



## Acute psychosocial stress and everyday moral decision-making in young healthy men: The impact of cortisol



Nina Singer<sup>a</sup>, Monika Sommer<sup>b,c</sup>, Katrin Döhnel<sup>b</sup>, Sandra Zänkert<sup>a</sup>, Stefan Wüst<sup>a</sup>, Brigitte M. Kudielka<sup>a,\*</sup>

<sup>a</sup> Department of Medical Psychology, Psychological Diagnostics and Research Methodology, University of Regensburg, Universitätsstrasse 31, 93053 Regensburg, Germany

<sup>b</sup> Department of Psychiatry and Psychotherapy, University of Regensburg, Universitätsstrasse 84, 93053 Regensburg, Germany

<sup>c</sup> Department of Psychology, Ludwig-Maximilians-University of Munich, Leopoldstrasse 13, 80802 Munich, Germany

### ARTICLE INFO

#### Article history:

Received 22 November 2016

Revised 4 April 2017

Accepted 6 May 2017

Available online xxxxx

#### Keywords:

Everyday moral decision-making

Acute psychosocial stress

Salivary cortisol

Social decision-making

Hypothalamic-pituitary-adrenal (HPA) axis

Trier Social Stress Test (TSST)

Placebo Trier Social Stress Test (PTSST)

Altruistic decisions

Egoistic decisions

Prosocial behavior

### ABSTRACT

In everyday life, moral decisions must frequently be made under acute stress. Although there is increasing evidence that both stress and cortisol affect moral judgment and behavior as well as decision-making in various domains unrelated to morality, surprisingly few attempts have been made to explore the effects of stress on everyday moral decision-making. Therefore, in the present study, we exposed 50 young healthy men to the Trier Social Stress Test (TSST) or its non-stressful placebo version (PTSST). We investigated the impact of acute stress exposure and stress-related cortisol levels on decision-making, decision certainty, and emotions in 28 everyday moral conflict situations with altruistic versus egoistic response alternatives. Results showed that the TSST-exposed group made more altruistic decisions than the non-stress control group, while groups did not differ in decision certainty and emotion ratings. Moreover, in correlational as well as regression analyses, additionally controlling for confounding variables, we observed significant positive associations between cortisol levels and altruistic decision-making. Further analyses revealed that altruistic decisions came along with significantly higher decision certainty and significantly more positive emotion ratings than egoistic decisions. Notably, our data also raise the idea that the personality trait agreeableness plays an important role in everyday moral decision-making. In sum, our findings provide initial evidence that both acute stress exposure and cortisol levels have prosocial effects on everyday moral decision-making in young healthy men.

© 2017 Elsevier Inc. All rights reserved.

### 1. Introduction

In everyday life, moral decisions must frequently be made under acute stress or can be stress-eliciting themselves, as for instance when seeking the best decision in an emergency situation (e.g., Kälvmemark et al., 2004; Starcke and Brand, 2012). In psychoneuroendocrinology, acute stress refers to a cascade of neurohormonal and metabolic responses to situations that are characterized by unpredictability and uncontrollability (Koolhaas et al., 2011), leading to a rapid activation of the sympathetic nervous system and to a somewhat slower activation of the hypothalamic-pituitary-adrenal (HPA) axis with its hormonal end product cortisol. There is increasing evidence that both stress and cortisol affect moral judgment and behavior (Kossowska et al., 2016; Starcke et al., 2011, 2012; Youssef et al., 2012) as well as decision-making in various domains unrelated to morality (e.g., Margittai et al., 2016; for

reviews and a recent meta-analysis see Starcke and Brand, 2012, 2016; Yu, 2016).

Outside of the moral domain, the field of decision-making covers a wide array of heterogeneous phenomena including, for example, monetary, culinary, and social decisions (Starcke and Brand, 2016). Overall, the effects of stress on decision-making are complex and – beyond stress – many overlapping factors including valuation, risk-taking, and financial aspects additionally complicate the picture (cf., Starcke and Brand, 2012).

