

BBC Ideas STEM playlist: What's the Difference Between Love and Lust?

Voiceover: Lovesick, head over heels, Butterflies in the tummy. We all have ways of describing what love feels like. But what is actually going on in our brains when we fall in love? And how do we know how to distinguish lust from love?

According to Helen E Fisher from Rutgers University, there are three aspects of romantic love. Often lust comes first, but not always. For some people are asexual, it may not happen at all. But for those who do experience lust, it's driven by the hormones oestrogen and testosterone. They affect our libido, the sex drive. It may feel purely carnal, but in fact it's about the urge to mate and pass on your DNA via offspring. Without lust, it's fair to say our species would not survive.

The second aspect of romantic love is attraction, influenced by a neurotransmitter called dopamine. This is a feel-good substance released in our brain that is involved in driving us towards reward. Do something, get a dopamine hit, feel good. Eventually, dopamine will push us towards repeating that behavior. This is why intense attraction feels like an addiction to another human being. Some people get stuck in that loop, always chasing their dopamine soaked excitement of a new relationship. Might as well face it, you're addicted to love. Dopamine also dampens the region of the brain that regulates critical thinking and rational behavior. People often stay in the somewhat irrational honeymoon period for up to 18 months. Another hormone that plays a role in attraction is norepinephrine, which is involved in generating the physiological responses we experience in this state. Thanks sweaty pants, heart fluttering, breathing faster. In that sense, strong attraction is similar to a state of stress. But it's good stress because we associate these sensations with positive things such as the sight, sound or even the smell of our lover.

The third aspect is attachment or bonding. There are two other hormones that work here, oxytocin and vasopressin. Oxytocin, known as the cuddle hormone, is released during sex and skin to skin contact. This heightens feelings of security and contentment, which help forge deep bonds with a mate. In some people, negative experiences as a child can affect the oxytocin system, making it harder for them to form attachments as adults. But thankfully, with the right kind of therapy, our brains can be rewired to form healthy relationships. As for vasopressin, this is released directly after having sex, and it too produces feelings of contentment. This may have a taming effect on more promiscuous people by triggering the neural reward system, encouraging you to want to stay with the person you love, and, all being well with time, love can morph into something stable and fulfilling. Research has shown that kindness plays a key role. You could say that a long term bond is a continuous exercise in kindness.

Of course, love can also have a darker side. Obsessive jealous behaviors can be intensified by falling levels of serotonin, a mood leveling hormone. And we all know that love doesn't always last, and when it doesn't, it hurts. Heartbreak is real. It's known as broken heart syndrome and can even be mistaken for a heart attack. The emotional stress that accompanies breakups releases chemicals that usually signal physical pain, so our brain interprets the breakup as intensely painful. But despite the heart breaks, the sweaty palms and the irrational behavior, people fall in love and stay in love every minute of every day. Because there was dopamine hits can feel amazing, so even if it doesn't always feel like it, the head really does rule the heart