Emotion Regulation, Stress Hormone Function, and Digital Technologies

Derick Homes*

Editorial Office, Journal of Health and Medical Research, Belgium

Corresponding Author*

Derick Homes
Editorial Office, Journal of Health and Medical Research, Belgium
E-mail: healthres@peerjournal.org

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Abstract

Controlling one's emotions under difficult times is a crucial part of mental wellness. Acute stress, on the other hand, disrupts prefrontal cortex control, leading to a loss of emotion regulating capacities. The stress response stimulates a range of defence mechanisms, including hormone messenger communication, to reduce the threat. We will analyse the current literature in regards to emotion management by better understanding the role of cortisol, the principal stress hormone, and the catecholamines epinephrine and norepinephrine. We also discussed and highlighted the significance of ICTs, such as online and mobile apps, AI and STEM tools, serious games, e-learning, and tele-education services, in the support and enhancement of emotional self-control and stress hormone management.

Keywords: Emotion regulation • Stress • Hormones • Cortisol • Norepinephrine • Digital technologies

Introduction

This current research in regard to emotion management by gaining a better knowledge of the role of cortisol, the principal stress hormone, and the catecholamines epinephrine and norepinephrine, which are linked to severe stress. Other hormones, such as sex steroids, can be affected by stress, although they aren't commonly thought of as stress hormones. Furthermore, we will discuss the function of digital technology in the support and enhancement of emotional self-control and stress hormone management. Cortisol, sometimes known as the "primordial stress hormone," is a glucocorticoid and the principal steroid hormone released by the cortex of the adrenal gland. It was determined to be crucial for glucose metabolism at first, but it was subsequently revealed to affect all physiological activities and to be required for general health. It regulates the stress response and performs normal homeostatic functions via glucocorticoid receptors. Cortisol has an effect on all peripheral tissues, but it also crosses across the blood-brain barrier, allowing it to change brain function under stressful conditions. Cortisol levels that are excessively low, as in Addison's disease, or too high, as in Cushing's syndrome, can cause a variety of physiological problems, including cognitive and emotional problems. The consequences of a delayed spike in cortisol in response to a stressor have been linked to mood and emotion regulation protection. The nature of cortisol release and feedback alters when the system needs shift from normal homeostasis to a stress mode of action. The paraventricular nucleus stimulates the pituitary gland utilising corticotropin releasing factor as the primary peptide hormone under normal settings. The paraventricular nucleus releases arginine vasopressin and corticotropin releasing factor during times of stress, and this combination stimulates about three times more adrenocorticotropin release by the pituitary, resulting in a very high release of cortisol into blood circulation from the adrenal gland. Increased cortisol production is associated by lower negative feedback sensitivity under stress, since corticotropin releasing factor-arginine vasopressin neurons respond less to feedback than corticotropin releasing factor fibres alone. This shift from a normal homeostatic mode of regulation to a stress level of activity is useful in coping with short-term crises, but it may come at a cost in the form of detrimental health repercussions if utilised repeatedly or for a long time. Catecholamines such as dopamine, adrenaline (epinephrine), and noradrenaline (norepinephrine) are found in certain parts of the body. Epinephrine is mostly found in the adrenal medulla, and once released into the circulation, it acts as a hormone primarily on distant target organs. Locally, norepinephrine serves as a neurotransmitter in vascular smooth muscle, adipose tissue, liver, heart, and brain effector cells. It's typically present in peripheral and central nervous system sympathetic nerves. Dopamine has two purposes: it is a precursor to noradrenaline and it is hypothesised to be a neurotransmitter in the areas of the brain that control motor activity coordination. When confronted with a major threat, such as during times of stress, the body activates the "fight-or-flight" reaction, which prepares us to battle an assailant or flee to safety. The sympathetic nervous system becomes 28 extremely active during "fight-or-flight" situations, resulting in increased norepinephrine release from sympathetic nerve endings and epinephrine secretion from the adrenal gland medulla. Norepinephrine projections from the locus coeruleus innervate the limbic system, which is involved in emotion and cognition control. The Information Age is in full swing in our culture. Individuals can use e-services and e-tools in their daily lives, as well as in educational practises, policies, and initiatives at all levels of education. As a result, the person, as well as the trainer and the instructor, have several options to employ ICTs in various forms to assist pupils in improving their capacity to comprehend, recognise, and regulate their emotions. It is feasible to manage and regulate their stress hormones by doing this activity. Information and communication technologies (ICTs), online and mobile apps, AI & STEM tools, serious games, e-learning, tele-education services, and so on are all examples of e-services and e-tools. ICTs may be utilised in general and special education as a tool for diagnosis and intervention, as well as to reduce stress hormones and promote emotional control. Mobile applications and technology are potential instruments for interfering in education and can help students and ordinary folks regulate their emotions on large sizes. AI and STEM are strong instruments for intervening and enhancing different aspects of schooling, as well as assessing and developing emotional capacities, control, and intellect. From an affective standpoint, digital technology can better complement various instructional methods. Digital technology, in many forms, may also be utilised and integrated with emotional intelligence approaches, metacognitive tactics, consciousness practises, and executive function training to enhance awareness of all humans, particularly emotional self-regulation and intelligence. To sum up, all forms of ICTs, such as web and mobile applications, AI, VR & STEM tools, serious games, e-learning and tele-education services, and so on, can help improve stress regulation abilities and train and improve emotional intelligence knowledge, consciousness, and awareness of emotions, stress, and hormones.