With regard to decision-making in the moral domain, the *Dual Process Theory of Moral Judgment* (DPTMJ; Greene et al., 2001, 2004) provides a conceptual framework for possible stress-induced differences by postulating that both cognitions and emotions play an important role in moral judgment (Greene and Haidt, 2002). The DPTMJ can be seen as a domain specific example of seminal dual process theories of decision-making, proposing that there are two routes for making decisions (a fast route and a slow route; Evans, 2008; Kahneman, 2011) and originating from the fields of economics (Kahneman, 2011), psychology (Shiffrin and Schneider, 1977 in terms of controlled and automatic processes), reinforcement learning (Dayan and Daw, 2008), and behavioral neuroscience (Dickinson, 1985). Furthermore, neuroimaging, clinical, and brain lesion studies have shown that the moral brain consists of a

\* Corresponding author.

E-mail addresses: [Nina1.Singer@stud.uni-regensburg.de](mailto:Nina1.Singer@stud.uni-regensburg.de) (N. Singer), [Monika.Sommer@medbo.de](mailto:Monika.Sommer@medbo.de) (M. Sommer), [Katrin.Doehnel@medbo.de](mailto:Katrin.Doehnel@medbo.de) (K. Döhnel), [Sandra.Zaenkert@psychologie.uni-regensburg.de](mailto:Sandra.Zaenkert@psychologie.uni-regensburg.de) (S. Zänkert), [Stefan.Wuest@psychologie.uni-regensburg.de](mailto:Stefan.Wuest@psychologie.uni-regensburg.de) (S. Wüst), [Brigitte.Kudielka@psychologie.uni-regensburg.de](mailto:Brigitte.Kudielka@psychologie.uni-regensburg.de) (B.M. Kudielka).

large network including cortical as well as subcortical anatomical structures (Fumagalli and Priori, 2012). There seems to be no brain area exclusively dedicated to moral reasoning, but rather several areas that make important contributions to moral judgments supporting both cognitive and affective processes (Greene and Haidt, 2002; Sommer et al., 2010, 2014). Importantly, some of the brain areas involved in moral decision-making (e.g., the prefrontal cortex, the anterior cingulate cortex, and the amygdala) can also be influenced by endocrine and environmental factors, as for example by stress (for reviews see Dedovic et al., 2009; Fumagalli and Priori, 2012).

So far, most previous studies on stress, cortisol, and moral decision-making (Kossowska et al., 2016; Starcke et al., 2012; Youssef et al., 2012) have used moral dilemmas, which require abstract reasoning about moral dead-or-alive situations, like the trolley problem (i.e., to decide whether to allow an uncontrollable trolley kill five people or whether to actively change the trolley's path to a track where it will kill only one person; Greene et al., 2004). However, such sacrificial dilemmas lack external and ecological validity (Bauman et al., 2014; Sommer et al., 2010) and can only hardly be transferred to situations experienced in everyday life. To the best of our knowledge, only one study (Starcke et al., 2011) has investigated so far how acute stress influences everyday moral decision-making, using 20 everyday moral dilemmas with altruistic versus egoistic response alternatives. In a mixed-sex sample, Starcke et al. (2011) did not find a significant difference in judgments between stressed and non-stressed participants, but an association between stress-induced cortisol increases and egoistic decision-making as well as a positive relationship between positive affect and altruistic decision-making in high-emotional dilemmas.

Recent research in the related domain of social decision-making has yielded heterogeneous results. Across a range of experimental paradigms (e.g., by using the *trust game*; FeldmanHall et al., 2015), it has been shown that acute stress can promote both prosocial (Buchanan and Preston, 2014; Sollberger et al., 2016; Takahashi et al., 2007; von Dawans et al., 2012) and antisocial behavior (FeldmanHall et al., 2015; Steinbeis et al., 2015) with the direction of effects probably depending on several modulating factors, such as the amount of time elapsed between stress and decision-making (Margittai et al., 2015; Vinkers et al., 2013) or task characteristics (e.g., social versus non-social nature of the task, donation task versus cooperation task, repeated design versus one-shot design; cf., Vinkers et al., 2013; von Dawans et al., 2012). In order to systematize the complex effects of stress on social decision-making, the recently proposed *Stress Induced Deliberation-to-Intuition* (SIDI) model (Yu, 2016) may prove useful. The SIDI model builds on vast existing research proposing a stress-related shift from deliberative and goal-directed to habitual and automatized behavior (e.g., Schwabe and Wolf, 2009, 2011). More precisely, it is postulated that decisions under acute stress result from an interplay of impaired cognitive control and heightened intuitive response tendencies (Yu, 2016). Concerning stress and social decision-making, the SIDI model does not entail the assumption that stress exclusively promotes prosocial or antisocial decisions. However, it is predicted that stress triggers spontaneous and innate responses (Yu, 2016), and there are some empirical findings suggesting that our first responses are prosocial actions (Rand, 2016; Rand et al., 2012, 2014).

