

Supplementary material

Neurophysiological mechanisms underlying music-based coping

Up to now, several physiological mechanisms have been proposed through which music listening might qualify as a potent mood regulation and coping strategy. This includes (a) its effect on neurotransmitter, neuropeptide and hormonal release with observed increases in dopamine (Ferreri et al., 2019; Salimpoor et al., 2011) and oxytocin (Ooishi et al., 2017) propagation as well as decreases in stress-related cortisol (Khalfa et al., 2003; Ooishi et al., 2017) and epinephrine levels (Conrad et al., 2007); (b) its activation of emotion-related brain areas, such as amygdala, hippocampus, insular, anterior cingulate and orbitofrontal cortex (Boso et al., 2006; Koelsch, 2020), as well as that of reward circuits similarly involved in pleasure experiences through food, sex and drugs (Ferreri et al., 2019; Mas-Herrero et al., 2018; Salimpoor et al., 2011); (c) its opioid-mediated suppression of bodily and mental pain (Bernatzky et al., 2012; Chai et al., 2017); (d) its activating effects on immune proteins (McCraty et al., 1996) and attenuating effects on cytokines (Conrad et al., 2007), both contributing to an overall (physical) resilience; and (e) its effect on hypothalamic and hippocampal neurotrophins, with observed increases in the brain-derived neurotrophic factor (Angelucci, Fiore, et al., 2007; Angelucci, Ricci, et al., 2007) and decreases in nerve growth factor (NGF; Angelucci, Ricci, et al., 2007), as well as its induction of synaptic plasticity (Reybrouck et al., 2018) and functional connectivity (Grahn & Rowe, 2009). Thus, at a molecular and circuitry level, music has the potential to either elicit stimulating responses, such as dopamine-mediated pleasure, or inhibitory ones, such as cortisol-mediated reduction of psychological stress. Moreover, neuroplastic changes described in (e) are a physiological prerequisite for cognitive reappraisal proven to be crucial in the clinical treatment of affective disorders and their comorbidities, such as depression and anxiety.