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Physiological tests of the cheater hypothesis for the Dark Triad traits: Testosterone, cortisol, and a social stressor[☆]

Laura K. Dane^{a,*}, Peter K. Jonason^b, Marlene McCaffrey^a

^a Douglas College, Canada

^b Western Sydney University, Australia

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ABSTRACT

In order to test the cheater hypothesis in relation to the Dark Triad traits (i.e., psychopathy, narcissism, and Machiavellianism), we conducted ($N = 25$ men) a pre- and post-test assessment of testosterone and cortisol with a social evaluative stress (i.e., lying while being video-taped) in between. Machiavellianism was positively correlated with pre-test testosterone, while psychopathy and Machiavellianism were positively correlated with pre-test cortisol. Cortisol decreased in men who were higher in Machiavellianism immediately after completing the lie-task and the patterns for narcissism and psychopathy were in the same direction, suggesting that these individuals were less stressed after the two truths and a lie task. Testosterone increased in those high in psychopathy and narcissism post-task, possibly reflecting, at least among narcissists, their enjoyment of the challenge to deceive others. Results provide physiological support to the hypothesis of the Dark Triad traits represent a “cheater strategy”.

In the last decade, the Dark Triad traits (i.e., narcissism, psychopathy, and Machiavellianism; Paulhus & Williams, 2002) have become an area of personality research of intense interest (Furnham, Richards, & Paulhus, 2013). Psychopathy is characterized by callous affect, interpersonal manipulation, erratic lifestyle, and antisocial behaviors (Williams, Paulhus, & Hare, 2007), whereas Machiavellianism is characterized by manipulation and a calculative style (Christie & Geis, 1970), and narcissism is characterized by grandiosity, self-entitlement, and perceptions/actions related to self-gain (Raskin & Hall, 1979). Recently, these traits have been successfully integrated into an evolutionary paradigm (Jonason, Koenig, & Tost, 2010; Jonason, Li, Webster, & Schmitt, 2009; McDonald, Donnellan, & Navarrete, 2012). From this perspective, the traits have been labeled as representing a “cheater strategy” (Jonason & Webster, 2012; Mealey, 1995). Tests of this hypothesis have come in the form of, for example, linking the traits to lying (Baughman, Jonason, Lyons, & Vernon, 2014), crime (Lee et al., 2013), tactics of social influence (Jonason & Webster, 2012), short term mating (Jonason et al., 2009), and mate-poaching (Sunderani, Arnocky, & Vaillancourt, 2013). However, two limitations of this work are that it tends to be self-report in nature and does not provide a particularly strong test of their purported cheater functions. One way to test the cheater hypothesis would be to have participants engage in a context-specific social stressor (e.g., trying to deceive others) and

measure their physiological—in this case hormonal—responses to the task. If these traits are adaptations that facilitate the exploitation of others, engaging in behavior that matches their “design” function should result in hormonal feedback similar to winning a social challenge and/or lacking stress reactivity (i.e., increased testosterone and diminished cortisol).

From an evolutionary perspective, these traits may represent a pseudopathology (Crawford & Anderson, 1989), whereby they cost the group but benefit the individual and tend to be labeled as “pathologies” or “undesirable” because of the externalities they impose on others (Ellis, Del Giudice, & Shirtcliff, 2016). In the evolutionary sense, these traits would be adaptive so long as they promote survival and reproduction and in as much as deception might facilitate such ends (Jonason et al., 2009), variability in the Dark Triad traits might represent adaptive individual differences. A common misconception is that if something is evolved or adapted it is fixed. This is an unfortunate misunderstanding of evolutionary models of personality. Instead, we would argue that traits like the Dark Triad are facultative or condition-dependent adaptations that bias the way individuals respond to and process information from their environments. For example, for most people, being asked to lie on film will induce a stress response (O’Leary, Loney, & Eckel, 2007; ten Brinke, Lee, & Carney, 2015). However, if one is already predisposed towards lying and that predisposition is

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* Corresponding author at: Department of Psychology, Douglas College, 700 Royal Avenue, New Westminster, B.C., Canada.

E-mail address: danel@douglascollege.ca (L.K. Dane).

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adaptive, setting the person up for success at that very thing, we might expect an active coping response (Salvador, 2012) reflected in heightened testosterone (Dabbs, Jurkovic, & Frady, 1991; Pompa et al., 2007; ten Brinke et al., 2015) and diminished stress after one lies (i.e., lower levels of cortisol). That is, in combination, these two hormonal responses should be instrumental, hormonal responses to evaluative social stressors resulting from feelings of more control (Dickerson & Kemeny, 2004), less fear (Hermans et al., 2007; Hermans, Putnam, Baas, Koppeschaar, & van Honk, 2006; Hermans, Ramsey, & van Honk, 2008) and higher tolerance for risk (Apicella, Dreber, & Mollerstrom, 2014; Coates & Herbert, 2008) that function behind the scenes to better enable those high on the Dark Triad traits to continue to exploit others.