Taken together, the current state of research in the field of stress and social (including moral) decision-making is far from conclusive and, beyond stress, many complicating overlapping factors play an important role in decision-making. Moreover, to date, only one study has investigated the impact of stress on everyday moral decision-making (Starcke et al., 2011). Thus, the present study aimed at further examining how acute psychosocial stress, induced by the Trier Social Stress Test (TSST; Kirschbaum et al., 1993; Kudielka et al., 2007), and particularly stress-related cortisol levels influence decision-making in everyday moral conflict situations in which a moral standard clashes with a personal desire. Moreover, as a confirmation of earlier study results by Sommer et al. (2010, 2014), who showed that egoistic decisions came along with

significantly lower decision certainty and more negative emotions than altruistic decisions, we additionally assessed decision certainty and emotions during everyday moral decision-making. As an exploratory analysis, we also investigated the impact of acute psychosocial stress on decision certainty and emotions in everyday moral conflict situations, although this exploratory question had, as yet, no direct empirical evidence.

Our study aims to contribute to the current literature in several respects. First, we assessed endocrine, autonomic, and subjective stress responses according to a multidimensional stress concept (Levine and Ursin, 1991). Second, we included only men in order to reduce the impact of variations in gonadal hormone concentrations on HPA axis stress responses (Kirschbaum et al., 1999). Third, we controlled for potentially confounding variables concerning stress and (moral) decision-making, namely the Big Five personality factors (Starcke and Brand, 2012), social desirability (Szekely et al., 2015), and empathy (Rosen et al., 2016). Fourth, we used a set of everyday moral dilemmas (Sommer et al., 2010), which could help to underpin the external and ecological validity of previous findings. Fifth, in the present experiment, the moral decision-making task was performed at the typical time window of peak cortisol levels after TSST stress exposures (approximately 10–20 min after cessation of the stress task; Kudielka et al., 2007), and an additional saliva sample was collected while completing the paradigm in order to capture cortisol levels during everyday moral decision-making.

## 2. Methods

### 2.1. Participants

Fifty healthy male students of the University of Regensburg and the University of Applied Sciences Regensburg, aged 18–28 years ( $M = 21.90$  years,  $SD = 2.14$ ), volunteered to participate. All participants reported to be non-smokers. We ascertained eligibility, the current health status, and health behavior with an in-house questionnaire sent by email to potential participants. Exclusion criteria were acute or chronic psychiatric or somatic diseases, intake of psychotropic or glucocorticoid medication, BMI above 30 kg/m<sup>2</sup>, drug abuse, and enrollment in another TSST study. All subjects reported speaking German as their first language or for at least 13 years. The study protocol was approved by the ethics committee of the German Psychological Society and was performed in line with the Declaration of Helsinki. Before entering the study, all participants provided written informed consent. All subjects received a monetary compensation of 10 € for their participation.

### 2.2. Study design

Applying an experimental between-subjects design (acute stress induction versus non-stressful control task), we randomly assigned  $n = 30$  participants to the stress condition and  $n = 20$  subjects to the control condition. As dependent variables, we assessed biological parameters (salivary cortisol and heart rate), psychological variables (emotional and cognitive stress responses), and behavioral responses (percentage of altruistic decisions, decision certainty, and emotion ratings) in a standardized everyday moral decision-making paradigm. Additionally, we investigated possible associations between cortisol levels and everyday moral decision-making in the total study sample. Moreover, we collected data intended to control for confounding variables (see Section 2.6). We decided a priori to recruit 50 participants and to oversample the stress condition because we wanted to ensure an adequate number of participants with robust cortisol increases for the investigation of the impact of cortisol on everyday moral decision-making (cf., Simmons et al., 2011).

### 2.3. Stress induction and control condition

The participants in the stress group were confronted with the standard procedure of the Trier Social Stress Test (TSST; for a detailed

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات