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Author

Qian, Yiming, PhD

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Girls' pubertal development is associated with functional connectivity in peer evaluation task

Yiming Qian^{1*}, Leehyun Yoon², Erika E. Forbes³, Alison E. Hipwell³, Kate Keenan⁴, Amanda E. Guyer^{1,5}

¹*Center for Mind and Brain, University of California, Davis, Davis, CA, USA*

²*Department of Psychology, University of Texas, Dallas, Dallas, TX, USA*

³*Department of Psychiatry, University of Pittsburgh, Pittsburgh, PA, USA*

⁴*Department of Psychiatry and Behavioral Neuroscience, University of Chicago, Chicago, IL, USA*

⁵*Department of Human Ecology, University of California, Davis, Davis, CA, USA*

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Abstract:

Growing evidence suggests that pubertal development shapes adolescent brain maturation; however, it remains unclear whether pubertal timing (earlier vs. later maturation) and tempo (rate of maturation) influence neural responses to peer evaluation. Using data from 120 girls in the Pittsburgh Girls Study, we examined how pubertal timing and tempo relate to neural activity and connectivity during a Chatroom fMRI task involving positive, negative, and neutral peer feedback. Regions of interest implicated in affective processing (anterior insula, subgenual and pregenual ACC, and amygdala) were examined for activity and functional connectivity when receiving positive (vs. neutral) and negative (vs. neutral) feedback from peers. No significant associations emerged for regional activation. However, faster pubertal tempo was associated with greater connectivity between the right anterior insula and medial prefrontal cortex, whereas earlier timing was linked to stronger amygdala–fusiform connectivity during peer rejection. Significant interactions between pubertal tempo and timing between right anterior insula and bilateral occipital regions/cerebellum, and between right pregenual ACC and right pre/postcentral gyrus were found. It revealed that faster maturation predicted greater connectivity among early-maturing girls, while slower maturation predicted greater connectivity among later-maturing girls. These findings highlight pubertal dynamics as key contributors to individual differences in socio-affective neural processing.

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Contact Information for Presenting Author: ymqian@ucdavis.edu