While testosterone and cortisol have been linked to many aspects related to the Dark Triad traits (i.e. empathy, fear reactivity, and instrumental aggression; see Yildirim and Derksen (2012) for review of testosterone and psychopathy), research on these endogenous steroid hormones (see Salvador, 2012) and direct measures of the Dark Triad traits in non-clinical populations is inconsistent. This may be partially caused by sampling method (e.g., measurement of baseline/basal v. stress induced) or population sampled (e.g., non-clinical v. deviant). Some non-clinical studies have found a positive relationship between psychopathy and baseline testosterone/cortisol (Welker, Lozoya, Campbell, Neumann, & Carre, 2014), and a ratio of baseline testosterone to cortisol reactivity (Denson, Mehta, & Ho Tan, 2013; Glenn, Raine, Schug, Gao, & Granger, 2011), where others have shown no zero-order correlations between psychopathy and baseline levels of either hormone (O'Leary et al., 2007; Pfattheicher, 2016; Sunderani et al., 2013). When exposed to social evaluative stressors (e.g., giving a speech or social rejection), men who were low in psychopathic traits tend to show a normal stress response (i.e., increases in cortisol) whereas those who were higher in psychopathic traits lacked this response (O'Leary et al., 2007; O'Leary, Taylor, & Eckel, 2010). Positive relationships between narcissism and baseline cortisol and testosterone were reported in at least two studies (Pfattheicher, 2016; Reinhard, Konrath, Lopez, & Cameron, 2012), although in other studies no correlations with baseline cortisol (Edelstein, Yim, & Quas, 2010; Wardecker, Chopik, LaBelle, & Edelstein, 2016) or testosterone (Lobbstael, Baumeister, Fiebig, & Eckel, 2014) are found. The picture with hormone reactivity is a bit different. Men who scored high on narcissism showed increased cortisol reactivity after a social evaluative stressor (i.e., giving a speech; Edelstein et al., 2010), however the stress response to this evaluation was paralleled by an increase in negative affect for men high in narcissism (which may reflect a lack of an active coping response; Salvador, 2012). Grandiose narcissism was positively related to testosterone reactivity after a behavioral aggression task (Lobbstael et al., 2014). Little research exists on Machiavellianism and hormonal response and what does, shows no evidence of relationships between basal cortisol/testosterone and this trait (Pfattheicher, 2016).

In the present study, we further examine the relationship between all three of the Dark Triad traits and steroid hormones with a social stressor (i.e., lying on video) from an evolutionary paradigm to test the cheater hypothesis. From this perspective, we predicted: (a) positive relationships between the Dark Triad traits and enjoyment of the task, (b) men higher in the Dark Triad traits would show decreases (or no changes) in cortisol and (c) increases in testosterone post-task.

1. Method

1.1. Participants

Participants were 25 male, western Canadian undergraduate college students ($M_{\text{age}} = 23.16$, $SD_{\text{age}} = 6.31$, $\text{Range} = 18\text{--}43$). The participants were 40% Asian, 24% Caucasian, 20% other (majority of Middle

Eastern descent), 4% South Asian, 4% African, 4% Hispanic, and 4% First Nations. Participants received partial (2%) course credit and were also entered into a draw for a CAN\$50 gift card. All procedures were approved by the College Institutional Research Ethics Board.

1.2. Measures

Narcissism was measured using the 40-item Narcissistic Personality Inventory (Raskin & Hall, 1979), which asks participants to choose between two statements such as, "I can usually talk my way out of anything" or "I try to accept the consequences of my behavior". The number of narcissistic endorsed options is summed to create an index of narcissism, resulting in a scale ranging from 0 to 40 (Cronbach's $\alpha = 0.87$).

The 20-item Mach IV (Christie & Geis, 1970), was used to measure Machiavellianism on a Likert-type scale (1 = *Strongly Disagree*; 5 = *Strongly Agree*) and includes questions such as, "The best way to handle people is to tell them what they want to hear". Items were averaged to create a single index of Machiavellianism ($\alpha = 0.64$).

Subclinical psychopathy was measured with the SRP III (Paulhus, Neumann, & Hare, 2009), which includes 64 items measured on a Likert-type scale (1 = *Strongly Disagree*; 5 = *Strongly Agree*) and includes questions such as, "I would get a kick out of scamming someone". Items were averaged to create a single index of psychopathy ($\alpha = 0.85$).

Enjoyment of the task was measured by asking participants how stressful they found playing the two truths and a lie game in comparison to activities they do on an everyday basis ($-3 = \textit{very stressful}$; $0 = \textit{neutral}$; $+3 = \textit{enjoyable}$).

Participants were asked to abstain from exercising, drinking caffeinated drinks, and/or eating for at least 1 h prior to the study. All sessions were scheduled between 10:00 am and 3:00 pm. Saliva was collected by passive drool into a cup and transferred into polystyrene test tubes. Samples were immediately frozen and held at -20°C until they were assayed. Samples were assayed in duplicate using competitive enzyme immunoassays for cortisol and testosterone in Dr. Neil Watson's lab (Salimetrics LLC, State College, PA) by a technician blind to the hypotheses. Cortisol was assayed from saliva at pre-test, immediately post-lie and 20 min following the lie task, whereas testosterone was assayed at pre-test and 20 min post-lie task. The average intra-assay coefficient of variation was 4.43% for cortisol and 3.52% for testosterone, and inter-assay coefficients for low and high testosterone were 1.16% and 15.01% for testosterone and 5.83% and 4.46% for cortisol. Cortisol was positively skewed, therefore, we used log10-transformed cortisol for all analyses, like prior studies (Welker et al., 2014; Zilioli & Watson, 2012).

1.3. Design and procedure

We investigated whether lying, while being videotaped, differentially affected testosterone and cortisol levels in individuals varying in the Dark Triad traits. Participants arrived at the lab one at a time and after giving informed consent, they completed a few demographic and individual difference measures while they provided a baseline sample of 2–3 ml of saliva by passive drool. The participants were then asked to play the game, two truths and a lie. They were asked to think of three "I" statements (i.e., statements beginning with the pronoun "I"), two of which were truthful and one of which was a lie. Participants were given an example of a truthful statement like, "I played basketball in high school and in the last game of the season, with 15 min left to play, the coach sent me in and I scored the winning goal" but asked to generate their own, short true and lie statements. Participants were advised they would be video-recorded and evaluated on how well they lied. They were told that it was important to be an "effective liar" so the person

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