



# Psychoendocrine validation of a short measure for assessment of perceived stress management skills in different non-clinical populations

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## Summary

**Background:** We investigated the psychometric properties of a short questionnaire for combined assessment of different perceived stress management skills in the general population and tested whether scores relate to physiological stress reactivity.

**Methods:** For psychometric evaluation, we determined the factor structure of the questionnaire and investigated its measurement invariance in the participant groups and over time in three different independent samples representing the general population (total  $N = 332$ ). Reliability was tested by estimating test–retest reliability, internal consistency, and item reliabilities. We examined convergent and criterion validity using selected criterion variables. For endocrine validation, 35 healthy non-smoking and medication-free men in a laboratory study and 35 male and female employees in a workplace study underwent an acute standardized psychosocial stress task. We assessed stress management skills and measured salivary cortisol before and several times up to 60 min (workplace study) and 120 min (laboratory study) after stress. Potential confounders were controlled.

**Results:** The factor structure of the questionnaire consists of five scales reflecting acceptably distinct stress management skills such as cognitive strategies, use of social support, relaxation strategies, anger regulation, and perception of bodily tension. This factor structure was stable across participant groups and over time. Internal consistencies, item reliabilities, and test–retest

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reliabilities met established statistical requirements. Convergent and criterion validity were also established. In both endocrine validation studies, higher stress management skills were independently associated with lower cortisol stress reactivity ( $p$ 's < .029).

*Conclusions:* Our findings suggest that the questionnaire has good psychometric properties and that it relates to subjective psychological and objective physiological stress indicators. Therefore, the instrument seems a suitable measure for differential assessment of stress management skills in the general population.

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## 1. Introduction

Accumulating evidence suggests adverse health effects of psychosocial stress, particularly if strenuous and repeated. In particular, large-magnitude physiological reactions to acute stressors have been implicated with poor health outcomes across several health conditions and particularly in cardiovascular disease (Holmes et al., 2006; Brotman et al., 2007; Chida and Steptoe, 2010).

Physiological stress reactivity has been shown to relate to psychological factors. An important identified psychological determinant of physiological stress reactivity is the cognitive appraisal of the stressful situation as proposed by Lazarus and Folkman (Lazarus and Folkman, 1984; Gaab et al., 2005). According to these investigators, the overall stress appraisal results from two cognitive appraisal processes, namely primary and secondary stress appraisals. While an individual's primary stress appraisal comprises perceived threat and challenge of a given stressful situation, secondary appraisal involves an evaluation of "what might and can be done" (Lazarus and Folkman, 1984) and reflects the individual's resources to master the stressful situation. Our group previously found that anticipatory cognitive stress appraisal determines the extent of an individual's hypothalamus–pituitary–adrenal (HPA)-axis reactivity to a potent standardized psychosocial stressor (Gaab et al., 2005). In contrast, social support has been suggested to maintain or even improve health by reducing psychobiological reactivity to stressors (Lepore, 1998; Christenfeld and Gerin, 2000). Indeed, various findings suggest that social support attenuates a variety of psychological and physiological stress responses (Seeman and McEwen, 1996; Uchino et al., 1996; Christenfeld and Gerin, 2000; Heinrichs et al., 2003; Uchino, 2006; Wirtz et al., 2006, 2009; Nausheen et al., 2007), whereas loneliness or social inhibition are associated with heightened psychobiological stress responses (Habra et al., 2003; Nausheen et al., 2007). Furthermore, poor anger regulation as indicated by higher aggression, hostility, or outwardly negatively expressed anger (anger-out) has been associated with heightened physiological reactivity to mental stress, particularly of the cardiovascular system (Chida and Hamer, 2008). These examples suggest that psychological and physiological stress responses may depend on the extent to which an individual can engage in several processes known to modulate the effects of stress.

Consequently, many current stress management interventions aim at training stress management skills by modulating psychological determinants and correlates of physiological stress reactivity. Typical stress management techniques include providing cognitive strategies such as cognitive restructuring, self-instructions, and systematic problem

solving (Meichenbaum, 1985, 1991; Kaluza, 1996; Siegrist and Silberhorn, 1998; Wagner-Link, 2001; Gaab et al., 2003; Hammerfeld et al., 2006) intended to modulate the cognitive stress appraisal processes to allow for optimal coping with a given stressful situation. Indeed, training individuals with cognitive strategies reduced anticipatory cognitive stress appraisal of a standardized stress situation which in turn predicted lower HPA-axis responses to a standardized psychosocial stressor (Gaab et al., 2003; Hammerfeld et al., 2006). Additional components of current stress management interventions include training of social skills (Reschke and Schröder, 2000; Wagner-Link, 2001; Hinsch and Pflingsten, 2007), or anger regulation skills (Siegrist and Silberhorn, 1998; Wiegand et al., 2000). The former aims at improving a person's potential to successfully initiate and maintain social contacts and thus increase perceived and given social support. The latter usually aims at reducing feelings of anger and uncontrolled outward anger expression either by cognitive restructuring (in unchangeable situations) or by assertive behavior (in changeable situations). Relaxation techniques such as progressive muscle relaxation have been shown to acutely decrease activity of stress-responsive systems and thus possibly prepare for either active stress management or regeneration (Crues et al., 2000; Pawlow and Jones, 2002, 2005). Moreover, awareness of bodily tension is often integrated in stress management interventions (Meichenbaum, 1985, 1991; Gaab et al., 2003; Hammerfeld et al., 2006). This component is likely to function as an indicator of the current stress level that does not per se reduce perceived stress but most likely serves as a cue to stimulate the active use of other stress management techniques by creating awareness of adverse effects of stress such as bodily tension.

Despite a number of studies documenting the psychological and physiological adverse effects of stress, and the role that several psychosocial processes (e.g., cognitive restructuring, emotional expression, ability to relax) may play in modulating such negative effects, there is no published standardized single instrument for assessment of stress management skills in the general population. Any such instrument should optimally be reliable, valid, and short. The only hitherto existing instrument whose items address relevant stress management skills is the "Measure of Current Status" (MOCS), a 17-item questionnaire in English language by Carver (2005) that has been developed for use in cancer patients. This scale showed adequate factor structure and internal consistency in samples of cancer patients and thus provided promising results (Penedo et al., 2003, 2004, 2006; Antoni et al., 2006). However, psychometric qualities of the instrument in non-cancer and non-clinical samples that more likely represent the general population have not yet been investigated.

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