



Racial and ethnic differences in diurnal cortisol rhythms in preadolescents: The role of parental psychosocial risk and monitoring

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ABSTRACT

Racial/ethnic minorities experience persistent health disparities due in part to their exposure to chronic SES and psychosocial risk. The hypothalamic–pituitary–adrenal axis and its hormonal end product, cortisol, are believed to mediate the associations between chronic stress and poor health. In this study, racial/ethnic differences in diurnal salivary cortisol rhythms in 179 preadolescent youths and the contributing roles of SES risk, psychosocial risk, perceived discrimination, harsh parenting, and parental monitoring were examined. The analyses revealed racial/ethnic differences in diurnal cortisol rhythms, with African Americans having significantly flatter morning-to-evening cortisol slopes than Caucasians and with Latinos having significantly lower evening cortisol levels than Caucasians. Greater psychosocial risk and less parental monitoring were associated with flatter cortisol slopes. Racial/ethnic differences on the cortisol measures persisted when controlling for SES, psychosocial risk, and parenting quality. The need to assess chronic risk across the lifespan and disentangle possible genetic from environmental contributors is discussed.

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Introduction

Health disparities among racial/ethnic minorities in the United States are well documented. In comparison to Caucasians, African Americans and Latinos experience disproportionately greater morbidity and mortality across many diseases, including cancer, cardiovascular disease, and diabetes (Centers for Disease Control and Prevention, 2011; National Center for Health Statistics, 2010; Walsemann et al., 2008). Despite recent improvements in the health of the general population (National Center for Health Statistics, 2010; Sondik et al., 2010), these improvements have not impacted all racial/ethnic groups equally; there are stable or increasing prevalence rates for chronic and life-threatening diseases among many minority populations (Orsi et al., 2010; Sondik et al., 2010). Thus, understanding the complex, multidimensional nature of health disparities and identifying the underlying mechanisms of these disparities is increasingly important (see Adler and Rehkopf, 2008). Prior research findings suggest that the hypothalamic–pituitary–adrenal (HPA) axis is a potential mediator between chronic stress and poor physical health (Chrousos, 2009; de Kloet et al., 1998; McEwen, 2008). As such, the HPA axis might play a critical role in the persistence of disparate morbidity and mortality among racial/ethnic minorities.

Racial/ethnic differences in diurnal cortisol rhythms

Cortisol, a glucocorticoid hormone, is the end product of HPA axis activation in humans. In healthy populations, the HPA axis exhibits a diurnal pattern of activity (Schmidt-Reinwald et al., 1999; Stone et al., 2001). Cortisol levels typically peak 30–45 min after waking and decline gradually throughout the day to levels near zero in the evening. The HPA axis also responds to physical and psychological stress (Johnson et al., 1992; Sapolsky et al., 2000). Exposure to stress has been shown to have a profound effect on the functioning of the HPA system, but the direction of the effect (i.e., increased vs. decreased diurnal cortisol levels) appears to depend upon factors such as the type, chronicity, and severity of the stressor (Miller et al., 2007). For example, exposure to chronic stress (vs. acute stress) is more often associated with lower morning and higher evening cortisol levels, resulting in a flatter diurnal slope (Fries et al., 2005; Gunnar and Vazquez, 2001; Miller et al., 2007). In turn, flatter diurnal slopes have been associated with chronic disease (Kumari et al., 2011; Nijm et al., 2007).

The literature on racial/ethnic disparities in cortisol is not extensive but demonstrates divergent diurnal cortisol rhythms for African Americans and Latinos compared to Caucasians (Cohen et al., 2006b; DeSantis et al., 2007; Hajat et al., 2010; Suglia et al., 2010; c.f., Cohen et al., 2006a). African Americans have been found to have flatter diurnal cortisol slopes, with lower morning levels and higher evening levels, than Caucasians across studies of adolescents (DeSantis et al., 2007), pregnant women (Suglia et al., 2010), adults (Cohen et al., 2006b; Hajat et al., 2010), and elderly participants (McCallum et al., 2006). Although prior researchers have shown

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that the diurnal cortisol rhythms for Latinos and Caucasians also differ, the nature of the differences is inconsistent across studies. For example, Hajat et al. found that, similar to African American adults, Latino adults had significantly lower morning cortisol levels compared to Caucasian adults. However, in contrast to African Americans and Caucasians, Latinos demonstrated a steeper decline in cortisol late in the day, resulting in lower evening cortisol levels. In contrast, DeSantis et al. found that Latino adolescents demonstrated flatter cortisol slopes, with higher evening levels, compared to Caucasians. In sum, although African Americans have consistently been shown to have lower morning and higher evening cortisol levels compared to Caucasians, the research findings with Latinos have been somewhat equivocal.

