



Two are better than one: Cortisol as a contingency in the association between epinephrine and self-employment



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ABSTRACT

In the context of self-employment, which is characterized by risk and uncertainty, epinephrine could elicit a “fight or flight” response. However, little attention has been given to what factors could differentiate those who ‘fight’ (i.e. pursue self-employment) versus those who ‘fly’ (i.e. forgo pursuing self-employment). Moving from individual and social explanations on drivers of self-employment as an occupational choice, we propose that the association between epinephrine and self-employment could be conditional on levels of a second hormone, namely cortisol. Based on a sample of 273 individuals from the Midlife in the United States (MIDUS 2) study, 2004–2006, and controlling for a wide variety of factors, epinephrine is not associated with self-employment on its own, however, it is associated with self-employment at low levels of cortisol. We are among the first to demonstrate a link between the dual influence of epinephrine and cortisol and self-employment.

1. Introduction

The influence of biological factors on self-employment is at the core of a growing stream of research. A number of recent studies have examined various potential biological links to self-employment, ranging from genetic factors (Nicolau and Shane, 2009; Shane et al., 2010) to mental health conditions (Verheul et al., 2016; Wiklund et al., 2016). Of late, there has been a growing interest in the neuroendocrinology of self-employment and entrepreneurial activity. For example, evidence suggests that individual differences in testosterone can influence entrepreneurial activity (White et al., 2006) and that greater exposure to prenatal testosterone can benefit new venture performance (Guiso and Rustichini, 2011). However, most of this stream of research has focused on the influence of a single hormone. Motivated by recent work on the dual hormone hypothesis from the field of neurophysiology (Mehta and Prasad, 2015), we develop and test a model intended to further our understanding of the joint association of hormones with self-employment as an occupational choice.

Our proposition that cortisol modulates the association between epinephrine and self-employment is based on that logic that specific stress conditions, along with the way that individuals appraise those conditions, can produce distinct emotional and physiological responses (referred to as the integrated specificity model) (Kemeny, 2003). Evidence suggests that cortisol and epinephrine control opposing circadian systems, which results in markedly different effects with regards to the immune system response to stress (Dimitrov et al., 2009), and could suggest a similar deviation with regards to their association in terms of the neuroendocrinological response to self-employment related stress as well. Because both cortisol and epinephrine can influence memory and learning (Cahill and Alkire, 2003) as well as emotional regulation and activity (Lanau et al., 1997), uncovering how specific levels of each are

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associated with self-employment could provide important insights, and could shed light onto a relatively understudied neuroendocrinological predictors of self-employment.

This article makes several important contributions. First, we extend the literature regarding the potential relationship between hormones and self-employment (Sapienza et al., 2009; White et al., 2006). While previous research has focused primarily on the influence that testosterone might have on self-employment, our study provides evidence that self-employment could also be related to other hormones, namely epinephrine and cortisol, and that these relationships are potentially complex in nature. Second, we respond to recent research calling for the need to allocate more attention to human physiology across a wide range of management phenomena (Heaphy and Dutton, 2008). Finally, we extend research regarding the dual hormone hypothesis from the field of neurophysiology, and demonstrate that this perspective could have important implications for the study of entrepreneurship.

2. Epinephrine, cortisol, and self-employment

Despite the limited research on the topic, evidence suggests that epinephrine, also known as adrenaline, can play a key role in self-employment as an occupational choice. Epinephrine has been linked to risk taking (Kreek et al., 2005) and impulsivity (Evenden, 1999), particularly as it relates to voluntary actions and behaviors associated with self-employment (Lupton and Tulloch, 2002). Moreover, sensation-seeking personality traits have been shown to be associated with elevated levels of epinephrine (Gerra et al., 1999). Thus, higher levels of epinephrine could be associated with individuals who crave more novel, higher risk experiences, and one way to discover such experiences is through self-employment. It is important to note that epinephrine is commonly associated with “fight or flight” behavior (Black, 1994), and while some individuals will likely seek out and thrive on self-employment as associated with levels of epinephrine it is possible that for others, the response could result in a rapid “flight” away from such stressful activities. As such, it is important to understand the conditions that could facilitate either the “fight” or “flight” response elicited under such circumstances, with one potential influence being the presence of other hormones.

Based off the dual hormone hypothesis in neurophysiology (Mehta and Prasad, 2015), we propose that the association between epinephrine and self-employment could be conditional on levels of a second hormone, namely cortisol. The dual hormone hypothesis by Mehta and Prasad (2015) states that the influence of testosterone on human behavior can be conditional, in part, on cortisol levels. In a similar vein, we extend this logic to explain how the association between epinephrine and self-employment could be modulated by cortisol levels – for epinephrine to be positively associated with self-employment, cortisol levels must be lower. From a physiological perspective, elevated cortisol and epinephrine levels have been linked to increased stress and high risk behavior (Schmitt et al., 1998), elevated levels of anxiety (Lederman et al., 1978), and the likelihood of experiencing post-traumatic stress disorder (PTSD) after traumatic events (Delahanty et al., 2005). However, while substantial evidence has established the potential for unilateral increases in both cortisol and epinephrine in association with stress, relatively less attention has been given to the differential responses that can be elicited from the underlying systems responsible for cortisol and epinephrine regulation.

This is important to note because epinephrine and cortisol represent hormonal components of the two primary brain stress-response systems; namely the sympathetic nervous system (epinephrine) and the hypothalamic–pituitary–adrenal (HPA) axis (cortisol). Thus, it is possible for both epinephrine and cortisol to be stimulated by similar events, although not necessarily in a uniform, consistent manner. The Integrated Specificity Model (ISM) states that the specific conditions of stress events, along with the unique way an individual appraises those conditions, can produce qualitatively distinct emotional and physiological responses (Kemeny, 2003). Therefore, it is possible that while production of both epinephrine and cortisol are likely to be stimulated by similar events, the relative levels of each can vary depending upon individual and situational variances. Furthermore, since the predominant effects of each hormone can vary, it is imperative that we develop a more comprehensive understanding of the nuanced relationship between self-employment and both epinephrine and cortisol. As such, we expect that epinephrine will have a differential relationship with self-employment depending upon the levels of cortisol present.

Research question 1: Will epinephrine have a differential relationship with self-employment at low versus high levels of cortisol?

3. Materials and methods

3.1. Participants

To test for the proposed associations, we drew on data from the National Survey of Midlife Development in the United States 2004–2006 (MIDUS II) (Swann et al., 2013), a comprehensive study of individuals between 35 and 86 years of age. MIDUS II measures a variety of behavioral and psychological characteristics, including biomarkers. A detailed description of sampling and data collection procedures are available at <http://midus.colectica.org/>.

The first wave of MIDUS started in 1995. The data was gathered from non-institutionalized individuals in the contiguous United States, and the participants were between the ages of 25 and 76. The next wave, MIDUS II, was conducted between 2004 and 2006. In addition to survey and phone interviews, 3308 participants were recruited for providing biomarker samples. Among the 3308 participants 338 were ineligible, and of the remaining individuals 1054 completed the biomarker component. For the biomarker component, individuals completed two-day visits to one of three clinics located on the either the East coast, Midwest, or West coast of the United States. The examination included a health assessment, fasting blood draw, and overnight 12-hour urine collection (from 19:00 on the previous day to 7:00 on the next day). Additional analyses conducted by MIDUS II collaborators indicates no significant difference between biomarker and non-biomarker participants on the dimensions of age, sex, race, marital status, income, and health

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