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Are changes in workplace bullying status related to changes in salivary cortisol? A longitudinal study among Danish employees

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ABSTRACT

Objectives: This study aims to investigate whether incident workplace bullying and its dicontinuance is related to subsequent change in morning and evening saliva cortisol concentrations.
Methods: Participants came from two Danish cohort studies, the PRISME cohort (n = 4489) and the Workplace Bullying and Harassment Cohort (n = 3707). At baseline and follow-up exposure to bullying was measured by a single question on bullying (preceded by a definition). Two saliva samples to measure cortisol were collected during a work-day (30 min after awakening and at 8 p.m.). All participants responding to the item on workplace bullying, giving saliva samples and participated at both baseline and follow-up were included. The reference group consisted of non-bullied respondents at both baseline and follow-up. Multilevel mixed-effects linear regressions were used to test for changes in salivary cortisol after newly onset of and discontinuance of workplace bullying. All analyses were adjusted for the potentially confounding effect of differences from baseline to follow-up in education, smoking, alcohol consumption, body mass index, cohort, sampling waves, time of awakening, and time of sampling.
Results: We found no indication of statistically significant difference in saliva cortisol, neither when participants changed their self-labelling from not bullied at baseline to being bullied at follow-up, nor when they at follow-up two years later reported discontinuance of bullying.
Conclusion: This longitudinal study on the impact of changes in bullying status on change in cortisol levels showed consistent lack of associations with onset and discontinuance of workplace bullying.

Introduction

Workplace bullying is often found in settings with a poor psychosocial working environment, and previous research has shown prospective association between exposure to bullying at work and employees health and well-being [11,16,18]. In occupational epidemiology, workplace bullying has been defined by Einarsen and co-workers [4] as harassing, offending, socially excluding, or negatively affecting someone's work. In order for the label 'bullying' to be applied to a particular activity, interaction, or process, the bullying behaviour has to occur repeatedly and regularly over a longer period (e.g. six months) [5].

Being bullied involves loss of control, lack of predictability, and negative feedback — all of which are central factors in the regulation of emotion and/or physiological arousal. For example, in their theoretical model Dickerson and Kemeny [3] proposed that a social threat can be accompanied by a specific set of psychological and physiological responses, including a cortisol increase. However, Dickerson and Kemeny reviewed laboratory studies of acute psychological stressors. Workplace bullying is considered being a lasting phenomenon with potential long-term health effects [6]. Indeed, the chronicity of workplace bullying is often implied in the operational definitions by emphasizing the long term perspective already in the phrasing of the question. Accordingly, workplace bullying may be related to chronic stress reactions. Chronic

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stress is presumed to be mediated by sustained and excessive activation of the stress response, which simultaneously influences the multiple homeostatic systems [2]. Sustained and excessive activation may affect physiological systems whose mediators are developed to be secreted in a quantity-limited and time-limited fashion but have gone awry [2]. According to Chrousos, the response to a chronic stress exposure may at first be an increased cortisol secretion that later switches to become a decreased secretion of cortisol, pointing in the direction of a defective reaction.

To date, one small cross-over observational study and three cross-sectional studies on associations between workplace bullying and saliva cortisol concentrations have been published [13,14,17,22]. The cross-over observational study is a pilot study of 16 victims of workplace bullying that found indications of attenuated decrease of cortisol after the morning peak on work-days compared to days off [22]. However, in the absence of a reference group, it is not known whether this difference in diurnal saliva profile is due to workplace bullying. Hansen et al. [14] included employees (n = 437) from different occupations. In a group of bullied persons (n = 22) they found a 30% (CI = 1; 50%) lower cortisol concentration at awakening and a non-significantly lower cortisol concentration (7% (CI = −2; 82%)) 45 min after awakening and no change in the evening. Another study by Hansen and co-workers among 1944 employees (1413 women and 531 men) from 55 workplaces in Denmark (16 private and 39 public workplaces) showed that frequently bullied employees (n = 22) had 24.8% (β: 0.75; CI = 0.62; 0.91) lower cortisol concentrations compared to the reference group [13]. Hogh et al. [17] found significantly reduced levels of cortisol concentration on exposure to direct harassment (10%) and intimidating behaviour (12%). Overall, the evidence is not supportive of the Dickerson and Kemney's theoretical model and indicates reduced saliva cortisol levels in employees perceiving themselves as bullied at the workplace. Further, the causal direction, if any, cannot be deduced from the cross-sectional analyses and to our knowledge, no studies have so far documented the effects in a longitudinal design.

To expand the knowledge on the relationship between workplace bullying and physiological stress reactions, we investigated changes in exposure to workplace bullying and changes in cortisol concentrations in two longitudinal designs. The aim of this study is thus to investigate whether a change in status of workplace bullying is related to subsequent change in morning and evening saliva cortisol concentrations and whether cortisol concentrations change after discontinuance of workplace bullying.

