the proportion of variance accounted for by the predictors. To do this, we examined associations between the estimated predicted values and the actual values of the outcome variables using the method proposed by Singer and Willett (2003). It is important to note, however, that there is disagreement in the literature regarding the best methods for estimating R^2 in multilevel models. Thus, these statistics should be interpreted with caution.

Results

Description of the Data

The black sample reported lower education levels, poorer financial status, lower self-rated health, and they were younger than the white sample (Table 1). The black sample also reported more interpersonal tensions, were more likely to report using avoidance and both avoidance and arguments, and reported greater negative affect than the white sample. Black individuals also had lower cortisol values at waking, 30 min after waking, and lunch time and higher cortisol at bedtime than did white individuals. These variations in cortisol may be due to the effects of chronic stress on the HPA axis. Overall, black respondents reported greater disadvantage and demonstrated evidence of greater stress than did white respondents.

Similar correlations emerged among the variables for black and white respondents (Table 2). Some of the higher correlations revealed that participants who appraised tensions as more stressful and who reported a greater number of tensions also reported greater negative and less positive affect. Positive and negative affect were negatively associated but the moderate correlation shows that these are distinct constructs. In addition, there were few correlations between cortisol and affect with most correlations revealing that greater stress appraisals, tensions, and greater negative affect were associated with lower cortisol levels. These seemingly contradictory findings are most likely due to examining individual cortisol scores rather than the diurnal rhythms.

Research Question 1: Race Differences in Exposure and Reactivity to Tensions

First, we conducted a series of multilevel models examining race differences in the number of interpersonal tensions, appraisals, coping strategies, and well-being. In the interest of space, these findings are not tabled. The models without covariates revealed that black respondents were more likely to report using both coping strategy types (avoidance of arguments and arguments) in the same day, they reported greater negative affect, and they had lower cortisol scores and a flatter decline over the course of the

Table 2 Correlations among number of tensions, appraisals, coping strategies, self-reported affect, and cortisol

	Number of tensions	Appraised stress of argument	Appraised stress of avoidance	Argument	Avoid	Both	Negative affect	Positive affect	Cortisol-wake	Cortisol-30 min after wake	Cortisol-lunch	Cortisol-bedtime
Number of tensions	1	−0.02	0.06	0.40**	0.60**	0.58**	0.33**	−0.19**	−0.06	−0.10	−0.01	−0.06
Appraised stress of argument	0.04	1	0.67**	0.02	–	−0.02	0.43**	−0.37**	−0.12	0.02	−0.30	−0.18
Appraised stress of avoidance	0.04	0.28**	1	–	−0.06	0.06	0.35**	−0.35**	−0.25	−0.39**	−0.17	−0.17
Argument	0.46**	−0.04	–	1	−0.11**	−0.05	0.19**	−0.12**	−0.06	−0.05	−0.04	0.01
Avoidance	0.63**	–	−0.04	−0.10**	1	−0.07**	0.12**	−0.08**	−0.03	−0.01	0.11	−0.03
Both	0.52**	0.04	0.04	−0.04**	−0.05**	1	0.23**	−0.12**	−0.02	−0.12*	−0.10	−0.07
Negative affect	0.32**	0.27**	0.37**	0.20**	0.16**	0.17**	1	−0.51**	−0.09	−0.18**	−0.14*	−0.11
Positive affect	−0.17**	−0.26**	−0.32**	−0.10**	−0.08**	−0.09**	−0.49**	1	0.07	0.14*	0.04	0.04
Cortisol-Wake	−0.04*	−0.03	−0.01	−0.03*	−0.03	0.01	−0.02	0.01	1	0.54**	0.35**	0.22**
Cortisol-30 min after wake	0.01	0.01	−0.01	−0.02	0.01	0.02	−0.01	0.02	0.52**	1	0.41**	0.25**
Cortisol-lunch	−0.01	−0.05	−0.10*	−0.02	−0.01	0.02	−0.01	0.03	0.29**	0.38**	1	0.38**
Cortisol-bedtime	−0.04*	0.01	0.04	−0.04*	−0.01	−0.02	0.03	0.01	0.16**	0.19**	0.31**	1

Correlations for whites are below the diagonal and correlations for blacks are above the diagonal. Cortisol values are the natural logged transformed and omit the flagged scores

day than white respondents. After controlling for socioeconomic status, health, gender, and age, there were no significant differences between black and white participants with the exception of cortisol. Black respondents had lower cortisol and flatter daily declines in cortisol than white respondents.

We also conducted analyses to examine whether there were race differences in the associations between tensions and well-being which revealed racial similarities in associations between tensions and well-being with a few exceptions. The models without covariates and with covariates revealed that black participants reported greater negative affect, higher cortisol, and a flatter CAR on days when they reported both types of coping strategies (avoidance, arguments) than did white participants.

Research Question 2: Age Differences in the Number of Interpersonal Tensions by Race

Multilevel models were estimated to examine the association between age and the number of interpersonal tensions reported each day separately for each racial group (Table 3). As predicted, older people reported fewer interpersonal tensions than younger people among both black and white respondents. Unlike we hypothesized, the age differences appeared to be similar if not greater among black respondents than among white respondents.

