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Stress-induced eating and the relaxation response as a potential antidote: A review and hypothesis

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ABSTRACT

There is an accumulating body of evidence to indicate that stress leads to the consumption of unhealthy, energy-dense, palatable food, potentially contributing to the alarming global prevalence of chronic diseases, including obesity. However, comparatively little research has been devoted to addressing how best to remedy this growing problem. We provide an overview of the influence of stress on dietary intake, and then explore the novel, yet simple, possibility that regular elicitation of the relaxation response may effectively reduce stress-induced eating via both physiological neuroendocrine and reward pathways and psychological pathways involving emotion regulation, and habitual coping. If shown to be effective, the regular practice of relaxation may provide a convenient, cost efficient, patient-centered therapeutic practice to assist in the prevention of unhealthy weight gain and other negative consequences of unhealthy food intake.

Contents

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1. Introduction

Stress-induced eating is characterised by an increased intake of energy-dense, highly palatable food, when faced with psychological stress (Gibson, 2012; McEwen, 2008). Indeed, numerous studies over the last 20 years have shown that stress leads to a change in eating behavior (Block, He, Zaslavsky, Ding, & Ayanian, 2009; Born et al., 2009; Dallman, 2010; Epel, Lapidus, McEwen, & Brownell, 2001; Kandiah, Yake, Jones, & Meyer, 2006). As a result, research, has served to highlight the prevalence of this problem (Diggins, Woods-Giscombe, & Waters, 2015; Mouchacca, Abbott, & Ball, 2013), delineate the underlying physiological and psychological drivers (Merali, Graitson, Mackay, & Kent, 2013; Pool, Delplanque, Coppin, & Sander, 2015; Rower, Maria Teresa, Tonantzin, & Pattussi, 2017), as well as attempt to identify those individuals most vulnerable to stress-induced eating (Darling, Fahrenkamp, Wilson, Karazsia and Sato, 2017; Neseliler et al., 2017; Rodrigues et al., 2017). However, potential solutions remain elusive.

The purpose of this narrative review is to explore the proposal that regular elicitation of the relaxation response, the very opposite of the stress response, may alleviate stress-induced eating. We begin by presenting the premise of our argument; followed by (a) a brief overview of the research pertaining to stress-induced eating, (b) coverage of the possible physiological and psychological drivers of stress-induced eating, and (c) a discussion of how relaxation techniques may influence the drivers of stress-induced eating, thus providing a simple and feasible, yet novel solution to dealing with the issue.

2. The stress response versus the relaxation response

Stress is commonly defined as a physiological and psychological state in which the demands upon an individual are perceived as outweighing the resources available to contend with them (Lazarus & Folkman, 1984). A stressor may be of a physiological or psychological nature, or simply the anticipation of such (McEwen, 2008). The acute physiological response to the stressor or the 'flight or fight' response sees that energy stores are mobilized and cardiovascular efforts are aimed at the delivery of essential nutrients to areas of high priority (McEwen, 2005). While the primary objective of this acute stress response is to ensure survival of the organism, unnecessary and/or chronic elicitation of the stress response (known as chronic stress) can have deleterious effects on the body (McEwen, 2008).

The relaxation response is the parasympathetic physiological opposite of the stress response. First coined by Herbert Benson (Benson, Greenwood, & Klemchuk, 1975), the relaxation response consists of four basic components including: 1) A mental focus: a repetitive sound, words or visual stimulus such as a symbol by which to minimize distraction. 2) A non-judgmental attitude: to allow the recognition and passing of thoughts. 3) Decreased muscular tone: the posture to be held during the practice should be relaxed. 4) A quiet environment: often with the eyes closed (Benson et al., 1975). It is important to note that we do not refer to 'relaxation' as engaging in pleasant activities that are popularly thought of as relaxing, such as occasional hobbies, watching television, socializing, or even massage. Nor do we consider relaxation to refer to all forms of mind-body practices, such as yoga, tai chi and meditation, as it cannot be assumed that all of these practices unequivocally elicit the relaxation response. For instance, Lumma, Kok, and Singer (2015) found that styles of meditation requiring relatively greater cognitive effort (such as focus on thoughts, or on the cultivation of positive feelings) were less relaxing (both psychologically and physiologically) than a meditation focused on the breath. Furthermore, for those mind-body practices that do elicit the relaxation response, it is unclear whether it is this specific component of the practice that provides benefit, or the holistic effects of such activities on both the body and the mind.