Methods

This longitudinal study is based on two extant Danish cohorts, the Workplace Bullying and Harassment Cohort (WBH) and the PRISME cohort [11]. The WBH cohort enrolled employees from public and private workplaces throughout Denmark. The cohort was established in 2006 (n = 7358, response rate 42%) and re-examined in 2008 (n = 3707, follow-up response rate 60%) [15]. The PRISME cohort comprised hospital and civil-service employees from workplaces in the Central Denmark Region. The PRISME cohort was established in 2007 (n = 10,036, response rate 45%) and re-examined in 2009 (n = 4489, response rate 72%) [9,10,20,21]. In 2011, the WBH- and the PRISME baseline cohorts were combined into a joint study, called the MODENA cohort, and re-examined with a new questionnaire (n = 3707, response rate 60%, n = 4489, response rate 73%, respectively). In the WBH and PRISME cohorts and in all waves, the participants received a questionnaire measuring workplace bullying, social and family life, education, and health, and a kit for measurement of saliva cortisol in the morning and evening. In the MODENA cohort in 2011, participants were invited to give saliva samples if the respondent reported exposure to at least one out of 11 negative acts of potential bullying behaviour weekly or more frequently, or perceived workplace bullying monthly or more often during the past 12 months (n = 207). We also invited a random sample of all respondents to the MODENA questionnaire to collect saliva samples (n = 220). Non-respondents at follow-up were 43 (46.7%) of the frequently bullied, 321 (50.4%) of the occasionally bullied, and 2857 (40.8%) of the non-bullied. A total of 324 participants gave saliva samples in 2011. Participants were included if they responded to the question on workplace bullying and delivered saliva samples on at least two waves two years apart. In order to study onset of workplace bullying, we identified 3589 participants that were never bullied at baseline, and of these 3397 continued to be not bullied, 173 changed to being bullied occasionally, and 19 to frequently bullied. To study discontinuance of workplace bullying, we identified 180 participants that were no longer bullied occasionally and 27 that changed from being frequently bullied to not being bullied. Some respondents participated at three occasions and these respondents were included in the analyses with two courses. This was the case if a participant which were not bullied in 2006/7 and 2008/9 and bullied in 2011 were included in the reference group with one course 2006/7 and 2008/9 and a second course in the new onset of bullying from 2008/9 to 2011 group. The study protocol was approved by the local ethics committee (H-2-2010-119).

Measures of self-labelled workplace bullying.

Questions on bullying was preceded by a description of bullying similar to the definition by Einarsen et al. [4]: "*Bullying occurs when one or more persons repeatedly over a longer period, are exposed to unpleasant or negative acts or behaviours at work, that it is difficult to defend oneself against*". Then they were asked: "*Have you been exposed to bullying at your current workplace within the last 6 months*?" The five response categories were: never, now and then, monthly, weekly, and daily (in the MODENA cohort, the response categories referred to the last 12 months). Based on these categories we constructed a three-level variable with the following categories: Not bullied, Occasional bullying (now and then and monthly), and Frequent bullying (comprising the response categories weekly and daily).

Collection of saliva samples.

In the first two waves 2006/2007 and 2008/2009 saliva samples were collected with Salivette®,containing a cotton swab, and the respondents filled in a short questionnaire on sleep, medication, and intake of alcohol at the day of sampling. A written instruction emphasized that swabs should be kept in the mouth until thoroughly saturated. Samples were to be stored in a refrigerator until returned by mail. The samples were then stored at −20 °C and analyzed within six months. For both cohorts, at all occasions, respondents were instructed to provide two saliva samples, the first sample was provided in the morning 30 min after awakening and the second sample in the evening at 20:00. In 2011, the participant collected saliva samples by spitting directly into Salivette® without swabs but following the same procedure as described above. We excluded 42 morning and 17 evening saliva samples with measured cortisol concentration higher than100 nmol/l. We included only morning samples delivered between 4 and 10 am and evening samples delivered between 6 PM and 2 AM. We calculated the change (baseline to follow-up) in morning and evening cortisol concentrations among participants who changed from not bullied at one examination to occasionally (n = 159) or frequently bullied (n = 19) at the subsequent examination two years later and compared to participants who were not bullied at any of the two subsequent examinations (n = 3309). For analyses of change in morning and evening cortisol concentration following discontinuance of bullying we also calculated the change from baseline to follow-up in morning and evening cortisol concentration among participants, who changed status from occasionally bullied (n = 172) or frequently bullied (n = 22) at baseline to not bullied at follow-up and compared with participants who did not perceive themselves as bullied at neither baseline nor follow-up (n = 3131) (Fig. 1). Of the participants 113, were bullied at the