Research Question 3: Age Differences in Stressor Appraisals and Interpersonal Coping by Race

Multilevel models were conducted to examine whether appraised stress of arguments and avoidance varied by age among white and black participants (Table 4). As we hypothesized, older people reported that avoidance was less stressful than younger participants among both white

Table 3 Multilevel models examining number of tensions by age separately for whites and blacks

Predictor	Number of tensions each day	
	White (n = 1,615) B (SE)	Black (n = 229) B (SE)
Intercept	0.432 (0.045)***	0.521 (0.125)***
Age	−0.004 (0.000)***	−0.005 (0.001)**
Covariates		
Gender	0.030 (0.012)**	0.033 (0.037)
Education	0.012 (0.002)***	0.015 (0.007)*
Financial situation	−0.012 (0.003)***	−0.028 (0.007)***
Self-rated health	−0.006 (0.006)	0.001 (0.017)
Pseudo R^2	0.02	0.04

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 4 Appraised stress of arguments and avoidance of arguments as a function of age among whites and blacks

Predictor	Appraised stress of argument		Appraised stress of avoidance	
	White (n = 1,615) B (SE)	Black (n = 229) B (SE)	White (n = 1,615) B (SE)	Black (n = 229) B (SE)
Intercept	2.071 (0.201)**	2.598 (0.626)**	1.957 (0.177)**	2.690 (0.468)**
Age	−0.004 (0.002)	−0.021 (0.008)*	−0.009 (0.002)**	−0.017 (0.006)**
Covariates				
Gender	0.252 (0.053)**	0.606 (0.209)**	0.384 (0.046)**	0.331 (0.149)*
Education	−0.008 (0.011)	−0.000 (0.039)	0.015 (0.010)	0.020 (0.029)
Financial situation	−0.009 (0.014)	−0.042 (0.036)	−0.035 (0.012)**	−0.060 (0.029)*
Self-rated health	−0.039 (0.028)	−0.097 (0.090)	−0.119 (0.026)***	−0.195 (0.067)**
Pseudo R^2	0.04	0.17	0.09	0.12

* $p < 0.05$; ** $p < 0.01$

Table 5 Multilevel models examining coping strategies by age in each racial group among individuals who experienced interpersonal tensions

Predictor	Argument		Avoidance		Both argument and avoidance	
	White (n = 1,174) B (SE)	Black (n = 163) B (SE)	White (n = 1,174) B (SE)	Black (n = 163) B (SE)	White (n = 1,174) B (SE)	Black (n = 163) B (SE)
Intercept	0.082 (0.346)	−0.598 (0.931)	−0.545 (0.333)	−0.230 (0.893)	−2.523 (0.700)**	−2.269 (1.466)
Age	−0.012 (0.004)**	−0.002 (0.012)	0.017 (0.004)**	0.010 (0.012)	−0.024 (0.008)**	−0.019 (0.020)
Covariates						
Gender	−0.101 (0.091)	0.415 (0.306)	0.005 (0.088)	−0.255 (0.289)	0.291 (0.185)	−0.197 (0.472)
Education	0.022 (0.019)	−0.134 (0.059)*	−0.040 (0.018)*	0.052 (0.056)	0.073 (0.038)	0.181 (0.092)
Financial situation	0.004 (0.023)	−0.035 (0.054)	0.001 (0.022)	0.111 (0.053)*	−0.022 (0.046)**	−0.210 (0.090)*
Self-rated health	−0.052 (0.050)	0.017 (0.131)	0.076 (0.048)	−0.097 (0.126)	−0.111 (0.098)	0.216 (0.206)
Pseudo R^2	0.01	0.03	0.01	0.04	0.01	0.05

* $p < 0.05$; ** $p < 0.01$

and black respondents. Arguments were also rated as less stressful with age among black respondents but not among white respondents. This finding was not consistent with our prediction that black respondents would show fewer age differences than white respondents.

Multilevel models were estimated to examine the association between age and each coping strategy type separately for blacks and whites (Table 5). Among white participants, as we hypothesized, older people were less likely to report arguments and more likely to report avoidance than younger people. There were no associations among age and any of the three coping strategy types (i.e., arguments, avoidance, and both arguments and avoidance) among the black participants. Thus, this finding was consistent with our hypothesis that there would be fewer age differences among black respondents.

Research Question 4: Age Differences in the Implications of Tensions for Daily Well-being by Race

Next, we conducted a series of multilevel models to examine whether there were age differences in the implications of tensions for well-being among white and black respondents (Table 6). We conducted analyses examining whether negative affect, positive affect, and cortisol varied by age, coping strategy type (engagement in arguments, avoidance of arguments), and age × coping strategy type separately for each racial group. Overall, there were fewer age differences among black respondents than white respondents.

Negative affect. There was a significant interaction between age and having both tensions (arguments, avoidance) among both blacks and whites when predicting negative affect which indicates that older people reported lower negative affect in response to having both types of tensions on the same day compared with younger people. In addition, among the white sample, there were significant interactions between age and arguments and age and avoidance which indicate that older people reported lower negative affect on days in which they reported engaging in arguments and days in which they avoided arguments than did younger people.

