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The association between affective psychopathic traits, time incarcerated, and cortisol response to psychosocial stress

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ABSTRACT

Previous research has demonstrated that psychopathic personality traits are significantly predictive of blunted cortisol reactivity to a performance-based stressor task (Trier Social Stress Test; TSST) in college students. However, the relationship between cortisol reactivity and psychopathy has not been explored in high risk samples such as incarcerated populations. Further, the role of imprisonment in relation to cortisol stress reactivity has not been previously explored, but could have practical and conceptual consequences in regard to rehabilitation and biological sensitivity to context, respectively. The current study tested the hypotheses that both psychopathic personality traits and amount of time incarcerated are related to cortisol blunting in response to stress among incarcerated young adults. A sample of 49 young adult male offenders was recruited to complete the TSST. Salivary hormone samples were taken just prior to and 20 min post-stressor, and participants were interviewed with the Psychopathy Checklist-Youth Version. Variables quantifying the amount of time at the present facility prior to the date of testing and number of commitments in juvenile facilities were also collected. Correlational analyses indicated that only number of incarcerations was related to blunted cortisol. Hierarchical Linear Modeling revealed that time incarcerated and number of commitments were related to a blunted cortisol response among responders and declining cortisol reactivity among nonresponders, respectively. Controlling for time incarcerated, psychopathic traits were significantly related to cortisol decline in response to the stressor among nonresponders, but were not related to blunted cortisol among responders. Results of this project highlight the potential biological effects of prolonged and repeated incarcerations, and extend our understanding about the relationship between psychopathic traits and cortisol reactivity in an incarcerated sample.

Introduction

Psychopathy represents a heterogeneous personality style that can vary considerably in symptom presentation (Brinkley et al., 2004). Psychopathy is also a unique classification, in that it not only affects the individual with the diagnosis, but also places others at risk for physical harm, with related mental and physical health concerns and costs. A substantial number of affected individuals experience comorbid substance use and other personality disorders and are generally considered to have poor response to treatment (Harris and Rice, 2006; Taylor and Lang, 2006). The array of psychological symptoms and poor treatment response associated with psychopathic traits makes understanding the underlying aspects contributing to this phenotype a serious public health concern.

One underlying aspect that has been hypothesized to be related to psychopathic traits is aberrant or blunted stress reactivity (Lykken, 1995; Patrick et al., 1993). Stress reactivity is a risk factor involved in fear conditioning (e.g., response to distress/punishment cues) and the socialization of conscience. Extremes of stress reactivity disrupt the careful processing of social feedback cues and promote failed socialization efforts and subsequent behavioral dysregulation (Lykken, 1957, 1995). Biological indicators of stress reactivity are of particular importance because they might have long term effects (i.e., contribute to both initiation and maintenance of psychopathology) and offer promise for early identification of risk factors that could help advance better prevention and intervention.

One such biological indicator of stress reactivity comes from the hypothalamic–pituitary–adrenal (HPA) axis. The HPA axis is a stress reactivity network that connects the central nervous and endocrine systems (Kudielka and Kirschbaum, 2005). Activation of the HPA axis is triggered by novel/threatening social stimuli and results in the release of the end product cortisol from the adrenal gland (Fries et al., 2009). Cortisol's response profile is relatively slow and, consequently, cortisol reactivity patterns have long lasting repercussions on brain and behavioral functioning as well as immediate implications for brain activation patterns by changing membrane

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excitability (Lupien et al., 2006; Sapolsky et al., 2000). The HPA axis interacts extensively with limbic and paralimbic neurocircuitry such as the amygdala, insula, and anterior cingulate cortex, causing some to rename this axis the LHPA axis (Limbic HPA axis; Gunnar and Vazquez, 2001; Shirtcliff et al., 2009). There are numerous neural extensions connecting the limbic system to the hypothalamus, which is the structure responsible for triggering the cascade that releases cortisol into the blood stream to target organs (Risold et al., 1997). Given this limbic–HPA link, studies that examine acute HPA reactivity to an acute challenge are sorely needed, especially in relation to the development of antisocial behavior, as physiological under-reactivity could be due to inherent personality traits (i.e., antisocial traits) or could represent habituation to prior stressful life events (Phillips et al., 2013), such as frequent and/or long periods of incarceration.

One phenotype that is prevalent in prison populations is psychopathy, a phenotype marked by incapacity to experience empathy and guilt (Cleckley, 1976) and therefore represents the aspects of antisocial personality that would be most affected by HPA deficiencies. It has been suggested that psychopathic personality traits (lack of empathy, guilt, and interpersonal callousness) are the underlying cause of persistent and severe forms of antisocial behavior like ASPD (Hare et al., 1991; Walters, 2003). Researchers have begun investigating basal or diurnal HPA functioning in incarcerated individuals (Brewer-Smyth and Burgess, 2008; Gostisha et al., 2014; Johnson et al., 2014), but no studies have investigated HPA reactivity in an incarcerated setting. This gap in the literature is surprising, given that reactivity to threat or emotion-laden stimuli is theorized to be a distinguishable feature of psychopathy (Benning et al., 2005; Drislane et al., 2013; Pastor et al., 2003).

