

# Testosterone influences regulation of emotions in psychopath's brain

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Brain research has demonstrated that psychopaths exhibit reduced control over their emotional actions. Researchers from the Donders Institute at Radboud University Nijmegen discovered that the quantity of testosterone a person produces influences the parts of the brain responsible for regulating emotions. The findings provide starting points for the treatment of psychopaths. The results were published in the online journal *eNeuro*. The article by Karin Roelofs and her group was realised thanks to a Vidi grant from NWO's Talent Scheme.

Professor of Psychopathology Karin Roelofs and her colleagues at the Donders Institute for Brain, Cognition and Behaviour investigated a group of 15 psychopathic criminal offenders in a joint research project with the Pompe Foundation for forensic psychiatry. The researchers were particularly interested in how the supply of testosterone influenced the regulation of emotions.

Among the general public, psychopaths are mainly known for their planned and targeted form of criminality. They are generally classed as calculating and set to work with a high degree of

apparent cold-bloodedness. Less well known – but no less disturbing – is that psychopaths exhibit impulsive behaviour and experience problems in regulating their emotions. These problems often lead to difficulty in social contacts and to police arrest because at vital moments they lose their cool. Why is that?

During Roelofs' research, criminal offenders and healthy study subjects carried out a task in an MRI scanner that measured the response time of the automatic tendency to move the joystick towards oneself upon seeing images of 'friendly' faces or to push it away upon seeing 'angry' faces.

In the healthy control persons, the researchers saw a normal pattern of communication between the prefrontal cortex and the emotion centre, the so-called amygdala, if they had to control their reflex by making the opposite movement with a joystick ('angry' towards themselves, 'friendly' away from themselves). Such counter-intuitive joystick movements require control and that was very clearly observable in the brain activity.

Karin Roelofs: 'However in people with psychopathy, and especially in patients with high endogenous testosterone levels, significantly less activity in the prefrontal brain regions and less communication between the prefrontal [brain](#) and the amygdala was observed. Thus there was less communication between emotion [control](#) regions. The research results provide a neuro-hormonal explanation for emotional regulation problems in psychopathic patients.'

Furthermore, the results provide starting points for the treatment of [psychopaths](#) by influencing the amount of testosterone in their bodies.

**More information:** I. Volman et al. Testosterone modulates altered prefrontal control of emotional actions in psychopathic offenders, *eNeuro* (2016). [DOI: 10.1523/ENEURO.0107-15.2016](https://doi.org/10.1523/ENEURO.0107-15.2016)

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