Introduction. Neuroscience evidence suggests that, similar to addiction, obesity involves neuroplasticity of brain reward systems. We aimed at examining whether individuals with different levels of adiposity had impaired activation of the brain reward circuitry.

Method. Forty-two adults with excess weight (21 with overweight and 21 with obesity) and 39 adults with healthy weight underwent functional resonance imaging (fMRI) scans during three tasks that involve the processing of varied rewards: foods (Willing to Pay), money (Monetary Incentive Delay) and social offers (Ultimatum Game). Tasks-related Blood-Oxygen-Level-Dependent (BOLD) signal was compared between the three groups using Statistical Parametrical Mapping software (SPM8) and correlated with adiposity levels using SPSS 20 software.

Result. Overweight but not obese individuals exhibit increased activation of core regions of the brain reward circuitry (orbitofrontal cortex, amygdala, and ventral tegmental area) in response to monetary rewards compared to healthy weight controls. Conversely, obese individuals relative to overweight individuals exhibit increased activation of the dorsal striatum in response to highly palatable foods, and of the anterior insula and anterior cingulate cortex in response to social rewards.

Conclusion. Overweight associates with enhanced sensitivity of motivational reward circuitry, whereas obesity involves hypersensitivity of the habit (dorsal striatum) and interoception (insula) systems.