



Review

Multidimensional perfectionism and cortisol stress response in non-clinical populations: A systematic review and evaluation

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ABSTRACT

The purpose of the study was to conduct a systematic review and evaluation of research examining multidimensional perfectionism and cortisol in non-clinical populations. A literature search yielded 6 studies examining cortisol reactivity (CR) and 2 studies examining cortisol awakening response (CAR). Each study was rated in terms of the methodological quality and evidence for the relationship between dimensions of perfectionism (perfectionistic strivings, PS, and perfectionistic concerns, PC) and cortisol was recorded. For CR, 1 study was rated as low methodological quality, 1 study was rated as medium methodological quality, and 4 studies were rated as high methodological quality. Of the high-quality studies, one study provided supportive evidence of a positive relationship between PC and CR, and a further 3 provided inconclusive/null evidence. The only high-quality study to examine the relationship between PS and CR provided inconclusive/null evidence. For CAR, 1 study was rated as low methodological quality and the other as medium methodological quality. Based on these findings, no firm conclusions can be drawn regarding the relationship between perfectionism and cortisol. Moreover, if research continues in the same vein, future research is unlikely to examine the relationship appropriately. We therefore recommend future research follows expert guidelines regarding assessing cortisol responses.

1. Introduction

The experience of stress is a normal and important part of healthy functioning. However, too much stress is known to contribute to ill-health (Schneiderman, Ironson, & Siegel, 2005). Research suggests that some people are more prone to stress than others. In regard to why this is the case, personality factors are thought to play an important part. Research has found, for example, that being more perfectionistic is related to the experience of higher levels of psychological stress (Flett, Nepon, Hewitt, & Fitzgerald, 2016) and stress related ill-health (Limburg, Watson, Hagger, & Egan, 2016). Some of this research has illustrated these relationships using physiological markers of stress (e.g., Wirtz et al., 2007). However, in actuality, there is considerable variability in methodologies adopted by studies examining perfectionism and physiological stress. It is therefore difficult for researchers and practitioners to assimilate research in this area. To do so, and provide a better indication of the current state of knowledge regarding perfectionism and physiological stress, in the current study we systematically review and evaluate research that has examined the relationship between multidimensional perfectionism and cortisol responses (cortisol reactivity and cortisol awakening response).

1.1. Psychological and physiological stress

A considerable amount of research has been dedicated to the study of stress. Broadly, stress is understood in terms of how an individual's response to internal or external stimuli manifest into a series of mental and physical effects (Lazarus, 1993). From a psychological perspective, a stress response is characterised by the cognitive appraisal of threat in the context of personally meaningful goals, intentions, or expectations, and subsequent coping behaviour (Lazarus, 1999). From a physiological perspective, a stress response is characterised by a disruption to the homeostatic state of the body and changes in the nervous, cardiovascular, endocrine, and immune systems aimed at restoring homeostasis (O'Connor, O'Halloran, & Shanahan, 2000). An immediate or acute stress response is essential to allow humans to survive and thrive (Segerstrom & Miller, 2004). However, chronic exposure to acute stress can act as an antecedent to ill-health (Schneiderman et al., 2005). For example, repeated exposure to stress contributes to suppression of immunity (Segerstrom & Miller, 2004) and an increased risk of a range of pathological conditions (e.g., insomnia, Basta, Chrousos, Vela-Bueno, & Vgontzas, 2007; cardiovascular disease, Dimsdale, 2008; obesity, Dallman et al., 2003).

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When seeking to examine the stress response, researchers have typically measured it using either psychometric instruments or physiological markers. Psychometric instruments take the form of paper-and-pencil questionnaires that focus on self-reported cognitive appraisals (e.g., perceived threat) or emotions (e.g., anxiety) involved in the stress process (see [Carpenter, 2015](#) for a review). There are a number of benefits to using psychometric instruments to measure stress that help explain their popularity. In particular, they are cheap, easily administered, non-invasive, and relatively easy to interpret. However, there are also a number of limitations to using psychometric instruments. For example, questionnaires are influenced by self-report biases (e.g. reporting in a manner considered more socially desirable), distorted self-perceptions (e.g., over or underestimating personal qualities) and cultural factors (e.g., differences in interpretation of socially derived concepts). In addition, while psychometric instruments designed to measure stress have been found to correlate to some physiological markers of stress (e.g., cortisol; [Brown, Weinstein, & Creswell, 2012](#)), they have been found to be uncorrelated with others (e.g., changes in immunity; [Segerstrom & Miller, 2004](#)).

When physiological markers have been used to examine the stress response they have typically focused on measures of cardiovascular function (e.g., blood pressure & heart rate variability; [Azam et al., 2015](#)), inflammatory proteins (e.g., interleukin-6 & C-reactive protein; [Pilger et al., 2014](#)) and hormones (e.g., testosterone & epinephrine; [Thoma, Kirschbaum, Wolf, & Rohleder, 2012](#)). There are a number of notable benefits to using physiological markers to measure stress in comparison to psychometric instruments. For example, physiological markers overcome the aforementioned issues associated with self-report measurement (self-report biases, distorted self-perceptions, and cultural factors). Furthermore, the use of physiological markers can provide more precise and reliable measurement of one's objective reactivity to stressful experiences. Therefore, physiological markers provide more direct measurement of the impact of stress on the body regardless of an individual's conscious experience of it.