Regardless, it is well established that relaxation reduces general stress (for example, Chellew, Evans, Fornes-Vives, Pérez, & Garcia-Banda, 2015). Indeed, the earliest studies that drew attention to relaxation as a potential healing modality were prompted by 'hypometabolic' changes seen in transcendental meditators. Such changes, distinct from those seen in sleep, included a decrease in oxygen consumption, carbon dioxide production, respiratory rate, and alterations in brainwave activity (Wallace, Benson, & Wilson, 1971). Other studies have reported reduced levels of stress hormones (such as cortisol) and central nervous system arousal in response to relaxation (Chellew et al., 2015; Dolbier & Rush, 2012; Jacobs, 2001), reduced anxiety and depression (Manzoni et al., 2009), in addition to heightening positive affect (Jain et al., 2007; Unger, Busse, & Yim, 2017). The proposition that elicitation of the relaxation response may also attenuate stress-induced eating is discussed in the following sections.

3. The problem: stress-induced eating

The phenomenon of stress-induced eating has been previously reviewed (Adam & Epel, 2007; Fink, 2016; Maniam & Morris, 2012; Rabasa, Dickson, Rabasa, & Dickson, 2016; Torres & Nowson, 2007). Indeed, numerous studies have demonstrated that *food choice* is markedly affected by stress (Dallman, 2010; Roberts, 2014). More specifically, preference for high fat-high sugar foods has been repeatedly documented (Epel et al., 2001; Macht, 2008; Newman, O'Connor, & Conner, 2007; Rutters, Nieuwenhuizen, Lemmens, Born, & Westerterp-plantenga, 2009). In parallel, reductions in the intake of nutritious mealtime foods such as vegetables during times of stress has been reported (Ledoux et al., 2012; Mikolajczyk, El Ansari, & Maxwell, 2009; O'Connor, Jones, Conner, McMillan, & Ferguson, 2008; Unusan, 2006). Stress, therefore, may foster dietary habits that are in conflict with healthy eating guidelines, likely predisposing individuals to increased risk of chronic diseases, particularly the cluster of abnormalities associated with the metabolic syndrome (Mendoza, Drewnowski, & Christakis, 2007; Mikolajczyk et al., 2009). In addition, given excess intake by as little as 50–100 kcal/d can result in weight gain of clinical concern in the long-term (Mozaffarian, Hao, Rimm, Willett, & Hu, 2011), stress may be an important driver of poor dietary habits leading to weight gain, potentially contributing to the worldwide epidemic of obesity we face today (Jauch-Chara & Oltmanns, 2014; Sinha & Jastreboff, 2013). Of equal relevance, research also highlights the role of stress in the development of diagnosed conditions of uncontrolled eating such as binge-eating disorder and bulimia (Hilbert, Vögele, Tuschen-Caffier, & Hartmann, 2011; Smyth et al., 2007; Sulkowski, Dempsey, & Dempsey, 2011). Notwithstanding these issues, it should be acknowledged that there is significant inter-individual variation in the precise effect of stress on *total* energy intake (Wallis & Hetherington, 2009; Yeomans & Coughlan, 2009). Admittedly, the dietary response to stress can be subject to a vast array of physiological and psychological factors, including perception of stressor type, length, intensity, and the impact of environment (Adam & Epel, 2007). It is not our intention, however, to provide an extensive summary of the literature relating to stress-induced eating here, but rather to highlight a potential solution to this issue.

4. The relaxation response – a potential antidote for stress-induced eating?

Stress has the potential to increase the intake of unhealthy