Positive affect. When predicting positive affect, there were interactions that approached significance among white and not black respondents. Consistent with our

Table 6 Multilevel models predicting negative and positive affect as a function of tension and age in each racial group

Predictor	Negative affect		Positive affect	
	White (n = 1,615) B (SE)	Black (n = 229) B (SE)	White (n = 1,615) B (SE)	Black (n = 229) B (SE)
Intercept	0.483 (0.043)**	0.889 (0.161)***	1.378 (0.125)***	1.132 (0.358)**
Argument	0.283 (0.037)**	0.456 (0.140)**	−0.071 (0.068)	−0.628 (0.247)*
Avoidance	0.208 (0.030)**	0.243 (0.107)*	−0.099 (0.056)	−0.373 (0.189)
Both argument and avoidance	0.607 (0.072)**	1.151 (0.244)**	0.022 (0.133)	−0.362 (0.432)
No interpersonal tension				
Age	−0.002 (0.000)**	−0.004 (0.002)*	0.009 (0.001)***	0.015 (0.004)**
Age × argument	−0.001 (0.001)†	−0.004 (0.003)	−0.002 (0.001)†	0.007 (0.005)
Age × avoidance	−0.002 (0.001)**	−0.002 (0.002)	0.000 (0.001)	0.005 (0.004)
Age × both	−0.006 (0.001)**	−0.014 (0.005)**	− 0.004 (0.003)†	0.002 (0.009)
Age × none				
Covariates				
Gender	0.029 (0.011)**	−0.007 (0.046)	0.008 (0.032)	0.050 (0.103)
Education	0.005 (0.002)*	−0.008 (0.009)	−0.036 (0.007)***	−0.025 (0.020)
Financial situation	−0.020 (0.003)**	−0.032 (0.009)**	0.075 (0.008)***	0.092 (0.020)**
Self-rated health	−0.048 (0.006)**	−0.070 (0.021)**	0.172 (0.017)***	0.144 (0.047)**
Pseudo R^2	0.16	0.21	0.15	0.19

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$

hypothesis, older white individuals reported higher positive affect on days in which they reported arguments and days in which they reported both tensions compared days in which they had no tensions than did younger participants who reported lower positive affect.

Cortisol. The analyses of cortisol revealed age differences in reactivity among whites and not blacks (Table 7). Older white people reported a greater cortisol awakening response than younger people on days in which they avoided tensions compared with days in which they had no tension. Thus, it would appear that older people are more physiologically reactive on days in which they avoid tensions compared with days in which they have no tension. The increased CAR may represent a boost in energy to prepare for the problems ahead and/or it may represent increased stress.

Discussion

This study examined age differences in exposure and reactivity to daily interpersonal tensions among black and white individuals. The purpose of the study was to examine whether there were age differences in the number of interpersonal tensions, appraised stress of those tensions, coping strategies used, and links between tensions and well-being among black and white individuals. This study revealed that age and race are important components of the interpersonal exposure-reactivity model. Among both black and white Americans older people reported fewer tensions and less reactivity to those tensions than younger people. There were variations, however, in the specific age differences by race that may reflect differences in life experiences and cultural norms for emotional expression.

Race Differences in Exposure and Reactivity to Tensions

Black respondents reported greater disadvantage than did white respondents, reporting lower socioeconomic status and poorer health. Description of the data also revealed that black respondents reported greater number of tensions each day, were more likely to use avoidance and both types of coping strategies on the same day, reported greater negative affect, and had either lower or higher cortisol levels than did white respondents. The multilevel models revealed, however, that some of the race differences were eliminated especially after controlling for indicators of disadvantage. In particular, there were no longer race differences in coping strategies and negative affect. The stress and anxiety associated with economic disadvantage and poor health may create a context ripe for interpersonal tensions and may cause feelings of greater negative affect (Grzywacz et al. 2004; Almeida et al. 2005).

There were race differences in cortisol and race differences in the links between tensions and well-being that remained after including covariates. In particular, black participants reported lower cortisol and a flatter daily

Table 7 Multilevel models predicting cortisol patterns by tensions and age in each racial group

