

# Teens' Self-Consciousness Linked With Specific Brain, Physiological Responses

July 02, 2013

Teenagers are famously self-conscious, acutely aware and concerned about what their peers think of them. A new study reveals that this self-consciousness is linked with specific physiological and brain responses that seem to emerge in adolescence.

“Our study identifies adolescence as a unique period of the lifespan in which self-conscious emotion, physiological reactivity, and activity in specific brain areas converge and peak in response to being evaluated by others,” says psychological scientist and lead researcher Leah Somerville of Harvard University.

The findings, published in [\*Psychological Science\*](#), a journal of the [Association for Psychological Science](#), suggest that teens' sensitivity to social evaluation might be explained by shifts in physiological and brain function during adolescence, in addition to the numerous sociocultural changes that take place during the teen years.

Somerville and colleagues wanted to investigate whether just being looked at — a minimal social-evaluation situation — might register with greater importance, arousal, and intensity for adolescents than for either children or adults. The researchers hypothesized that late-developing regions of the brain, such as the medial prefrontal cortex (MPFC), could play a unique role in the way teens monitor these types of social evaluative contexts.

The researchers had 69 participants, ranging in age from 8 to almost 23 years old, come to the lab and complete measures that gauged emotional, physiological, and neural responses to social evaluation.

They told the participants that they would be testing a new video camera embedded in the head coil of a functional MRI scanner. The participants watched a screen indicating whether the camera was “off,” “warming up,” or “on”, and were told that a same-sex peer of about the same age would be watching the video feed and would be able to see them when the camera was on. In reality, there was no camera in the MRI machine.

The consistency and strength of the resulting data took the researchers by surprise:

“We were concerned about whether simply being looked at was a strong enough ‘social evaluation’ to evoke emotional, physiological and neural responses,” says Somerville. “Our findings suggest that being watched, and to some extent anticipating being watched, were sufficient to elicit self-conscious emotional responses at each level of measurement.”

Specifically, participants' self-reported embarrassment, physiological arousal, and MPFC activation showed reactivity to social evaluation that seemed to converge and peak during adolescence.

Adolescent participants also showed increased functional connectivity between the MPFC and striatum, an area of the brain that mediates motivated behaviors and actions. Somerville and colleagues speculate that the MPFC-striatum pathway may be a route by which social evaluative contexts influence behavior. The link may provide an initial clue as to why teens often engage in riskier behaviors when they're with their peers.

Co-authors on the study include B.J. Casey, Rebecca M. Jones, Erika J. Ruberry, and Jonathan P. Dyke of Weill Cornell Medical College and Gary Glover of Stanford University.

This work was supported by K99 MH078713 and the Mortimer D. Sackler family.