Euphoria

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Euphoria[note 1] (pronunciation: /juːˈfɔːriə/) is an affective state and a form of pleasure in which a person experiences intense feelings of well-being, happiness, and excitement.[3][4][5] Certain drugs, many of which are addictive, can cause euphoria, which at least partially motivates their recreational use.[6] Similarly, certain natural rewards and social activities, such as aerobic exercise, laughter, listening to emotionally arousing music, music-making, and dancing, can induce a state of euphoria.[5][7] Euphoria is also a symptom of certain neurological or neuropsychiatric disorders, such as mania.[8] Romantic love and components of the human sexual response cycle are also associated with the induction of euphoria.[9][10][11]

Playing can induce an intense state of happiness and contentment.

Intense euphoria is believed to occur via the simultaneous activation of every hedonic hotspot within the brain's reward system.[12]

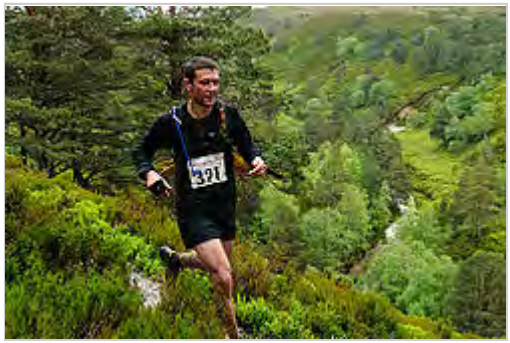
Contents

Types

Many different types of stimuli can induce euphoria, including psychoactive drugs, natural rewards, and social activities.[3][4][7][8] Affective disorders such as unipolar mania or bipolar disorder can involve euphoria as a symptom.[8]

Exercise-induced

Continuous physical exercise, particularly aerobic exercise, can induce a state of euphoria; for example, distance running is often associated with a "runner's high", which is a pronounced state of exercise-induced euphoria.[13] Exercise is known to affect dopamine signaling in the nucleus accumbens, producing euphoria as a result, through increased biosynthesis of three particular neurochemicals: anandamide (an endocannabinoid),[14] β-endorphin (an endogenous opioid),[15] and phenethylamine (a trace amine and amphetamine analog).[13][16][17]



Runners can experience a euphoric state often called a "runner's high".

Music euphoria

Euphoria can occur as a result of dancing to music, music-making, and listening to emotionally arousing music.[7][18][19] Neuroimaging studies have demonstrated that the reward system plays a central role in mediating music-induced pleasure.[19][20] Pleasurable emotionally arousing music strongly increases dopamine neurotransmission in the dopaminergic pathways that project to the striatum (i.e., the mesolimbic pathway and nigrostriatal pathway).[18][19][20] Approximately 5% of the population experiences a phenomenon termed "musical anhedonia", in which individuals do not experience pleasure from listening to emotionally arousing music despite having the ability to perceive the intended emotion that is conveyed in passages of music.[20]

Drug-induced

A **euphoriant** is a type of psychoactive drug which tends to induce euphoria.[22][23] Most euphoriants are addictive drugs due to their reinforcing properties and ability to activate the brain's reward system.[8]

Stimulants

Dopaminergic stimulants like amphetamine, methamphetamine, cocaine, MDMA, and methylphenidate are euphoriants.[3][8] Nicotine is a parasympathetic stimulant that acts as a mild euphoriant in some people.[8]

Depressants

A large dose of methamphetamine causes a drug-induced euphoria.[21]

Certain depressants can produce euphoria; some of the euphoriant drugs in this class include drinking alcohol (i.e., ethanol) in moderate doses,[24][25] γ-hydroxybutyric acid,[3] and ketamine.[3] Euphoria has also been noted to occur in a very small percentage of individuals who used pregabalin in controlled trials as a treatment for neuropathic pain associated with diabetic peripheral neuropathy.[26]

Some barbiturates and benzodiazepines may cause euphoria. Euphoriant effects are determined by the drug's speed of onset,[27] increasing dose,[28] and with intravenous administration.[29] Barbiturates more likely to cause euphoria include amobarbital, secobarbital and pentobarbital.[30][31] Benzodiazepines more likely to cause euphoria are flunitrazepam, alprazolam and clonazepam.[27][32][33] Benzodiazepines also tend to enhance opioid-induced euphoria.[34]

Opioids

μ-Opioid receptor agonists are a set of euphoriants[8] that include drugs such as heroin, morphine, codeine, oxycodone, and methadone. By contrast, κ-opioid receptor agonists, like the endogenous neuropeptide *dynorphin*, are known to cause dysphoria,[8] a mood state opposite to euphoria that involves feelings of profound discontent.

Cannabinoids

Cannabinoid receptor 1 agonists are a group of euphoriants that includes certain plant-based cannabinoids (e.g., THC from the cannabis plant), endogenous cannabinoids (e.g., anandamide), and synthetic cannabinoids.[8]

Inhalants

Certain gases, like nitrous oxide (N_2O, aka "laughing gas"), can induce euphoria when inhaled.[8]

Glucocorticoids

Acute exogenous glucocorticoid administration is known to produce euphoria, but this effect is not observed with long-term exposure.[8]

Asphyxia-induced

Asphyxiation initially produces an extreme feeling of euphoria[35] leading some people to intentionally induce temporary asphyxiation. Erotic asphyxiation typically employs strangulation to produce euphoria which enhances masturbation and orgasm.[36] The choking game, prevalent in adolescents, uses brief hypoxia in the brain to achieve euphoria.[37][38] Strangulation, or hyperventilation followed by breath holding are commonly used to achieve the effects. Accidental deaths occur from both practices but are often mislabeled as suicide.[39][40][41]

