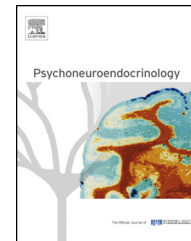




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Sex-specific effects of mindfulness on romantic partners' cortisol responses to conflict and relations with psychological adjustment



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Received 13 April 2013; received in revised form 29 July 2013; accepted 29 July 2013

KEYWORDS

Mindfulness;
HPA;
Cortisol;
Couples;
Interpersonal stress;
Depression;
Well-being;
Sex difference

Abstract Mindfulness is known to improve individuals' and couples' subjective stress regulation, but little is known about how it impacts hypothalamic–pituitary–adrenal (HPA) axis responses to acute psychosocial stress. The current study tested effects of dispositional mindfulness facets on young adult couples' cortisol responses to a conflict discussion stressor, as well as associations with psychological adjustment. One hundred heterosexual couples completed the five facet mindfulness questionnaire one week before engaging in a conflict discussion task. Each partner provided five saliva samples from pre- to post-conflict, which were assayed for cortisol. Measures of adjustment – depression and anxiety symptoms and global well-being – were also completed at this session. Hierarchical linear modeling of cortisol trajectories revealed sex-specific effects; whereas women's mindfulness (nonreactivity facet) predicted higher conflict stress cortisol levels, men's mindfulness (describing facet) predicted less pronounced cortisol reactivity/recovery curves. These patterns were related to better adjustment—lower depression symptoms for women and greater well-being for men. Implications for sex differences in mindfulness benefits are discussed.

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The cultivation of mindfulness – defined as intentional present-moment, nonjudgmental awareness (Kabat-Zinn, 1990) – shows promise for enhancing the well-being of individuals and couples (Keng et al., 2011; Barnes et al., 2007). In particular, mindfulness-based interventions increase mindful

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qualities such as attentional control, emotional awareness, and nonreactivity to thoughts and feelings, which help people regulate their subjective and neural responses to stressful stimuli (e.g., [Creswell et al., 2007](#); [Farb et al., 2012](#); [Hölzel et al., 2011](#)). Rather than simply dampening responses, this research suggests mindfulness helps people respond appropriately to the situation at hand, neither minimizing nor amplifying the experience. However, there is little available information regarding the impact of mindfulness on acute responsiveness of the major neuroendocrine stress system, the hypothalamic–pituitary–adrenal (HPA) axis. Given well established links between HPA reactivity/recovery and both mental and physical health ([Danese and McEwen, 2012](#); [Golden, 2007](#); [Palazidou, 2012](#)), it is important to discern how mindfulness shapes HPA response to psychosocial stressors encountered in daily life. The current study was designed to assess effects of dispositional mindfulness on young adult romantic partners' HPA responses to conflict stress. Secondly, relations between HPA responses and partners' psychological adjustment were examined to contextualize mindfulness-related effects.

Initial evidence for associations between mindfulness and stress physiology is mixed, likely because of variability in sample characteristics (i.e., healthy college students vs. cancer patients vs. long-term meditators), operationalizations of mindfulness (i.e., self-report measures vs. mindfulness-based intervention effects vs. meditation practice effects), and stress measurement ([Matousek et al., 2010](#)). The majority of previous mindfulness–HPA studies have measured diurnal cortisol levels. Whereas some research demonstrates reductions in cortisol output following mindfulness intervention ([Brand et al., 2012](#); [Carlson et al., 2007](#); [Jensen et al., 2012](#); but see [Gex-Fabry et al., 2012](#); [Lengacher et al., 2012](#); [Lipschitz et al., 2013](#) for null effects), other studies show increases in cortisol and/or a mix of increasing and decreasing trajectories from pre–post intervention ([Bränström et al., 2013](#); [Carlson et al., 2004](#); [Matousek et al., 2011](#)). The latter findings have been interpreted as a normalization of HPA function because those with higher initial levels tend to decrease, whereas those with lower initial levels tend to increase. Although these studies differ in focus on afternoon/evening cortisol vs. cortisol awakening response, they converge in showing that mindfulness intervention-related HPA changes are accompanied by improvements in subjective stress, quality of life, and psychological and somatic symptoms. What is largely missing from this literature is an understanding of how mindfulness impacts acute responses to psychosocial stressors. Furthermore, most prior research has focused on group-wide pre–post intervention changes, rather than on individual differences in self-reported mindfulness, even though the latter may be more decisive for effects on the HPA axis ([Jacobs et al., 2013](#)).

