Psychoneuroendocrinology (2014) 40, 27—36

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Burnout symptom sub-types and cortisol profiles: What's burning most?

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Received 18 April 2013; received in revised form 18 October 2013; accepted 21 October 2013

KEYWORDS
Burnout;
Cortisol;
Cortisol awakening response;
Cynicism;
Emotional exhaustion;
Maslach Burnout Inventory;
Professional inefficacy;
Workplace stress

Summary The current study assessed which specific burnout symptoms were most predictive of distinct diurnal cortisol profiles. Participants included 401 day-shift workers employed in a random sampling of 34 Canadian workplaces. The 16-item Maslach Burnout Inventory was used to extract burnout sub-scales that included emotional exhaustion, cynicism, professional inefficacy, as well as a global burnout average. Consenting workers provided five saliva samples a day (awaking, 30 min after awaking, 1400 h, 1600 h, and bedtime) repeated three times over the course of a week (Saturday, Tuesday, Thursday) to capture workday and non-workday variations. Multilevel regression models were estimated from cortisol measurements at each occasion within a day at level-1, workers at level-2, and workplaces at level-3. Multilevel regression analyses found that emotional exhaustion and a global burnout showed the strongest and consistent negative associations to cortisol in the afternoon and evening. In a separate analysis using regression coefficients, emotional exhaustion and a global burnout average were associated with low cortisol levels 30 min upon awakening. By contrast, professional inefficacy was associated only with lower bedtime cortisol. No associations were detected for cynicism and sex did not emerge as a moderator in secondary analyses. Our findings are discussed in a theoretical framework postulating different pathophysiological stages of burnout development. Specifically, professional inefficacy may be the earliest warning signal culminating with emotional exhaustion that may dampen diurnal cortisol levels.

1. Introduction

Burnout is an enigmatic psychological condition with elusive biological correlates. In accordance, a systematic review of 31 burnout studies incorporating 38 different biomarkers

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0306-4530/$ — see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.psyneuen.2013.10.011

suggest that there is no clear-cut biological signature of burnout due to methodological inconsistencies and vast heterogeneity of this ill-defined syndrome (Danhof-Pont et al., 2011). The term ''burn-out'' originated with the personal and professional observations of Freudenberger, a psychoanalyst who described diverse behavioural, emotional, and cognitive debilitations among overcommitted community workers (Freudenberger, 1974). Despite continued debate on the nature of burnout and whether it symptomatically overlaps with other diagnosable psychopathologies like depression or adjustment disorder (Kaschka et al., 2011), growing psychoneuroendocrine evidence suggests that burnout may be associated with distinct alterations in diurnal *hypothalamic-pituitary-adrenal* (HPA) axis production of the stress hormone cortisol.

Cortisol levels normally follow a diurnal rhythm consisting of an acute increase during the first hour after awakening (Pruessner et al., 1997) — known as the *cortisol awakening response* (CAR) — followed thereafter by gradual decreases until attaining the lowest levels around bedtime (Clow et al., 2010a). A meta-analysis of 62 studies recently concluded that while the CAR is positively associated with workplace stress and general life stress, it is negatively associated with symptoms of burnout, fatigue, and exhaustion (Chida and Steptoe, 2009). One of the greatest challenges in deciphering burnout's manifestations, however, is to first identify which specific symptom clusters are most prominently associated with HPA-axis functioning.

Continuing debate centres on whether burnout symptomatologies correspond with hypoactive HPA-axis functioning. Hypocortisolism is a phenomenon that occurs in approximately 20—25% of patients suffering from stress-related diseases like burnout, chronic fatigue syndrome, fibromyalgia, post-traumatic stress disorder, and atypical depression to name a few (for a review, see Fries et al., 2005). Of particular interest are nuances among depression and burnout, two conditions that are qualitatively similar (Tennant, 2001; Iacovides et al., 2003; Nyklicek and Pop, 2005), but suspected to differ substantially in terms of cortisol levels. Studies aiming to delineate distinct cortisol profiles (e.g., awakening concentrations, CAR magnitude, differential afternoon and bedtime concentrations) must first incorporate established operational definitions of burnout.

According to Maslach's seminal formulation and psychometric substantiation, burnout comprises three symptom sub-types: (1) *emotional exhaustion* characterized by one's fatigued inability to occupationally offer oneself affectively; (2) *cynicism* characterized by a distancing attitude or depersonalization away from one's work; and (3) *professional inefficacy* characterized by the inability to perform tasks as adequately as before (Maslach and Jackson, 1981). Of these three popular Maslach burnout sub-types, emotional exhaustion is the most widely reported in the occupational health literature (Maslach et al., 2001). By contrast, there is no consensus on which biomarkers are most consistently associated to Maslach burnout sub-types (Danhof-Pont et al., 2011).

To address this lacuna, the current study assessed whether emotional exhaustion, cynicism, professional inefficacy, and a global burnout average were most predictive of diurnal cortisol concentrations in a representative sample of healthy day-shift workers randomly selected from diverse workplaces and industries. Focus was placed on statistical magnitude in specific Maslach burnout sub-types comparisons with overall HPA-axis activities as well as at precise diurnal time-points. Two approaches were applied: (1) a multilevel regression approach to model cortisol and (2) a cut-off approach based on regression information to help illustrate cortisol patterns according to burnout symptomatologies. Our primary hypothesis was that emotional exhaustion would be most significantly correlated with distinct HPA-axis functioning.

In secondary analyses, we assessed the moderation effect of sex using interaction terms. This was justified because of known inequalities in the distribution of occupations and differential exposure to unique stressors within diverse workplaces that render Canadian women more vulnerable than men to stress-related health problems (Vermeulen and Mustard, 2000; Marchand et al., 2005a, 2005b, 2005c).

2. Methods

2.1. Participants

Data were collected throughout 2009 to 2012 using a sample of 34 Canadian workplaces randomly selected from a list of over 500 companies insured by a large insurance company. For each workplace, a random sample of employees was first selected to answer a questionnaire (N = 1301 workers, average response rate of 66.7%, range 55.3—95.5%). From among these respondents, a sample of 10 to 15 workers per workplace was targeted to participate in the second phase of the research project whereby saliva samples were collected for assessment of cortisol levels in accordance with a previous approach (Marchand et al., 2013).

Overall, 1043 workers were re-invited, of which 401 workers agreed to participate in the current biomarker sub-study (mean of 11.8 workers per workplace, response rate of 39.9%). Women represented 56.1% of workers and the mean age of the entire sample was 41.3 years (SD = 10.81, range 19—69). Participants provided informed consent and were given detailed study instructions. The study protocol for the first and second phase of the research project was approved by the Ethics Committees of the University of Montreal, McGill University, Laval University, Bishops University, and Concordia University.

2.2. Saliva sampling and cortisol determination

Consenting workers were instructed to provide five saliva samples per day at the following occasions as previously done by our group in order to discern diurnal cortisol levels (Juster et al., 2011): (1) awaking, (2) 30 min post-awaking, (3) 1400 h, (4) 1600 h, and (5) bedtime. Because sampling occurred during the workday afternoon and could cause inconvenience, we instructed participants to be as exact as conveniently possible.

Sampling was repeated for 3 days (Saturday, Tuesday, Thursday for the majority of workers) over the course of 1 week to best account for workday and non-workday variability (Kunz-Ebrecht et al., 2004). In total, 94.9% reported that the weekend day (Saturday) was their rest day, while 5.1% reported that a weekday (Tuesday or Thursday) was their rest day which were carefully coded accordingly.