Predictor	White (n = 1,287)			Black (n = 109)		
	Intercept B (SE)	CAR B (SE)	DEC B (SE)	Intercept B (SE)	CAR B (SE)	DEC B (SE)
Intercept	2.809 (0.113)**	0.281 (0.119)*	−0.298 (0.008)**	2.323 (0.411)**	0.097 (0.506)	−0.194 (0.032)**
Argument	−0.020 (0.146)	0.438 (0.351)	−0.005 (0.019)	−0.884 (0.622)	−0.524 (1.359)	0.121 (0.074)
Avoidance	−0.155 (0.113)	−0.473 (0.279)†	0.013 (0.015)	0.169 (0.444)	−1.015 (1.087)	−0.085 (0.051)†
Both arg. and avoid	0.244 (0.271)	0.949 (0.679)	−0.051 (0.036)	−1.222 (0.984)	−2.405 (1.984)	0.014 (0.110)
No interpersonal tension						
Age	0.006 (0.001)**	−0.004 (0.002)*	0.001 (0.000)**	0.005 (0.005)	0.011 (0.009)	−0.000 (0.001)
Age × arg.	0.001 (0.003)	−0.005 (0.006)	0.000 (0.000)	0.015 (0.011)	0.008 (0.024)	−0.002 (0.001)
Age × avoid	0.003 (0.002)	0.010 (0.005)*	−0.000 (0.000)	−0.002 (0.008)	0.025 (0.021)	0.001 (0.001)
Age × both	−0.002 (0.005)	−0.012 (0.013)	0.001 (0.001)	0.013 (0.016)	0.025 (0.033)	−0.000 (0.002)
Age × none						
Covariates						
Waking time	−0.052 (0.007)***			−0.031 (0.023)		
Smoker	0.065 (0.036)			0.149 (0.128)		
Medicine user	−0.050 (0.026)*			0.136 (0.117)		
Weekend	−0.060 (0.013)**			0.058 (0.046)		
Gender	−0.071 (0.025)**			−0.068 (0.105)		
Self-rated health	0.056 (0.014)**			0.023 (0.048)		
Education	0.001 (0.005)			0.007 (0.020)		
Financial situation	−0.003 (0.007)			0.010 (0.023)		
Pseudo R^2	0.87			0.77		

† $p < 0.10$; * $p < 0.05$; ** $p < 0.01$

decline in cortisol over the course of the day. This finding is consistent with previous work indicating that black participants have higher cortisol levels in the evenings even after controlling for sociodemographic characteristics (Cohen et al. 2006). Bedtime cortisol levels may be the most sensitive to chronic stress due to reduced ability to unwind after experiencing high levels of stress. Researchers have postulated race differences in cortisol may have a genetic or heritable component (Cohen et al. 2006). However, there are most likely many other factors accounting for race differences in cortisol that were not considered in the present study such as early life events, chronic environmental and economic stress, and health behaviors, to name a few.

Further, black respondents were more reactive (greater negative affect, higher cortisol) to days in which they reported both types of coping strategies (arguments, avoidance of arguments) than white respondents and these effects remained after controlling for the indicators of disadvantage. This finding indicated that as hypothesized, the black individuals may be more vulnerable to stress than whites perhaps because of the experience of chronic stress.

Age Differences in Exposure to Tensions by Race

Older people reported fewer tensions among both black and white Americans. This is consistent with gerontological theory and previous research using predominately white samples (Birditt et al. 2005; Carstensen et al. 1999). Older people may report fewer tensions because of age-related improvements in emotion regulation. For example, older people experience less anger in response to problems with social partners than do younger people (Birditt and Fingerman 2003). Research also shows that older people pay less attention to and are less likely to remember negative information than are younger people (Carstensen 2006).

However, these age differences may also be due to changes in social roles that lead to less exposure to tensions among older people. For example, older people are less likely to be employed full time which may reduce the number of interactions that occur on a daily basis. It is also possible that age differences reflect cohort differences rather than developmental changes. The older generations may have been exposed to more stress in general or feel it is less appropriate to describe irritations in their

relationships than younger cohorts due to the historical experiences of their cohort such as the Great Depression.

Age Differences in Appraisals and Coping Strategies by Race

Appraisals varied by age among white and black participants. Older people reported that avoidance was less stressful than younger participants among both white and black respondents. Arguments were also rated as less stressful with age among black respondents but not among white respondents. This finding may be due to greater resilience among black Americans as they age. Evidence of this resilience is found in studies of chronic stress, where black caregivers appraise the stressors associated with family caregiving more favorably compared with white caregivers (Gallagher-Thompson 2006; Pinquart and Sorensen 2005). Our findings suggest this resilience also characterizes black Americans' appraisal of their daily experiences. Throughout life, black Americans are exposed to more stress across the life span and thus may view tensions as less stressful as they age, especially in comparison to the other stressors older black Americans face, such as financial concerns or chronic health conditions (Mujahid et al. 2011; Ross and Mirowsky 2001; Williams and Mohammed 2009).

Gerontological research consistently notes that when older people do experience tensions, they are more likely to avoid tensions than to engage in arguments (Birditt et al. 2005; Blanchard-Fields et al. 1997). This study indicates that these age patterns exist among white Americans and not among black Americans. The variations in age differences by race do not appear to be due to race differences in the coping strategies reported. We found no differences in the frequency with which white and black Americans reported avoidance or engagement in arguments. There may be differences between racial groups in the ways in which their relationships and emotion regulation improve with age. In addition, the measures we employed may not have captured the types of strategies that older black Americans use.

However, it is also possible that this finding reflects racial differences in stress exposure and vulnerability (George and Lynch 2003; Thoits 2010; Turner and Avison 2003). Although older adults experience fewer problems and rate experiences as less stressful among the black participants, they may be less able to change their behavioral reactions to those tensions. Indeed, the Strength and Vulnerability Integration model suggests that age-related improvements in emotion regulation are dampened when individuals have experienced chronic stress and stress is unavoidable (Charles 2010). There may also be cultural differences in emotion regulation. For example, emotional expression is more valued among black Americans than white Americans which may lead to fewer age-related changes in coping strategies among black Americans (Kochman 1981; Mackey and O'Brien 1998).