Neuropsychiatric

Mania

Euphoria is also strongly associated with both hypomania and mania, mental states characterized by a pathological heightening of mood, which may be either euphoric or irritable, in addition to other symptoms, such as pressured speech, flight of ideas, and grandiosity.[42][43]

Although hypomania and mania are syndromes with multiple etiologies (that is, ones that may arise from any number of conditions), they are most commonly seen in bipolar disorder, a psychiatric illness characterized by alternating periods of mania and depression.[42][43]

Epilepsy

Brief euphoria may occur immediately before or during epileptic seizures originating in the temporal lobes or insulae.[44][45] This euphoria is symptomatic of a rare syndrome called ecstatic seizures, itself closely associated with religious and mystical experiences which are often euphoric. Euphoria (or more commonly dysphoria) may also occur in periods between such seizures. This condition, *interictal dysphoric disorder*, is considered an atypical affective disorder.[46]

Multiple sclerosis

Euphoria sometimes occurs in persons with multiple sclerosis as the illness progresses. This euphoria is part of a syndrome originally called *euphoria sclerotica,* which typically includes disinhibition and other symptoms of cognitive and behavioral dysfunction.[47][48][49]

See also

Psychological

- Dysphoria
- Euthymia
- Hyperthymia
- Sense of wonder

Pharmacological

- Anxiolytic
- Designer drug
- Legal intoxicant
- Recreational drug use

Notes

1. Derived from Ancient Greek εὐφορία: εὖ *eu* meaning "well" and φέρω *pherō* meaning "to bear".[1][2] The word is semantically opposite of dysphoria.

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2. Online Etymology Dictionary (http://www.etymonline.com/index.php?search=euphoria&searchmode=none)
3. Bearn J, O'Brien M (2015). " "Addicted to Euphoria": The History, Clinical Presentation, and Management of Party Drug Misuse". *Int. Rev. Neurobiol*. **120**: 205–33. doi:10.1016/bs.irn.2015.02.005. PMID 26070759. "Eating, drinking, sexual activity, and parenting invoke pleasure, an emotion that promotes repetition of these behaviors, are essential for survival. Euphoria, a feeling or state of intense excitement and happiness, is an amplification of pleasure, aspired to one's essential biological needs that are satisfied. People use party drugs as a shortcut to euphoria. Ecstasy (3,4-methylenedioxymethamphetamine), γ-hydroxybutyric acid, and ketamine fall under the umbrella of the term "party drugs," each with differing neuropharmacological and physiological actions."
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Many individuals experience a particularly euphoric response to music, sometimes described as ‘‘shivers-down-the-spine’’ or ‘‘chills’’, which perhaps is not unrelated to the orgasm phase of the sexual pleasure cycle ... Perhaps even more interesting is the finding that activity in VS/NAcc, medial and mid-anterior OFC strongly correlated with the intensity of chills related to musical pleasure (Blood and Zatorre, 2001). Further studies showed that VS/NAcc dopamine release were specifically linked to the peak of perceived chills and not to their anticipation (Salimpoor et al., 2011), and there was an absence of activity in VS/NAcc and OFC when exposed to a novel, but liked, pop song (Berns et al., 2010). The peaks in the medial and mid-anterior OFC are very similar to those found during orgasms or during hedonic processing of foods ...
Drugs of abuse that enhance sympathetic arousal also typically induce euphoria, which is described as intensely pleasurable, especially in drug naïve participants (Vollm et al., 2004). In one fMRI study, participants rated feelings of high, low, rush, and craving after cocaine infusion (Breiter et al., 1997). Rush and high both peaked within 3 min after the volunteers received cocaine, after which these feelings dissipated (though rush more quickly than high). ... Thus, areas correlating with rush are not only likely to reflect general arousal effects (e.g. elevated heart rate, sweating), but also the euphoria associated with high. The overlap between areas related to cocaine rush/high and sexual arousal (genital stimulation) is striking, and includes aMCC, anterior and posterior insula, ventral pallidum/basal forebrain, and frontal operculum/vPMC. In addition, the amygdala showed prolonged decreased activity after cocaine infusion, similar to decreased activity during sexual genital stimulation (Georgi dis et al., 2009, 2010a)."
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β-Endorphin, an endogenous μ-opioid receptor selective ligand, has received much attention in the literature linking endorphins and depression or mood states. ... exercise of sufficient intensity and duration can increase circulating β-endorphin levels. ... Moreover, a recent study demonstrated that exercise and physical activity increased β-endorphin levels in plasma with positive effects on mood. Interestingly, the researchers reported that, independently of sex and age, dynamic anaerobic exercises increased β-endorphin, while resistance and aerobic exercises seem to only have small effects on β-endorphins. ... The results showed that mood tends to be higher in a day an individual exercises as well as that daily activity and exercise overall are strongly linked with mood states. In line with these findings, a recent study showed that exercise significantly improved mood states in non-exercises, recreational exercisers, as well as marathon runners. More importantly, the effects of exercise on mood were twofold in recreational exercisers and marathon runners."
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Conclusions
Listening to music strongly modulates activity in a network of mesolimbic structures involved in reward processing including the NA. Music, acting as a positive pleasant emotion, increases NA DAergic activity. Specifically the NA is more involved during the experience of peak emotional responses to music. Reward value of music can be predicted by increased functional connectivity of auditory cortices, amygdala and ventromedial prefrontal regions with the NA. Further research is needed to improve our understanding of the NA role in the influence of music in our lives."

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