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Brain scans prove Freud right: Guilt plays key role in depression

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Scientists have shown that the brains of people with depression respond differently to feelings of guilt – even after their symptoms have subsided.

University of Manchester researchers found that the brain scans of people with a history of depression differed in the regions associated with guilt and knowledge of socially acceptable behaviour from individuals who never get depressed.

The study – published in the journal *Archives of General Psychiatry* – provides the first evidence of brain mechanisms to explain Freud's classical observation that exaggerated guilt and self-blame are key to understanding depression.

Lead researcher Dr Roland Zahn, from the University's School of Psychological Sciences, said: "Our research provides the first brain mechanism that could explain the classical observation by Freud that depression is distinguished from normal sadness by proneness to exaggerated feelings of guilt or self-blame.

"For the first time, we chart the regions of the brain that interact to link detailed knowledge about socially appropriate behaviour – the anterior temporal lobe – with feelings of guilt – the subgenual region of the brain – in people who are prone to depression."

The study used functional magnetic resonance imaging (fMRI) to scan

the brains of a group of people after remission from major depression for more than a year, and a control group who have never had depression. Both groups were asked to imagine acting badly, for example being 'stingy' or 'bossy' towards their best friends. They then reported their feelings to the research team.

"The scans revealed that the people with a history of depression did not 'couple' the brain regions associated with guilt and knowledge of appropriate behaviour together as strongly as the never depressed control group do," said Dr Zahn, a MRC Clinician Scientist Fellow.

"Interestingly, this 'decoupling' only occurs when people prone to depression feel guilty or blame themselves, but not when they feel angry or blame others. This could reflect a lack of access to details about what exactly was inappropriate about their behaviour when feeling guilty, thereby extending guilt to things they are not responsible for and feeling guilty for everything."

The research, part-funded by the Medical Research Council (MRC), is important because it reveals brain mechanisms underlying specific symptoms of depression that may explain why some people react to stress with depression rather than aggression.

The team is now investigating whether the results from the study can be used to predict depression risk after remission of a previous episode. If successful, this could provide the first fMRI marker of risk of future depression.

More information: 'Guilt-Selective Functional Disconnection of Anterior Temporal and Subgenual Cortices in Major Depressive Disorder,' by Sophie Green et al., *Archives of General Psychiatry*, 2012.