One common and popular hormone that can be used to examine the stress response is cortisol. Cortisol is produced by the hypothalamus-pituitary-adrenal (HPA) axis. Specifically, as part of a stress response, the paraventricular nucleus of the hypothalamus secretes corticotropin-releasing factor (CRH) and vasopressin. This in turn signals the pituitary gland to secrete adrenocorticotrophic hormone which then signals the adrenal glands to secrete cortisol in the zona fasciculata ([Pariante & Lightman, 2008](#); [Smith & Vale, 2006](#)). Once released, cortisol is responsible for important stress-regulating processes, such as increasing gluconeogenesis, vascular tone, and respiratory rate, and inhibiting general vegetative functions such as digestion ([Smith & Vale, 2006](#)). In doing so, cortisol is indirectly preparing the body for a fight or flight response. Cortisol is a particular good measure of the stress response because it is abundant and can be measured easily via serum or saliva, with a high degree of reliability ([Poll et al., 2007](#)). There are also established guidelines on the best methods to use when collecting and analysing cortisol. These include when to measure it, how to measure it, and what confounding factors need to be controlled for when measuring it ([Levine, Zagoory-Sharon, Feldman, Lewis, & Weller, 2007](#); [Pruessner, Kirschbaum, Meinlschmid, & Hellhammer, 2003](#); [Stalder et al., 2016](#)). Again, this means that cortisol is especially useful in terms of examining the stress response.

Cortisol is commonly measured as part of the stress process in two ways. The first way is to measure cortisol as part of a response to an acute stressor (cortisol reactivity, CR). When examining CR cortisol is typically quantified using either absolute or relative change in cortisol compared to baseline following introduction of a stressor ([Pruessner et al., 2003](#)). A review of research by [Dickerson and Kemeny \(2004\)](#) identified a number of factors associated with increased CR. Based on their findings, tasks that are active performance situations requiring

immediate overt or cognitive responses (e.g., mental arithmetic), include salient social-evaluative threat (e.g., performance could be negatively judged by others) or are uncontrollable (e.g., completing impossible tasks, performing under time constraint, and false feedback) are associated with particularly strong CR. Moreover, tasks that contain all these elements, such as the commonly used Trier Social Stress Test (TSST), produce the largest changes in CR and have the longest recovery times (i.e., return of cortisol levels back to baseline).

The second way to measure cortisol is as part of the diurnal rhythm (cortisol awakening response, CAR). CAR refers to the rapid increase of cortisol levels within 20 to 30 min in the morning immediately upon awakening ([Fries, Dettenborn, & Kirschbaum, 2009](#)). This process occurs as part of the natural diurnal rhythm and is captured by the shape of the cortisol secretion curve during the first hour upon awakening. Despite some uncertainty regarding its exact function, current consensus is that heightened or lowered CAR represent maladaptive neuroendocrine processes ([Stalder et al., 2016](#)). This is demonstrated by a number of reviews that have confirmed the relationship between CAR and psychiatric and health-related variables (e.g., [Chida & Steptoe, 2009](#); [Fries et al., 2009](#); [Kudielka & Wüst, 2010](#)). In terms of factors that contribute to CAR, research suggests that on a single day CAR is determined by both trait-like factors (e.g., positive affect) and state factors (e.g., anticipation of day ahead), with a larger proportion of variance in CAR being explained by the latter ([Stalder et al., 2016](#)).

1.2. Multidimensional perfectionism

Both CR and CAR have been found to be related to personality and individual differences (e.g., [Brown et al., 2012](#); [Chida & Steptoe, 2009](#); [Oswald et al., 2006](#)). One factor that has been found to be related to both CR and CAR is perfectionism. Although a variety of perfectionism models exist, it is typically understood to be a multidimensional personality trait consisting of two higher-order dimensions: perfectionistic strivings (PS) and perfectionistic concerns (PC) ([Stoeber & Otto, 2006](#)). As described by [Gotwals, Stoeber, Dunn, & Stoll \(2012\)](#), PS capture self-oriented strivings for perfection and the setting of high performance standards. By contrast, PC capture the negative reactions to imperfections and mistakes, and the fear of negative social appraisal. These two broad dimensions encapsulate the core features of perfectionism from different models and allows various approaches to be understood as part of a single unified model ([Hill, 2016](#)).

Most studies examining the role of perfectionism in the stress response (with the few exceptions outlined below) have done so using self-report questionnaires to measure stress. This research has taken place across a wide range of settings including students (e.g., [Flett, Besser, Hewitt, & Davis, 2007](#)), athletes (e.g., [Stoeber, Otto, Pescheck, Becker, & Stoll, 2007](#)), and patients diagnosed with eating-disorders, major depression, and obsessive-compulsive disorder (e.g., [Sassaroli et al., 2008](#)). In this research, PS are typically negatively related or unrelated to stress (e.g., [Stoeber, 2012](#); [Stoeber & Otto, 2006](#); [Stoeber & Rambow, 2007](#)). Conversely, PC are typically positively related to stress (e.g., [Dunkley, Zuroff, & Blankstein, 2003](#); [Luyten et al., 2011](#); [Stoeber & Rennert, 2008](#)). These findings are indicative of research more widely that has found similar relationships between the two dimensions of perfectionism and other stress-related factors. This includes perceptions of threat and use of coping strategies (e.g., [Dunkley et al., 2003](#)).

A small number of studies have examined the relationship between multidimensional perfectionism and cortisol stress response (e.g., [Richardson, Rice, & Devine, 2014](#); [Rimes, Papadopoulos, Cleare, & Chalder, 2014](#); [Zureck, Altstötter-Gleich, Wolf, & Brand, 2014](#)). When reading this research, the use of a wide range of methods is immediately apparent. It is also evident that some of these studies have not employed many of the recommended procedures when measuring cortisol. [McGirr and Turecki \(2009\)](#) for example, did not control for gender in

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