The role of contextual risk factors

Low SES and psychosocial risk have often been associated with dysregulated diurnal cortisol levels in the general population (Gustafsson et al., 2010; Miller et al., 2007; c.f., Dowd et al., 2009). These risk factors might similarly affect the relationship between minority status and dysregulated diurnal cortisol rhythms. Racial/ethnic minorities are disproportionately more likely to live in poverty and to be at greater risk for psychosocial stressors such as racism and discrimination, interparental violence, parental depression and stress, and multiple caregiver transitions (Fomby and Cherlin, 2007; Hatch and Dohrenwend, 2007; Holman et al., 2000; Raphael et al., 2010; Spence et al., 2011). Moreover, exposure to adversity without sufficient access to financial resources appears to be especially detrimental (Matthews and Gallo, 2011; Thoits, 2010); racial/ethnic minorities are less likely to have access to such resources (Thoits, 2010). However, racial/ethnic differences in diurnal cortisol rhythms have been found even when SES, psychosocial, and health-related risk factors are controlled (Cohen et al., 2006b; DeSantis et al., 2007; Hajat et al., 2010; Suglia et al., 2010). Furthermore, although minorities living in poverty appear to be the most disadvantaged in terms of health outcomes (Williams and Jackson, 2005), the interaction between SES and race/ethnicity has not been supported when examining differences in biological indicators of stress (Cohen et al., 2006b; Juster et al., 2010). Thus, additional factors should be considered when examining racial/ethnic differences in diurnal cortisol rhythms. Potential contributors that have yet to be examined include parenting qualities such as harsh parenting and parental monitoring.

The role of harsh parenting and parental monitoring

Within the last decade, a consensus has emerged that early life experiences have a substantial influence on physical and mental health (Shonkoff et al., 2009). Exposure to family adversity (e.g., harsh parenting, abuse, and neglect) has been consistently linked with indicators of poor health in childhood (Flaherty et al., 2009), adolescence (Miller and Chen, 2010), and adulthood (Dube et al., 2009). Previous research findings also suggest that there are racial/ethnic differences in family adversity. For example, differential exposure to harsh parenting has been found between racial/ethnic groups, with African American and Latino youths being more likely to experience harsh discipline and injurious spanking compared to Caucasian youths (Cardona et al., 2000; Hawkins et al., 2010; MacKenzie et al., 2011; Pinderhughes et al., 2000). Racial/ethnic differences have also been found in terms of parental monitoring, with African American parents monitoring their youths less than Caucasian or Latino parents (Tolma et al., 2011). In turn, these parenting qualities have been linked to dysregulated diurnal cortisol rhythms in children (Gunnar, 1998; Gunnar and Donzella, 2002; Gunnar et al., 1996; Lucas-Thompson and Goldberg, 2011). For example, low maternal involvement and warmth has been linked to flatter diurnal cortisol slopes in children (Flinn and England, 1997; Pendry and Adam, 2007). Notably, responsive and supportive caregiving has been found to attenuate the negative effects of being raised in stressful environments (Evans et al.,

2007). Similarly, a parenting intervention that increases parental responsiveness and monitoring has been shown to impact diurnal cortisol rhythms in foster children, with cortisol slopes becoming more akin to those of non-foster children (Fisher and Stoolmiller, 2008; Fisher et al., 2007). Although these parenting qualities have been associated with dysregulated diurnal cortisol rhythms, little research has been conducted to examine this relationship in racially/ethnically diverse samples.

Objectives and hypotheses of the current study

We examined racial/ethnic differences in diurnal cortisol rhythms in a diverse sample of preadolescents, expanding upon prior research by examining the roles of contextual risk factors (i.e., SES risk, psychosocial risk, and perceived discrimination) and parenting (i.e., harsh parenting and parental monitoring). In line with previous findings (Cohen et al., 2006b; DeSantis et al., 2007; Hajat et al., 2010), we hypothesized that African American youths would have significantly flatter diurnal cortisol slopes compared to Caucasian youths, exhibiting lower morning and higher evening levels. Due to the inconsistent research findings on cortisol in Latinos, we did not make any a priori hypotheses regarding the direction of the effect for this group. We further predicted that racial/ethnic differences would persist after controlling for contextual risk factors. However, considering the racial/ethnic differences in harsh parenting and parental monitoring and the link between these parenting qualities and dysregulated cortisol, we hypothesized that the racial/ethnic differences in cortisol would be accounted for by these parenting variables.

Material and methods

Participants

The participants ($N = 242$) were recruited as a long-term follow-up subsample from the Healthy Families America (HFA) San Diego clinical trial (Landsverk et al., 2002). The HFA intervention is a widely implemented home visitation program for high-risk families with newborns aimed at improving parenting, promoting healthy child development, and preventing maltreatment. The original study recruited 488 families at birth based on being at risk for child maltreatment, and the children were followed for 36 months. The follow-up study was conducted after a 6-year hiatus, when the children were 9–12 years old. No significant intervention effects on reducing child maltreatment have been found to date in the HFA San Diego clinical trial (Landsverk et al., 2002). Nonetheless, we examined these potential group effects.

Salivary cortisol samples were collected for 196 of the youths. Youths were excluded if they were taking medications containing corticosteroids ($n = 5$), did not provide two of the three cortisol samples for at least 2 of the 3 sampling days ($n = 1$), ate full meals 30 min prior to each cortisol collection ($n = 1$), or did not provide questionnaire data ($n = 10$). The final analytic sample consisted of 179 youths, aged 9–12 years ($M = 10.97$ years, $SD = 0.68$ years; 53% female), and their primary parent. The youths were racially/ethnically diverse based on parent reports: 50% ($n = 90$) Latino or Hispanic descent, 16% ($n = 29$) multiracial, 15% ($n = 27$) African American, 15% ($n = 27$) Caucasian, and 4% ($n = 6$) Asian American or Pacific Islander. The parents were primarily female (92%) and were biological parents (89%) or biological relatives (8%). Additional caregivers included adoptive parents, foster parents, and stepparents. The youths in the final analytic sample did not differ significantly from the excluded youths in terms of age, gender, race/ethnicity, intervention status, SES risk, psychosocial risk, perceived discrimination, harsh parenting, or parental monitoring.

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