To our knowledge, only a handful of studies have addressed effects of mindfulness on cortisol during acute stress, and only one demonstrated a link between dispositional mindfulness and psychosocial stress response. Specifically, participation in a brief mindfulness intervention predicted lower cortisol responses to cognitive stress (a mental arithmetic task) in one study ([Tang et al., 2007](#)), whereas another study using a similar stressor (mental arithmetic plus speech tasks without direct social evaluation)

showed reduced blood pressure, but no differences in cortisol ([Nyklíček et al., 2013](#)). Finally, the one study involving a psychosocial stress task (the Trier Social Stress Test; TSST) revealed lower cortisol reactivity, anxiety and negative affect among participants higher in self-reported mindfulness ([Brown et al., 2012](#)). These findings offer preliminary support for the stress-buffering role of mindfulness, though many questions remain. One question is whether mindfulness affects cortisol in response to common interpersonal stressors, which may elicit different responses than performance stressors such as the TSST ([Stroud et al., 2009](#)). Because the [Brown et al., 2012](#) study used an overall mindfulness score, it is also unknown whether particular aspects of the larger construct of mindfulness – i.e., nonreactivity to and non-judgment of internal experience, the ability to observe and describe one's experiences, and acting with awareness ([Baer et al., 2006](#)) – are especially important for HPA regulation. Finally, Brown's study comprised a mostly female (82%) sample. Given that cortisol responses may vary by sex, particularly in the context of interpersonal stress (see [Stroud et al., 2002](#)), it is important to examine mindfulness effects separately in men and women.

Sex differences may especially matter in determining what constitutes a “good” cortisol response. There are mixed indications for which response parameters are problematic—high or low cortisol levels during stress and lack of recovery following stress have all been linked to mental health problems, including depression, anxiety, and post-traumatic symptoms ([Burke et al., 2005](#); [Graeff, 2007](#); [Morris et al., 2012](#)). Among other moderators of cortisol-adjustment links, sex appears to matter; while young women reporting elevated depression symptoms showed lower cortisol levels and a blunted reactivity/recovery curve in response to romantic conflict, young men with elevated depression symptoms showed the opposite pattern of higher cortisol levels ([Powers et al.](#), unpublished observations). Besides underlining the importance of sex differences, this research supports modeling the entire response trajectory to discern adjustment-relevant effects not only on cortisol levels, but also on dynamics of reactivity/recovery.

In the present study we tested effects of dispositional mindfulness facets on young adult couples' cortisol trajectories in response to romantic conflict. To better understand the mental health implications of any mindfulness effects, we also examined associations between young men's and women's cortisol responses and measures of psychological adjustment—depression and anxiety symptoms and global well-being. We were particularly interested in possible sex differences in paths between mindfulness and cortisol, and between cortisol and adjustment. We hypothesized that mindfulness would predict lower cortisol for men, but higher cortisol and sharper reactivity/recovery curves for women, which would relate to lower symptoms and greater well-being. We further hypothesized that nonreactivity and non-judgment facets would most strongly predict partners' stress responses, given previous evidence for their role in well-being in non-meditator samples ([Baer et al., 2008](#)). In the absence of previous research examining sex differences in the effects of specific mindfulness facets, we made no a priori hypotheses about which facets would relate differently to cortisol for men vs. women.

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