Available online at www.sciencedirect.com
ScienceDirect
Biological Psychology 78 (2008) 75–86
BIOLOGICAL PSYCHOLOGY
www.elsevier.com/locate/biopsycho

Self-reported trauma, cortisol levels, and aggression in psychopathic and non-psychopathic prison inmates

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Received 18 May 2007; accepted 21 December 2007
Available online 15 January 2008

Abstract

The relationship between self-reported traumatic childhood experiences, cortisol levels, aggression, and psychopathy was investigated in prison inmates ($n = 47$) and healthy controls ($n = 27$). Besides questionnaires, a brief salivary diurnal profile was measured. Results show that criminals (both psychopaths and non-psychopaths) demonstrate more traumatic childhood experiences than the control group. Within the group of criminals, psychopaths showed the lowest diurnal cortisol concentrations, whereas the non-psychopaths demonstrated highest daily average cortisol (DAC) scores. High levels of aggression were related to traumatic childhood experiences in non-psychopaths and control participants, but not in psychopaths. Although psychopathic offenders demonstrated low levels of cortisol, high levels of childhood traumatic experiences and high levels of aggression, cortisol was not a mediating factor between childhood traumatic experiences and aggression. Implications of the finding that psychopathic offenders displayed lower and non-psychopaths showed higher daily cortisol levels are discussed.

Keywords: Cortisol; Psychopathy; Self-reported trauma; Aggression

1. Introduction

Psychopathy is a clinical construct traditionally defined by a constellation of interpersonal, behavioural, and affective characteristics that are associated with a socially deviant lifestyle (Hare, 2003). These characteristics include irresponsibility, manipulation of others, impulsivity, sensation seeking (i.e., behavioural components), and a general poverty in major affective reactions, such as a lack of remorse, shame and empathy (Hare, 2003). Psychopathic personality has typically been operationalized using the psychopathy checklist-revised (PCL-R; Hare, 2003). Studies utilizing the PCL-R have focused on the original 2-factor model (Blair, 2005). The first factor comprises interpersonal and affective characteristics of psychopathy, which includes symptoms as shallow affect, lack of remorse or guilt and glibness/superficial charm (Cooke, 2001; Hare, 2003). The second impulsive, antisocial and unstable lifestyle factor comprises the social deviance characteristics such as, impulsivity, early behavioural problems, and parasitic lifestyle (Cooke, 2001; Hare, 2003). Another instrument measuring these psychopathic characteristics is the psychopathic personality inventory (PPI; Lilienfeld and Andrews, 1996) which determines psychopathic traits via self-report. This measurement is heavily grounded in the work of Cleckley (1941) and other early theorists, focusing on personality traits, attitudes, and dispositions, but unlike the PCL-R, does not assess explicitly antisocial behaviour (Patrick et al., 2006). Work by Benning et al. (2003), revealed that the subscales of the PPI come together around two factors. The first factor is termed the fearless dominance factor (Benning et al., 2005) and comprises the subscales social potency, fearlessness, and stress immunity. This factor is associated with a lack of social and physical anxiety. The second factor is termed impulsive antisociality, and is marked by the subscales carefree nonplanfullness, impulsive nonconformity, Machiavellian egocentricity, and blame externalization (Benning et al., 2005), and this factor is associated with a lack of impulse control, ruthlessness, and insouciant flaunting of social norms. These two PPI factors exhibit markedly different correlates. Indeed, Benning et al. (2003) found that the two factors (i.e., PPI-1 and PPI-2) were differentially associated with other concepts. For instance, PPI-1 was correlated with academic performance, socioeconomic status, and verbal intelligence, while PPI-2 was negatively associated with these variables. In

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doi:10.1016/j.biopsycho.2007.12.011

line with this notion, research has demonstrated that psychopathic offenders who show low fearlessness (e.g., higher PPI-1 scores), display lower autonomic reactivity (Popma et al., 2006). Additionally, the PPI-1 factor has been negatively linked to levels of anxiety and depression (Benning et al., 2003; Uzieblo et al., 2007), indicating a relationship with low emotional reactivity (Herpertz et al., 2001). Since the stress hormone cortisol is related to anxiety responses (e.g., Buss et al., 2004; Kirschbaum and Hellhammer, 1989, 1994), one would expect lower levels of the stress hormone cortisol in those individuals being less fearful (e.g., high PPI-1 factor). However, studies regarding the relationship between cortisol levels and psychopathy are sparse. Moreover, there are only indirect studies showing that cortisol is related to psychopathic traits. For instance, in a study of Oosterlaan et al. (2005) low cortisol levels were associated with conduct disorder (CD). Research has demonstrated that CD problems are linked to the development of psychopathy (Christian et al., 1997), and refers to a pattern of antisocial behaviour in childhood or adolescence (McBurnett et al., 2000). In line with this, another study (Shoal et al., 2003) demonstrated that low levels of cortisol appeared predictive of clinically important personality factors. More specifically, the study demonstrated that in 314 boys aged 10–12, the personality factor of self-control accounted for a high percentage of the relation between cortisol and aggressive behaviour at age 15–17. Especially, impulsiveness, carelessness, and aggressive behaviour were associated with lower cortisol levels (e.g., McBurnett et al., 2000; Ramirez, 2003; Shoal et al., 2003). The study of Shoal et al. (2003) actually extends studies of McBurnett et al. (2000) by demonstrating that low cortisol is in fact predictive of aggressive behaviour 5 years later. Furthermore, CD has been linked to lower cortisol levels (Oosterlaan et al., 2005; Vanyukov et al., 1993).

