
The relationship between puberty and social brain development

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Abstract

The social brain undergoes developmental changes during adolescence, and it is hypothesized that pubertal hormones contribute to this development. We used fMRI to explore how pubertal indicators (salivary concentrations of testosterone, oestradiol and DHEA; and pubertal stage determined by Tanner staging and menarcheal status) relate to brain activity during a social emotion task. 42 females aged 11.0 to 13.7 years underwent fMRI scanning while reading scenarios that pertained either to social emotions, which require the representation of another person's mental states, or to basic emotions, which do not. Across the entire group, the social versus basic emotion processing contrast resulted in activity within the social brain network, including the dorsomedial prefrontal cortex (DMPFC), the posterior superior temporal sulci, and the anterior temporal cortex (ATC) in both hemispheres. The group comparison showed that increased hormone levels (independent of age) were associated with higher activity in the left ATC during social relative to basic emotion processing. More advanced age (independent of hormone levels) was associated with greater activity in the DMPFC during social relative to basic emotion processing. Psychophysiological interactions showed that participants in later stages of puberty had increased functional connectivity between the DMPFC and other social brain network regions. This pattern of results suggests functionally dissociable effects of pubertal hormones and age on the adolescent social brain.

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