Discussion

The function of knowledge in the regulation of emotions as well as the related stress hormones in this study. We presented research on emotion control by understanding the action of stress hormones, and there is clearly room for more study since, in the aftermath of stressful events, managing these hormones has a high chance of re-establishing emotional stability. We've also discussed and highlighted the importance of ICTs, such as online and mobile applications, AI and STEM tools, serious games, e-learning and tele-education services, and so on, in assisting and improving individuals' emotional self-control and stress hormone management. As different studies have shown, the necessity for understanding about the relationship between stress hormones and emotional disturbances is somewhat obligatory in the education culture, as well as in people's everyday lives, both personal and professional. Emotional intelligence is a phrase that encompasses a variety of talents and skills that enable a person to identify and manage emotional circumstances, both his own and those of others, with the goal of social and personal growth. The first half of this study, in particular, examines the function of emotional intelligence in the person. The primary goal of this research is to determine how metacognition, the sympathetic-parasympathetic nervous system, and fundamental stress hormones/neurotransmitters interact. The research aims to answer the following questions in order to attain this goal: Is it possible for metacognition to control stress hormones and sympathetic nervous system hyperactivity? What role may it play in the management of unmanageable stress? What role do executive functions play? Can metacognition prevent the degradation of cells and neurons, as well as the shrinkage of the brain? The research backs up the idea that metacognition, stress hormones, and the autonomic nervous system have a close association. As a result, the findings above pave the way for the development of novel stress management measures that might be used in the home, at school, and at work. The dietary habits are critical for human health. People all around the globe suffer from health problems as a result

of their food. Malnutrition mixed with a lack of necessary nutrients, as well as obesity caused by excessive sugar intake, are serious issues. The human daily diet should primarily consist of foods high in vitamins, fatty acids, minerals, and trace elements. Consumption of chemicals such as sugar and trans fats, on the other hand, has detrimental consequences for the human body. Some foods that contribute to excellent health include fish, veggies, and nuts. Despite the fact that stress is a developing issue that affects a large number of people, it is critical to understand how to manage it. In this situation, preventing and managing work-related stress and related mental health issues is a major concern, and mobile applications hold the possibility of including preventative techniques as well. Chronic stress is becoming a more ubiquitous problem in health care, but mobile apps have the ability to give stress management solutions and reduce tension in instructional operations. Metacognition, mindfulness, and meditation are the most popular techniques. Empathy cultivation and the development of emotional and social skills can reduce stress hormones and improve emotional intelligence and social abilities in common and socially sensitive social groups, and they can be cultivated using ICTs, music, metacognition, multisensory & attention training, and other methods. Stress and associated hormones are also among the causes of ADHD, and they must be managed.

Finally, we emphasise the relevance of digital technology in assimilation of this vital information into everyday life activities, particularly in the educational domain, as well as the function of knowledge in the link between stress hormones and emotional regulation.

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