However, results regarding the relationship between cortisol levels and aggression are mixed. Earlier studies suggested increased tryptophan and testosterone concentrations along with decreased cortisol concentrations in violent offenders compared to healthy controls (Virkkunen, 1985; Dabbs et al., 1991; Bergman and Brismar, 1994; Tiihonen et al., 2001). Moreover, Van Bokhoven et al. (2005) found higher cortisol levels in boys with CD than in those without CD. In addition, boys with an aggressive form of CD had higher cortisol levels than those who showed a covert form of CD. Accordingly, a study from Soderstrom et al. (2004) demonstrated that violent offenders demonstrated elevated cortisol levels compared to healthy controls. Although the mixed results, most recent studies all demonstrated that CD problems are negatively related to cortisol levels (e.g., Loney et al., 2006).

The mechanism linking aggression and low cortisol is still unclear. One might expect certain lifestyle correlates of antisocial families (e.g., maternal use of tobacco, abuse, or deprivation; Wakschlag et al., 1997; McGee and Williams, 1999) to be associated with dysregulation of children's HPA axis. Among many factors that contribute to individual differences in antisocial behaviour, stress-regulating mechanisms appear important (Vanyukov et al., 1993; Kerr et al., 1997; Mezzacappa et al., 1997; McBurnett et al., 2000). Animal models have shown that prenatal and early developmental stress can cause long-lasting or even permanent alteration of the hypothalamic-pituitary-adrenal (HPA) axis (Levine, 1994; Weinstock, 2005) by affecting steroid receptors residing in the hippocampus and frontal cortex (Meany et al., 1958). For example, in a study of Bosch et al. (2007), it was demonstrated that exposure to prenatal stress in rats, resulted in long-lasting behavioural and neuroendocrine alterations in the female offspring, which are manifested during the lactation period. Furthermore, the study implicates that alterations in the HPA axis reactivity are involved. The HPA axis is sensitive to physical and psychological stressors. Activity of the HPA axis can be measured using its end products, glucocorticoids. The primary glucocorticoid in humans is cortisol, which can be reliably measured via saliva sampling (Kirschbaum and Hellhammer, 1989,1994). Typically, activity of the HPA axis follows a circadian rhythm. In the morning, a rapid and acute increase in cortisol (i.e., the primary glucocorticoid secreted by the adrenal cortex) levels can generally be observed, with a peak occurring at about 30 min after awakening (Pruessner et al., 1997; Wüst et al., 2000). During the remainder of the day cortisol levels continually decrease. Lower levels of this stress hormone cortisol may occur when exposed to extreme stress and as a consequent a post-traumatic stress disorder (PTSD; APA, 1994) develops. Indeed, patients with PTSD have been found to have normal or reduced function of the HPA axis resulting in lower cortisol levels (Yehuda, 2002; McNally, 2003). In line with this notion, some studies reported significant associations between traumatic youth experiences and low salivary cortisol levels (e.g., Bugental et al., 2003). For instance, in a study of Weissbecker et al. (2006), patients with a history of trauma had markedly low levels of cortisol at the time of awakening. However, this study also reports elevated evening cortisol levels in emotionally abused women. These findings are partly consistent with studies in which cortisol is elevated in relation to stress through the day in abused women (e.g., Heim et al., 2003). Research regarding cortisol levels in Holocaust survivors with PTSD, has demonstrated that these subjects demonstrate lower mean 24-h urinary cortisol excretion than both Holocaust survivors without PTSD and controls not exposed to the Holocaust (e.g., Yehuda et al., 1995). In contrast, other studies demonstrated that traumatic experiences during youth were related to high salivary cortisol levels (e.g., Nicolson, 2004), leading to extreme sensitivity to stressors (Resnick et al., 1995). For instance, one study demonstrated elevations of 24-h urine cortisol excretion among victims of childhood sexual abuse (Lemieux and Coe, 1995).

In sum than, although there is evidence that cortisol levels in aggressive offenders are reduced (Virkkunen, 1985; Dabbs et al., 1991; Bergman and Brismar, 1994; Tiihonen et al., 2001), the direct relationship between cortisol and psychopathy has never been investigated. Since psychopathic traits can lead to severe forms of aggression (Frick and Morris, 2004; Poulin and Boivin, 2000; Kimonos et al., 2006), one would expect high levels of aggression to be related to lower cortisol levels in psychopathic offenders. Moreover, earlier research has demonstrated HPA axis dysregulations following exposure to