Age Differences in Reactivity by Race

Consistent with the exposure-reactivity model and gerontological theories, we found that older people tend to be less reactive to tensions than younger people (Birditt et al. 2005; Charles et al. 2009). There were variations in the specific age differences by race. Overall, we found fewer age differences in reactivity among blacks than whites.

When examining self-reported affect among the white American sample, older people reported lower negative affect on days in which they experienced avoidance of arguments, engagement in arguments, or both arguments and avoidance of arguments compared with younger people. In addition, older people reported higher positive affect on days in which they reported arguments or both arguments and avoidance of arguments than did younger people. This is somewhat consistent with work on the first wave of the NSDE. Charles et al. (2009) found that older people were less reactive to avoidance of arguments than younger adults. However, they did not find age differences in the reactivity to arguments. It is possible that we found age differences in response to both tensions because we had a larger age range. Indeed, our previous work shows that individuals over 80 have distinct advantages with regard to interpersonal tensions, reporting less anger and more avoidance (Birditt and Fingerman 2003, 2005).

Among the black sample, older people reported lower negative affect on days in which they reported both arguing and avoidance of arguments compared with younger people. There were no age differences in reactivity when examining positive affect. Although older black Americans may appraise arguments as less stressful relative to white Americans, our findings suggest these tensions are still stressful enough to elicit an emotional response from older black Americans. The few age differences in reactivity observed among black Americans suggest that they may not benefit from age-related improvements in emotion regulation. Perhaps a lifetime of repeated stressor exposure and reactivity may deplete the resources older black Americans have to cope with interpersonal tensions (Charles 2010).

The cortisol analyses also revealed variations in age in cortisol reactivity among the white sample and not the black sample. Among the white sample, older people reported a greater cortisol awakening response than younger people on days in which they avoided tensions compared with days in which they had no tension. The increased CAR can represent a positive boost for the course

of the day or it may indicate increased stress on days in which conflict will be avoided (Chida and Steptoe 2009; Fries et al. 2009). If it is an indication of increased stress, this finding may indicate a disconnect between what older adults are reporting in the self-reported affect measure (lower negative affect) and what they are experiencing physiologically. It is also important to note here that the reports of conflict avoidance most likely occur after the CAR in the morning. Thus, it may be that the increased CAR leads to more conflict avoidance. However, it may also mean that there is an ongoing problem in an individual's relationship that they are preparing to deal with.

Limitations and Future Research Directions

There are several directions to pursue in future research. Because the data are cross sectional, it is unclear whether the effects are due to cohort differences and/or aging. In addition, there is most likely a bidirectional relationship between interpersonal tensions, affect, and cortisol. For example, the CAR may predict variations in the experience of interpersonal tensions. Further research should be conducted to examine these associations over time. Although there were more black Americans in the MIDUS II than in MIDUS I, future studies of daily interpersonal tensions should include a larger and more representative national sample of black Americans. It is unclear how applicable these results are to black Americans in general. Future research should also consider more complex measurements of coping strategies. The coping strategies were limited to either the avoidance of arguments or engagement in arguments. In addition, it is unclear what participants mean by the avoidance of arguments or engagement in arguments. For example, avoidance may include a variety of behaviors (e.g., keeping quiet, cognitive reappraisal, drinking alcohol) just as arguments may include a variety of behaviors (e.g., heated discussion, screaming, insults). A more nuanced measure of coping strategies may provide information on age differences in coping among black Americans. In addition, we know little about race differences in the ideals with regard to coping strategies. Future studies should examine what participants did as well as what they believe they should have done in response to interpersonal tensions which would allow for an examination of cultural and age differences in beliefs about appropriate emotional expression. This type of study would provide another necessary layer of information for understanding variations in the experience of interpersonal tensions.

Overall, this study shows that age and race are important components of the interpersonal exposure-reactivity model. The research to date has often focused on white Americans. This study shows that while there may be age-related improvements among both black and white Americans, the specific nature of those improvements may vary by race. We hope that this study leads to more research in this area with regard to the examination of age differences among individuals from different cultural and ethnic groups.

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References

Adam, E. K. (2006). Transactions among adolescent trait and state emotion and diurnal and momentary cortisol activity in naturalistic settings. *Psychoneuroendocrinology, 31*, 664–679.

Adam, E. K., & Gunnar, M. R. (2001). Relationship functioning and home and work demands predict individual differences in diurnal cortisol patterns in women. *Psychoneuroendocrinology, 26*, 189–208.

Adam, E. K., Hawkley, L. C., Kudielka, B. M., & Cacioppo, J. T. (2006). Day-to-day dynamics of experience–cortisol associations in a population-based sample of older adults. *Proceedings of the National Academy of Sciences, 103*, 17058–17063.

