



# Testosterone, cortisol and the Dark Triad: Narcissism (but not Machiavellianism or psychopathy) is positively related to basal testosterone and cortisol

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## ARTICLE INFO

### Article history:

Received 6 August 2015

Received in revised form 24 February 2016

Accepted 7 March 2016

Available online xxxx

### Keywords:

Cortisol

Endocrinology

Dark Triad

Machiavellianism

Narcissism

Psychopathy

Testosterone

## ABSTRACT

This research investigates endocrinological associations of the Dark Triad by relating narcissism, Machiavellianism and psychopathy to endogenous testosterone and cortisol. Building on the notion that narcissists (in contrast to individuals with a proneness to Machiavellianism or psychopathy) possess a preference for being superior and a propensity to dominate other individuals, it is assumed that the dominance-related hormone testosterone is positively associated with narcissism. It is additionally assumed that narcissism specifically is positively related to basal cortisol levels given narcissists' vigilance and sensitivity regarding their social esteem and status which is linked to cortisol activity. In a study including 129 men from the subclinical population ( $M_{age} = 21.97$ , range = 18 to 34 years), a positive correlation of narcissism with basal testosterone levels was found. Narcissism was also positively correlated with basal cortisol levels. No significant relations emerged for Machiavellianism or psychopathy. In sum, the present contribution suggests that dark personality traits, in this case narcissism, are expressed in the endocrinology of individuals.

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## 1. Introduction

In recent years, the Dark Triad of narcissism, Machiavellianism and psychopathy have received a remarkable amount of attention from personality researchers (Furnham, Richards, & Paulhus, 2013; Veselka & Vernon, 2014). The Triad has been associated with a variety of outcomes including job performance and counterproductive work behavior (O'Boyle, Forsyth, Banks, & McDaniel, 2012), subjective well-being (Egan, Chan, & Shorter, 2014), and, in particular, basic personality models (interpersonal circumplex, HEXACO, Big Five; Furnham et al., 2013; Lee & Ashton, 2014). It is noteworthy that endocrinological associations of the Dark Triad received little attention, especially in the subclinical context, although there is a long history of research investigating the biological foundations of personality traits (Corr, 2009; Eysenck, 1967; Gray, 1970).<sup>1</sup>

The present contribution aims to address this gap in research on the Dark Triad. Specifically, the present research investigates the basal endocrinological factors that are associated with the Dark Triad (Paulhus & Williams, 2002). In this work, the focus is on specific endocrinological factors, namely, endogenous testosterone (T) and endogenous cortisol (C).

## 2. Testosterone and cortisol

There is striking evidence that T, released by the hypothalamic–pituitary–gonadal (HPG) axis, regulates dominant behavior in human (e.g., Eisenegger, Haushofer, & Fehr, 2011; Knight & Mehta, 2014; Mazur & Booth, 1998; Mehta & Josephs, 2006) and non-human animals (Brain & Haug, 1992), especially in status-relevant situations (Mehta, Jones, & Josephs, 2008). For instance, when individuals with relatively low basal levels of testosterone were placed in a high status position they reported greater emotional arousal and lower cognitive functioning as compared with when they were placed in a low status position. The reverse was true for individuals with relatively high levels of testosterone (Josephs et al., 2006). The notion that T regulates dominant tendencies in humans also corresponds to empirical evidence showing that T is positively related to self-reported dominance (Carré, Putnam, & McCormick, 2009; Sellers, Mehl, & Josephs, 2007).

The steroid hormone C, released by the hypothalamic–pituitary–adrenal (HPA) axis, is strongly associated with psychological stress (Dickerson & Kemeny, 2004). C is released particularly when uncontrollable situations or possible threats to the self occur (e.g., Kirschbaum, Pirke, & Hellhammer, 1993). These findings are in line with social self-preservation theory (Dickerson & Kemeny, 2004) according to which individuals possess a regulatory system that monitors social situations relating to one's social esteem and social status and regulates psychobiological responses to cope with respective threats. The endocrinological response to acute or chronic threats to one's social

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<sup>1</sup> The overwhelming majority of articles that examined the endocrinology of dark and maladaptive personality traits were conducted in the clinical context (see the overview by Yildirim & Derksen, 2012).

esteem and social status involves the secretion of cortisol (Dickerson & Kemeny, 2004).

### 3. The Dark Triad and its relation to T and C

Turning to the Dark Triad, the common features of narcissism, Machiavellianism and psychopathy include, to varying degrees, antisocial tendencies such as the disregard for the preferences of other individuals, other-derogation, and aggressiveness (Paulhus & Williams, 2002). The core of the Dark Triad is callousness and the tendency to manipulate others in order to maximize one's own benefit (Jones & Figueredo, 2013). The members of the Dark Triad also share disagreeableness, high neuroticism, and low conscientiousness, low honesty-humility and overall, social destructiveness (Lee & Ashton, 2014; Paulhus & Williams, 2002; for an overview about the core of the Dark Triad, see Furnham, Richards, & Delroy, 2013).

The essence of narcissism is self-ascribed grandiosity and the ego-focus narcissists possess (Fox & Rooney, 2015; Jones & Paulhus, 2011). When narcissists' ego is threatened (e.g., via negative feedback) they react with aggression towards the provocation (Bushman & Baumeister, 1998). Furthermore, narcissists are concerned about their social standing while being motivated to be superior to and better than others (Brown & Zeigler-Hill, 2004). Congruently, they possess a propensity to leadership and dominance (Emmons, 1987; O'Boyle et al., 2012). In line with these considerations it is shown that narcissism is positively related to the need to be superior to others and dominance concerns (Brown & Zeigler-Hill, 2004; Emmons, 1987; Raskin & Terry, 1988). Building on the notion that narcissists possess a preference for being superior and a propensity to dominate other individuals, it is assumed that the dominance-related hormone T is positively associated with narcissism. Additionally, assuming that narcissists are vigilant and sensitive regarding their social esteem and status, which should entail the endocrinological response of cortisol secretion (see social self-preservation theory; Dickerson & Kemeny, 2004), it is expected that narcissism is positively related to basal cortisol levels. In fact, previous research documents a positive association between basal cortisol levels and narcissism in men (Reinhard, Konrath, Lopez, & Cameron, 2012).