One of the most prominent and well validated stress induction measures used in prior hormone research is the Trier Social Stress Test (TSST; Gaab et al., 2003; Kirschbaum et al., 1993). The TSST has been shown to induce a significant increase in cortisol levels and heart rate in college samples (Gaab et al., 2003; Kirschbaum et al., 1993) but has never been utilized in incarcerated samples in prior studies. Previous studies utilizing the TSST have demonstrated a lack of stress-induced increases in cortisol among college students high in psychopathic traits regardless of level of antisocial behavior (O'Leary et al., 2007; O'Leary et al., 2010). The results of the O'Leary et al. studies imply that hypo-reactive HPA axis may be a neurobiological indicator of psychopathic traits; however this effect has not been shown in individuals who are at the highest likelihood to exhibit the phenotype of psychopathy, such as incarcerated samples.

Aside from psychopathic traits, there are a variety of stressful experiences that could be linked to blunted HPA reactivity in a secure correction facility. Individuals entering incarceration for the first time may experience elevated levels of stress during incarceration (Brown and Ireland, 2005). However, recent research has also shown that adults who experienced early adverse life events during development demonstrate blunted cardiovascular and cortisol response to laboratory stress (Lovallo, 2013). It has been hypothesized that prolonged stress "gets under the skin" and tends to result in a down-regulated biological stress system, leading to what is termed "burnout" of the HPA axis (Heim et al., 2000; Miller et al., 2007). In support of this theory, a recent study found that greater life stress exposure was related to hypoarousal of the HPA axis (Gostisha et al., 2014). The mechanism for this hypocortisolism has been speculated to be related to reduced adrenal cortical secretion or reactivity, or enhanced negative feedback inhibition of the HPA axis (Heim et al., 2000). The reduced impact of cortisol on target cells could potentially be related to increased cortisol binding (resulting in less "free" and bioavailable cortisol) or reduced sensitivity of target cells for cortisol (Heim et al., 2000). The hypocortisolism phenomenon has never been assessed before in incarcerated samples, despite the fact that burnout of the HPA axis could have profound effects on rehabilitation by causing less responsiveness to treatment efforts. Further, research from foster children indicates that number of placements is associated with blunted diurnal cortisol (Fisher et al., 2011) and that time since a traumatic experience elapsed is an important moderator of cortisol functioning (Weems and Carrion, 2007; Miller et al., 2007). However, number of placements in incarcerated facilities and amount of time incarcerated have never before been examined in relation to cortisol reactivity. The experience of incarceration may have similar effects on the HPA axis as foster placements or other adverse life events, but could also have a unique impact on HPA reactivity and is thus highly important to investigate. Therefore, both amount of time incarcerated prior to testing date and number of times incarcerated appear to be important variables that could lead to blunting of HPA axis response. Along these same lines, repeated substance abuse can cause recruitment of stress-related neurocircuitry brain stress systems including the HPA axis, and is associated with dysregulation of the HPA axis (Koob and Le Moal, 2008; Lovallo, 2006). Antisocial behavior has been associated with substance abuse (e.g., Taylor and Lang, 2006), and therefore assessment of previous substance use is necessary in order to parse out the effects of personality traits (i.e., psychopathy) and stressful experiences (i.e., incarceration).

In conclusion, the current study is novel in many respects, including its use of a well-known stress test (i.e., TSST) in an incarcerated sample to test whether psychopathic traits are associated with blunted cortisol reaction to psychosocial stress. This hypothesis was based on prior research demonstrating that Factor 1 psychopathic traits are predictive of blunted cortisol reactivity in college students, but this effect has never before been tested in an incarcerated sample of males who are more likely to demonstrate the phenotype of psychopathy. The effects of the amount of time incarcerated prior to the experiment and the number of times incarcerated were also evaluated in order to better understand whether these stressful experiences lead to hypocortisol response to stress. Finally, the presence of substance use disorders was also assessed as a potential covariate in analyses.

Materials and methods

Participants

A total of 49 (mean age = 18.41, *SD* = .31) young adult male offenders aged 18 and older were recruited for the current project. Participants resided at a high-risk residential facility for male offenders who were convicted of crimes prior to the age of 18, but who turned 18 while at this facility. Offenders were referred for serious felony crimes, and many had been referred from other facilities of lower security (low or moderate) due to poor behavior or additional crimes committed in those facilities. Offenders were sentenced for at least one year, with time added for poor behavior if necessary. However, all participants were tested within their first year at the facility. It should be noted that at the time of the experiment, the facility was under heightened stress due to speculations that the facility might be shut down, and it was closed shortly after the completion of the experiment. This may have increased the stress felt among the participants of the study. All 18 year-olds at this facility were asked to participate in the study, of which only 2 refused due to factors unrelated to the project (i.e., being released in a few days from the facility). The ethnicity of the sample was African American (63.3%), White (34.7%), and other (2%).

Procedure

The study was conducted in two sessions run in the afternoon over two days. Potential participants were recruited by project personnel who explained the general procedures of the study to the participant and obtained consent. Participants were told to abstain from excessive exercise, eating, and consuming caffeinated beverages 1 h prior to the first session, as these activities can impact cortisol production (Takai et al., 2004).