Adam, E. K., Klimes-Dougan, B., & Gunnar, M. R. (2007). Social regulation of the adrenocortical response to stress in infants, children, and adolescents: Implications for psychopathology and education. In K. W. Fischer (Ed.), *Human behavior, learning, and the developing brain: Atypical development* (pp. 264–304). New York, NY US: Guilford Press.

Ader, R. (2001). Psychoneuroimmunology. *Current Directions in Psychological Science, 10*, 94–98.

Akiyama, H., Antonucci, T., Takakashi, K., & Langfahl, E. S. (2003). Negative interactions in close relationships across the lifespan. *Journal of Gerontology: Psychological Sciences, 58B*, P70–P79.

Almeida, D. M. (2005). Resilience and vulnerability to daily stressors assessed via diary methods. *Current Directions in Psychological Science, 14*, 64–68.

Almeida, D. M., & Kessler, R. C. (1998). Everyday stressors and gender differences in daily distress. *Journal of Personality and Social Psychology, 75*, 670–680.

Almeida, D. M., McGonagle, K., & King, H. A. (2009a). Assessing daily stress processes in social surveys by combining stressor exposure and salivary cortisol. *Biodemography and Social Biology, 55*(2), 219–237.

Almeida, D. M., Neupert, S. D., Banks, S. R., & Serido, J. (2005). Do daily stress processes account for socioeconomic health disparities? *Journal of Gerontology*: *Social Sciences, 60*, S34–S39.

Almeida, D. M., Piazza, J. R., & Stawski, R. S. (2009b). Interindividual differences and intraindividual variability in the cortisol awakening response: An examination of age and gender. *Psychology and Aging, 24*, 819–827.

Birditt, K. S., & Fingerman, K. L. (2003). Age and gender differences in adults' descriptions of emotional reactions to interpersonal problems. *The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 58B*(4), P237–P245.

Birditt, K. S., & Fingerman, K. L. (2005). Do we get better at picking our battles? Age group differences in descriptions of behavioral reactions to interpersonal tensions. *The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 60B*(3), P121–P128.

Birditt, K. S., Fingerman, K. L., & Almeida, D. M. (2005). Age differences in exposure and reactions to interpersonal tensions: A daily diary study. *Psychology and Aging, 20*, 330–340.

Birditt, K. S., Jackey, L. H., & Antonucci, T. C. (2009). Longitudinal patterns of negative relationship quality across adulthood. *The*

Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 64B(1), 55–64.

Blanchard-Fields, F., Chen, Y., & Norris, L. (1997). Everyday problem solving across the adult life span: Influence of domain specificity and cognitive appraisal. *Psychology and Aging, 12*(4), 684–693.

Blanchard-Fields, F., Stein, R., & Watson, T. L. (2004). Age differences in emotion-regulation strategies in handling everyday problems. *The Journals of Gerontology: Psychological Sciences, 59B*, P261–P269.

Bolger, N., & Zuckerman, A. (1995). A framework for studying personality in the stress process. *Journal of Personality and Social Psychology, 69*, 890–902.

Carstensen, L. L. (2006). The influence of a sense of time on human development. *Science, 312*(5782), 1913–1915.

Carstensen, L. L., & Charles, S. (1998). Emotion in the second half of life. *Current Directions in Psychological Science, 7*(5), 144–149.

Carstensen, L. L., Fung, H. H., & Charles, S. T. (2003). Socioemotional selectivity theory and the regulation of emotion in the second half of life. *Motivation and Emotion, 27*(2), 103–123.

Carstensen, L. L., Gottman, J. M., & Levenson, R. W. (1995). Emotional behavior in long-term marriage. *Psychology and Aging, 10*(1), 140–149.

Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist, 54*(3), 165–181.

Charles, S. (2010). Strength and vulnerability integration: A model of emotional well-being across adulthood. *Psychological Bulletin, 136*(6), 1068–1091.

Charles, S. T., Piazza, J. R., Luong, G., & Almeida, D. M. (2009). Now you see it, now you don't: Age differences in affective reactivity to social tensions. *Psychology and Aging, 24*, 645–653.

Chida, Y., & Steptoe, A. (2009). Cortisol awakening response and psychosocial factors: A systematic review and meta-analysis. *Biological Psychology, 80*, 265–278.

Cohen, S., Schwartz, J. E., Epel, E., Kirschbaum, C., Sidney, S., & Seeman, T. (2006). Socioeconomic status, race, and diurnal cortisol decline in the coronary artery risk development in young adults (CARDIA) study. *Psychosomatic Medicine, 68*(1), 41–50.

Davidson, M. N. (2002). Know thine adversary: The impact of race on styles of dealing with conflict. *Sex Roles, 45*, 259–276.

Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin, 125*, 276–302.

Evans, P., Forte, D., Jacobs, C., Fredhoi, C., Aitchison, E., Hucklebridge, F., et al. (2007). Cortisol secretory activity in older people in relation to positive and negative well-being. *Psychoneuroendocrinology, 32*, 922–930.

Farley, R., & Frey, W. H. (1994). Changes in the segregation of whites from blacks during the 1980's: Small steps toward a more integrated society. *American Sociological Review, 59*, 23–45.