Psychopaths are empathy-lacking, impulsive individuals (Paulhus & Williams, 2002). Accordingly, psychopathy is negatively associated with emotional empathy (Blair, 2005) and positively associated with dysfunctional impulsivity (Jones & Paulhus, 2011). Jones and Paulhus (2010) showed that subclinical psychopaths are indeed ready to engage in aggressive tendencies, especially when being physically provoked. It is important to note that T is not a specific biological marker of aggression but a marker of dominance (Eisenegger et al., 2011). In fact, a meta-analysis reveals only a very weak positive association ( $r = .08$ ) between T and aggression in humans (Archer, Graham-Kevan, & Davies, 2005). T regulates an individual's need for superiority and one's propensity to leadership, that is, dominant tendencies in humans (Carré et al., 2009; Sellers et al., 2007). Dominant tendencies are not explicitly conceptualized in subclinical psychopathy. From this perspective, a relation of psychopathy with the dominance-related hormone T is unlikely to emerge.

Previous research investigating the relation of C and psychopathy documents that low C levels characterize individuals high in psychopathy. In fact, subclinical psychopathy was negatively related to stress responses and cortisol levels (Cima, Smeets, & Jelicic, 2008; van Honk, Schutter, Hermans, & Putman, 2003). Other research, however, found no significant relation between psychopathy-related traits and cortisol levels (see Feilhauer, Cima, Korebrits, & Nicholson, 2013; Yildirim & Derksen, 2012). Given the inconsistent literature no prediction is made regarding the relation between subclinical psychopathy and C.

Finally, individuals possessing a strong Machiavellian tendency are intensely focused on what will benefit them and are ready to exploit others (Paulhus & Williams, 2002). They also possess a misanthropic

worldview, callous affect, and lack of fairness and honesty concerns, as documented in undergraduate student samples (Lee & Ashton, 2005; Jones & Paulhus, 2014). As with psychopaths, individuals who are prone to Machiavellianism are not especially sensitive regarding their social esteem and status. Accordingly, it seems unlikely that Machiavellianism is related to C. Regarding the relation of Machiavellianism and T, the picture is less clear. In fact, Machiavellianism is related to competitiveness (e.g., Hunter, Gerbing, & Boster, 1982), and T is relevant in competitive situations (Salvador, Suay, Martinez-Sanchis, Simon, & Brain, 1999). T, however, is especially important in "hot" emotional competitive situations (Pfattheicher et al., 2014; Salvador, Suay, Gonzalez-Bono, & Serrano, 2003), whereas Machiavellianism is characterized by cold, egoistic tendencies and strategic planning. From these considerations, it seems unlikely that Machiavellianism is related to T.

In sum, it is expected that narcissism (in contrast to Machiavellianism and psychopathy) is positively related to T and C. In the study reported below these assumptions were subjected to an empirical test. An additional idea was empirically tested. Recent research documents a relation of T and dominance in particular in individuals with a low level of C (Carré & Mehta, 2011; Mehta & Josephs, 2010). To address these recent developments, this dual-hormone hypothesis was (explanatorily) tested.

## 4. Method

### 4.1. Participants

One hundred and twenty-nine healthy, non-smoking male volunteers from a German university participated in this study ( $M_{\text{age}} = 21.97$ ,  $SD = 4.01$ ). One case was not considered in data analysis due to systematic random responses regarding the Dark Triad items.

### 4.2. T and C

Endogenous T and C were measured via two saliva samples collected in sampling tubes (SaliCap®) 5 and 11 min after arriving in the laboratory. All first samples of the 129 participants were taken at 1:35 p.m. or 3:20 p.m. ( $\pm 2$  min) to minimize diurnal variation in hormone concentrations. Time of assessment did not significantly moderate the present results. T and C were analyzed in the endocrinological laboratory at Dresden University, Germany, following well-established standard procedures (Kirschbaum & Hellhammer, 1994). T and C levels were in the normal ranges (see Table 1). The two saliva samples of T ( $r = .67$ ,  $p < .001$ ) and C ( $r = .82$ ,  $p < .001$ ) were strongly correlated and averaged in each case. Intra- and inter-assay coefficients of variation for T and C were below 10%.

### 4.3. Dark Triad

Narcissism, Machiavellianism and psychopathy were assessed using the Short Dark Triad (SD3) developed by Jones and Paulhus (2014). A sample item of the nine-item narcissism subscale reads: "I know that I am special because everyone keeps telling me so." A sample item of the nine-item Machiavellianism subscale reads: "Make sure your plans benefit you, not others." A sample item of the nine-item psychopathy subscale reads: "It's true that I can be mean to others." The scale end-points of the items are labeled "1" (strongly disagree) and "7" (strongly agree). The alpha reliabilities, means, and standard deviations of all scales are displayed in Table 1.<sup>2</sup>

<sup>2</sup> The data reported in the present contribution were assessed in the context of a larger study including economic games (see Pfattheicher & Keller, 2013) and a subtle experimental manipulation. All participants reported on in the present contribution were selected from this study. There were no denials or drop outs. The Dark Triad was assessed after the economic games. The experimental condition did not significantly moderate the results of the present contribution nor was the Dark Triad affected by the manipulation.

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