How exercise can improve your mental health - it’s a no brainer!

A plethora of studies are emerging which show the positive effects that exercise can have on mental health and emotional state. The physical effects of exercise include reduction of blood pressure, greater cardiovascular fitness, weight loss and prevention and management of chronic diseases. It appears that the benefits of exercise come about by a variety of physiological and psychological changes. These include an increase in the level of endorphins, better functioning of mitochondria, an increase in production of chemicals such as serotonin, tryptophan and cortisol and lowering of inflammation. Psychologically, exercise is very effective in providing a distraction from feelings of depression and anxiety and contributes to positive feelings associated with mastery and self-efficacy.

Fig. 1. Illustration of the effects of exercise on different physiological and psychological changes.

Endorphins: Numerous athletes report feelings of euphoria, sedation and analgesia following intense training sessions and these feelings of well-being often referred to as the “runners high” is a well-known phenomenon amongst athletes. These effects have primarily been attributed to the action of endorphins and indeed several studies have verified elevated plasma levels of endorphins following exercise.

Mitochondrial function: Mitochondria plays a regulatory role in synaptic strength and cellular resilience of neuronal circuits within the brain. Current theories of depression and mood disorders, center around brain neuroplasticity and neurogenesis. It is believed that poor mental health may

stem from poor neuroplasticity which may result in an inability to respond and adapt to stress or aversive stimuli. Mitochondria plays an integral role in neuroplasticity as grey matter has a high number of mitochondria which undergo intense neuronal activity. It is well documented that exercise/physical activity is directly related to increased production of mitochondria and that individuals who primarily undertake aerobic training, show an increase in the number of mitochondria and oxygen utilization capabilities.

mTOR: Mammalian target of rapamycin (mTOR) is a serine/threonine protein kinase which controls cell growth and metabolism. mTOR plays an important role in development and ageing and is associated with learning, memory and antidepressant effects. Exercise activates mTOR in brain regions which deals with cognition and emotional behavior's and can help improve mental health states by reducing the effects of stress, anxiety and depression.

Neurotransmitters: Serotonin, dopamine, noradrenaline and glutamate imbalances are often noted in the central nervous systems of people suffering from depression. Depression is successfully managed in some patients with selective serotonin reuptake inhibitors (SSRI) which work to prevent the reuptake of monoamines such as serotonin and noradrenaline, thereby, increasing the availability of these in the brain. It is thought that exercise can also increase serotonergic and adrenergic levels in the brain, effectively acting in the same way as the SSRI antidepressants.

Hypothalamic Pituitary Adrenal (HPA) axis: There is much evidence from studies of people suffering from depression and anxiety to implicate HPA dysfunction especially via hyperactivity of HPA response. HPA dysfunction seen in anxiety or depression can be characterized by heightened or reduced cortisol production, hypersecretion of corticotrophin releasing hormone and hypersensitivity to glucocorticoids. Voluntary exercise adjusts the release of corticotrophin releasing factor from the hypothalamus and adrenocorticotropic hormone from the anterior pituitary gland and these changes in the HPA axis modulates stress reactivity and anxiety in humans.

Immune system function: The positive effects of exercise on mental health may well be due to the ability of exercise to reduce inflammation. It has been established that the anti-inflammatory effects of exercise may be attributed to 4 main mechanisms, (i) change in cytokines, ii) reduction in visceral fat, iii) down regulation of toll like receptors, iv) increase in vagal tone. Thus, implementing a regular exercise routine may lead to decreased inflammation and improve symptoms of poor mental health.

It is clear that exercise is a viable preventative or adjunct treatment option for improved mental health outcomes.

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