Fingerman, K. L. (1998). Tight lips?: Aging mothers' and adult daughters' responses to interpersonal tensions in their relationships. *Personal Relationships, 5*(2), 121–138.

Fingerman, K. L., & Birditt, K. S. (2003). Do age differences in close and problematic family ties reflect the pool of available relatives? *The Journals of Gerontology: Series B: Psychological Sciences and Social Sciences, 58B*(2), P80–P87.

Folkman, S., Lazarus, R. S., Pimley, S., & Novacek, J. (1987). Age differences in stress and coping processes. *Psychology and Aging, 2*(2), 171–184.

Fries, E., Dettenborn, L., & Kirschbaum, C. (2009). The cortisol awakening response (CAR): Facts and future directions. *International Journal of Psychophysiology, 72*, 67–73.

Gallagher-Thompson, D. (2006). The family as unit of assessment and treatment in work with ethnically diverse older adults with dementia. In G. Yeo & D. Gallagher-Thompson (Eds.), *Ethnicity and the dementias* (2nd ed.). New York: Taylor and Francis Group.

George, L. K., & Lynch, S. M. (2003). Race differences in depressive symptoms: A dynamic perspective on stress exposure and vulnerability. *Journal of Health and Social Behavior, 44*, 353–369.

Geronimus, A. T., Hicken, M., Keene, D., & Bound, J. (2006). "Weathering" and age patterns of allostatic load scores among blacks and whites in the United States. *American Journal of Public Health, 96*(5), 826–833.

Granger, D. A., Kivlighan, K. T., Blair, C., El-Sheikh, M., Mize, J., Lisonbee, J. A., et al. (2006). Integrating the measurement of salivary α-amylase into studies of child health, development, and social relationships. *Journal of Social and Personal Relationships, 23*, 267–290.

Gross, J. J., Carstensen, L. L., Pasupathi, M., Tsai, J., Götestam Skorpen, C., & Hsu, A. C. (1997). Emotion and aging: Experience, expression, and control. *Psychology and Aging, 12*(4), 590–599.

Grzywacz, J. G., Almeida, D. M., Neupert, S. D., & Ettner, S. L. (2004). Socioeconomic status and health: A micro-level analysis o exposure and vulnerability to daily stressors. *Journal of Health and Social Behavior, 45*, 1–16.

Heim, C., Ehlert, U., & Hellhammer, D. H. (2000). The potential role of hypocortisolism in the pathophysiology of stress-related bodily disorders. *Psychoneuroendocrinology, 25*, 1–35.

Hess, T. M., Osowski, N. L., & Leclerc, C. M. (2005). Age and experience influences on the complexity of social inferences. *Psychology and Aging, 20*(3), 447–459.

Idler, E., Leventhal, H., McLaughlin, J., & Leventhal, E. (2004). In sickness but not in health: Self-ratings, identity, and mortality. *Journal of Health and Social Behavior, 45*, 336–356.

Kahneman, D., Krueger, A. B., Schkade, D., Schwarz, N., & Stone, A. A. (2006). Would you be happier if you were richer? A focusing illusion. *Science, 312*, 1908–1910.

Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S.–. L. T., et al. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine: A Journal of Research in Psychiatry and the Allied Sciences, 32*, 959–976.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*, 593–602.

Kochman, T. (1981). *Black and White styles in conflict*. Chicago, IL: University of Chicago Press.

Lazarus, R. S. (1999). *Stress and emotion*. New York: Springer Publishing.

Lazarus, R. S., & Folkman, S. (1984). *Stress, coping, and appraisal*. New York: Springer.

Levine, M. V. (2007). *The crisis of black male joblessness in Milwaukee*: *Trends*, *explanations*, *and policy options*. Working paper, Center for Economic Development, University of Wisconsin-Milwaukee.

Love, G. D., Seeman, T. E., Weinstein, M., & Ryff, C. D. (2010). Bioindicators in the MIDUS national study: Protocol, measures, sample and comparative context. *Journal of Aging and Health, 22*(8), 1059–1080.

Mackey, R., & O'Brien, B. (1998). Marital conflict management: Gender and ethnic differences. *Social Work, 43*, 128–143.

Massey, D. S., & Denton, N. A. (1993). *American apartheid: Segregation and the making of the underclass*. Cambridge, MA: Harvard University Press.

McEwen, B. S. (1998). Protective and damaging effects of stress mediators. *The New England Journal of Medicine, 338*, 171–179.

McEwen, B. S., & Sapolsky, R. M. (1995). Stress and cognitive function. *Current Opinion in Neurobiology, 5*, 205–216.

Mezuk, B., Rafferty, J. A., Kershaw, K. N., Hudson, D., Abdou, C. M., Lee, H., et al. (2010). Reconsidering the role of social disadvantage in physical and mental health: Stressful life events, health behaviors, race, and depression. *American Journal of Epidemiology, 172*, 1238–1249.

MIDUS. (1995). Methodology of the national survey of midlife development in the United States. Retrieved on 08/12/2011 from http://midmac.med.harvard.edu/download.html.

