Psychoneuroendocrinology (2014) 50, 280—288

Available online at www.sciencedirect.com

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journal homepage: www.elsevier.com/locate/psyneuen

Associations between self-reported discrimination and diurnal cortisol rhythms among young adults: The moderating role of racial—ethnic minority status

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Received 24 April 2014; received in revised form 22 August 2014; accepted 25 August 2014

KEYWORDS
HPA axis;
Diurnal cortisol;
Discrimination;
Racial/ethnic minority young adults

Abstract Discrimination is theorized to set in motion a neuroendocrine response, which includes cortisol secretion from the hypothalamic—pituitary—adrenal axis. Repeated exposure to perceived discrimination is thought to contribute to alterations in diurnal cortisol rhythms and to have implications for health. Discrimination may have particularly strong effects on racial/ethnic minority individuals, based on histories of past exposure and/or greater perceived implications of discriminatory events. Utilizing an ethnically and racially diverse sample of young adults ($N = 140$; $M_{age} = 22.8$ years) and a multiple-day naturalistic cortisol protocol, the present study examined associations between self-reported discrimination and diurnal cortisol rhythms, and whether this relation was moderated by racial/ethnic minority status. Results revealed that self-reported discrimination predicted flatter diurnal cortisol slopes for racial/ethnic minority individuals only. These findings align with theory suggesting that discrimination experiences are important among racial/ethnic minorities.

Introduction

Discrimination is a common stressor for racial/ethnic minority individuals in the US (Williams and Mohammed, 2009; Priest et al., 2013). Chronic exposure to discrimination can set in motion a series of cardiovascular and neuroendocrine

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http://dx.doi.org/10.1016/j.psyneuen.2014.08.023
0306-4530/

responses that may contribute to widening health disparities in the US (Meyers, 2009). While previous studies have linked self-reported discrimination and cardiovascular functioning (Harrell et al., 2003; Steffen et al., 2003; Mendes et al., 2008), very few studies have examined the relation between discrimination and one of the body's major stress response systems, the hypothalamic–pituitary–adrenal (HPA) axis. The current study examined associations between self-reported discrimination and HPA axis functioning in a diverse sample of young adults.

The biopsychosocial model of cumulative vulnerability and minority health suggests that discrimination activates a range of physiological processes, including the HPA axis (Clark et al., 1999; Meyers, 2009). When a stressor is perceived, a complex cascade of events occurs, involving the hypothalamus, the pituitary gland, and the adrenal cortex, resulting in the release of cortisol (Johnson et al., 1992; de Kloet and Derijk, 2004). The HPA axis is equipped with feedback mechanisms that reduce the stress-related release of cortisol when the individual no longer perceives the situation to be stressful (Chrousos and Gold, 1992). In addition to responding to environmental stimuli, cortisol levels are also released according to a strong diurnal rhythm; levels are high upon waking, increase by 50–60% in the first 30–40 min after waking [known as cortisol awakening response (CAR)], and then rapidly decline throughout the day, reaching their lowest point around midnight (Pruessner et al., 1997). Periodic activation of the HPA axis is considered adaptive and necessary to cope with acute stress; however, when the HPA axis response is persistent, both acute and chronic alterations in diurnal cortisol rhythms can be found.

Changes in the rate of decline in cortisol from waking to bedtime (referred to as the diurnal cortisol slope) represent an important indicator of a stress-related alteration of the diurnal cortisol rhythm (Adam and Kumari, 2009). Both acute and chronic stress exposures have been linked to flatter diurnal cortisol slopes (Steffen et al., 2003; Miller et al., 2002, 2007; Suglia et al., 2010; Adam, 2012) and flatter cortisol slopes have been linked to worse mental health (Havermans et al., 2011), higher fatigue (Bower et al., 2005), increased breast cancer mortality (Sephton et al., 2000), and cardiovascular disease (Matthews et al., 2006). These findings are in line with theoretical models suggesting that environmental factors contribute to alterations in the diurnal functioning of the HPA axis, and that changes in diurnal slopes are likely key mediators linking environmental stressors to health outcomes (e.g., Gunnar and Quevedo, 2007; Adam and Kumari, 2009).

Very few empirical studies have examined the link between self-reported discrimination and diurnal cortisol slopes. This is surprising given that prior work suggests that stressors that are characterized as uncontrollable and socially evaluative, both of which apply to perceptions of discrimination, are some of the strongest activators of the HPA axis (Dickerson and Kemeny, 2004). In a study of young adults, Skinner et al. (2011) examined the relation between a variety of environmental stressors, which included discrimination, and diurnal cortisol among White and African American adolescents and found that perceived discrimination related to flatter diurnal cortisol slopes among all youth. In contrast, a study examining White and African American adults found that discrimination related to flatter diurnal cortisol slopes in White adults, but steeper diurnal cortisol slopes in African American adults (Fuller-Rowell et al., 2012).

From a general stress and coping perspective (Compas, 1987; Trawalter et al., 2009), experiences of discrimination should be considered stressful regardless of the group membership upon which that discrimination was based (e.g., gender, race, ethnicity, and age). For racial and ethnic minority individuals, however, experiences of discrimination are more common. Estimates among adults suggest that roughly 3% of Non-Hispanic Whites endorsed experiencing day-to-day discrimination as *often*, whereas 25% of African Americans and 17% of other racial/ethnic minorities endorsed experiencing day-to-day discrimination as *often* (Kessler et al., 1999). More recent estimates, that include Hispanic adults, suggest a similar pattern in regards to differences between Non-Hispanic Whites and ethnic/racial minorities; 32% of African American and 27% of US-born Hispanic adults reported experiences of lifetime discrimination, whereas only 13% of Non-Hispanic Whites reported such experiences (Sternthal et al., 2011). In addition to discrimination being more common, the historical mistreatment, prejudices, and oppression within US society could make experiences of discrimination particularly relevant and impactful among racial and ethnic minority individuals (Branscombe et al., 1999; Feagin et al., 2001), increasing the extent to which such experiences are embodied as alterations in stress physiology and negative health outcomes.

The current study examined the relation of self-reported discrimination and diurnal cortisol slopes in a multiracial/ethnic young adult sample. We first examined the relation between discrimination and diurnal cortisol slopes for all individuals, hypothesizing that self-reported discrimination would relate to flatter diurnal cortisol slopes. Next, we examined the moderating role of racial/ethnic minority status, hypothesizing that the relation between self-reported discrimination and diurnal cortisol would be stronger for racial/ethnic minority individuals than majority individuals.

Methods

Participants

Data for the current study come from a larger two-site longitudinal project focused on young adults' risk factors for internalizing disorders. A complete description of this project's participants and recruitment procedures are reported by Zinbarg et al. (2010). High school juniors from two diverse public high schools in suburban Chicago and Los Angeles were screened and selected for the study based on their neuroticism score from the Revised Eysenck Personality Questionnaire (Eysenck et al., 1985). Individuals who scored high on the measure were oversampled, resulting in a group of 627 (69% female) who completed baseline interviews and questionnaires. The greater proportion of females over males is accounted for by the fact that individuals with high levels of neuroticism were oversampled, and females are, on average, higher on this personality trait (Costa et al., 2001). Of those participants, two-thirds of individuals were randomly invited to participate in the initial cortisol