Mujahid, M. S., Diez Roux, A. V., Cooper, R. C., Shea, S., & Williams, D. R. (2011). Neighborhood stressors and race/ethnic differences in hypertension prevalence (The Multi-Ethnic Study of Atherosclerosis). *American Journal of Hypertension, 24*, 187–193.

Neighbors, H. W., Sellers, S. L., Zhang, R., & Jackson, J. S. (2011). Goal-striving stress and racial differences in mental health. *Race and Social Problems, 3*, 51–62.

Phillips, A. C., Der, G., & Carroll, D. (2010). Self-reported health, self-reported fitness, and all-cause mortality: Prospective cohort study. *British Journal of Health Psychology, 15*, 337–346.

Pinquart, M., & Sorensen, S. (2005). Ethnic differences in stressors, resources, and psychological outcomes of family caregiving. *The Gerontologist, 45*, 90–106.

Pruessner, J. C., Gaab, J., Hellhammer, D. H., Lintz, D., Schommer, N., & Kirschbaum, C. (1997). Increasing correlations between personality traits and cortisol stress responses obtained by data aggregation. *Psychoneuroendocrinology, 22*, 615–625.

Repetti, R. L., Taylor, S. E., & Seeman, T. E. (2002). Risky families: Family social environments and the mental and physical health of offspring. *Psychological Bulletin, 128*, 330–366.

Ross, C. E., & Mirowsky, J. (2001). Neighborhood disadvantage, disorder, and health. *Journal of Health and Social Behavior, 42*, 258–276.

Sapolsky, R. M. (1996). Why stress is bad for your brain. *Science, 273*, 749–750.

Saxbe, D. E., Repetti, R. L., & Nishina, A. (2008). Marital satisfaction, recovery from work, and diurnal cortisol among men and women. *Health Psychology, 27*, 15–25.

Schlotz, W., Hellhammer, J., Schulz, P., & Stone, A. A. (2004). Perceived work overload and chronic worrying predict weekend-weekday differences in the cortisol awakening response. *Psychosomatic Medicine, 66*, 207–214.

Schwartz, S., & Meyer, I. H. (2010). Mental health disparities research: The impact of within and between group analyses tests of social stress hypotheses. *Social Science and Medicine, 70*, 1111–1118.

Sephton, S. E., Sapolsky, R. M., Kraemer, H. C., & Spiegel, D. (2000). Diurnal cortisol rhythm as a predictor of breast cancer survival. *Journal of the National Cancer Institute, 92*, 994–1000.

Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis*. New York: Oxford University Press.

Stawski, R. S., Almeida, D. M., Lachman, M. E., Tun, P. A., Rosnick, C. B., & Seeman, T. (2011). Associations between cognitive function and naturally occurring daily cortisol during middle-adulthood: Timing is everything. *Journals of Gerontology: Psychological Sciences, 66b*(suppl 1), 71–81.

Steptoe, A., Kunz-Ebrecht, S., Owen, N., Feldman, P. J., Willemsen, G., Kirschbaum, C., et al. (2003). Socioeconomic status and stress-related biological responses over the working day. *Psychosomatic Medicine, 65*, 461–470.

Taylor, S. E., & Aspinwall, L. G. (1996). Mediating and moderating processes in psychosocial stress: Appraisal, coping, resistance, and vulnerability. In H. B. Kaplan (Ed.), *Psychosocial stress: Perspectives on structure, theory, life course and methods* (pp. 71–100). San Diego: CA: Academic Press.

Thoits, P. (2010). Stress and health: Major findings and policy implications. *Journal of Health and Social Behavior, 51*, S41–S53.

Thomas, D. L., & Diener, E. (1990). Memory accuracy in the recall of emotions. *Journal of Personality and Social Psychology, 59*, 291–297.

Thorn, L., Hucklebridge, F., Evans, P., & Clow, A. (2006). Suspected non-adherence and weekend versus week day differences in the awakening cortisol response. *Psychoneuroendocrinology, 31*, 1009–1018.

Turner, R. J., & Avison, W. R. (2003). Status variations in stress exposure: Implications for the interpretation of research on race, socioeconomic status, and gender. *Journal of Health and Social Behavior, 44*, 488–505.

Watson, T. L., & Blanchard-Fields, F. (1998). Thinking with your head and your heart: Age differences in everyday problem-solving strategy preferences. *Aging, Neuropsychology and Cognition, 5*(3), 225–240.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063–1070.

Williams, D. R., Gonzales, H. M., Neighbors, H., Nesse, R., Abelson, J. M., Sweetman, J., et al. (2007). Prevalence and distribution of major depressive disorder in African Americans, Caribbean blacks, and non-Hispanic whites: Results from the National Survey of American Life. *Archives of General Psychiatry, 64*, 305–315.

Williams, D. R., & Jackson, B. P. (2005). Social sources of racial disparities in health. *Health Affairs, 24*, 325–334.

Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: Evidence and needed research. *Journal of Behavioral Medicine, 32*, 20–47.

Woods-Giscombé, C. L., & Lobel, M. (2008). Race and gender matter: A multidimensional approach to conceptualizing and measuring stress in African American women. *Cultural Diversity and Ethnic Minority Psychology, 14*, 173–182.