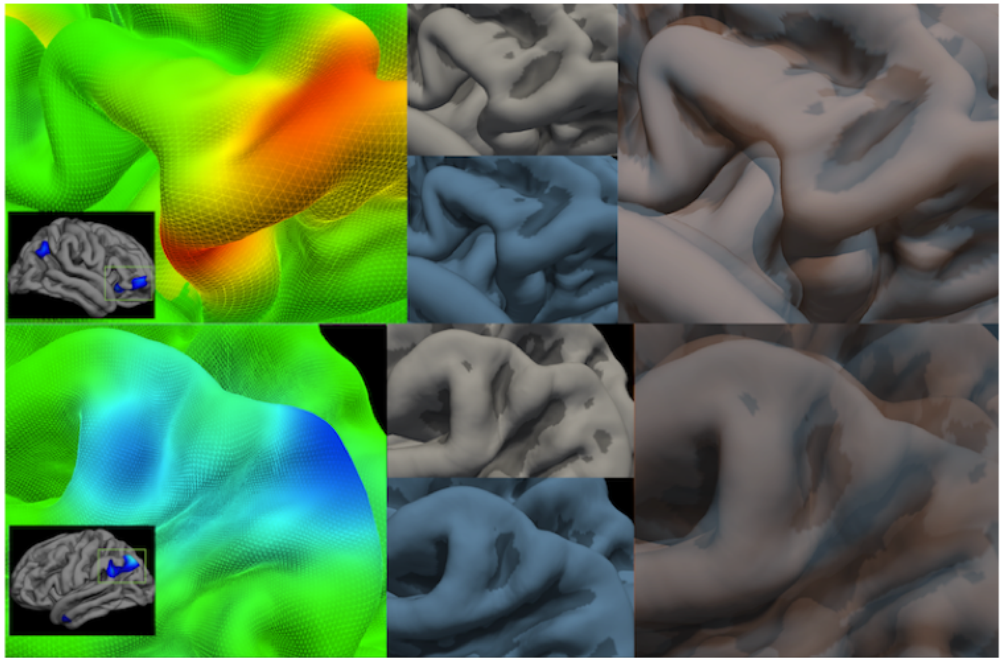
DevSci student Katherine Damme fills gap in psychopathologies research by examining prenatal development

Severe psychopathologies (e.g. schizophrenia and bipolar disorder) typically appear in late adolescence and early adulthood, a time of rapid neuromaturation. In addition to late adolescent neuromaturation, early brain development may critically contribute to future development of psychopathology. Increased rates of severe psychopathology have been linked to prenatal famine/nutrition, prenatal flu exposure, and deletions of genes related to early brain development. This evidence has led many to theorize that psychopathology may arise from an initial prenatal developmental insult and a second hit in late adolescent neuromaturation. Despite this model, psychopathologies are rarely examined in a developmental context and are instead treated as stable distinct categories. This approach does little to elucidate the pathophysiology of psychopathologies. Furthermore, little is known about the contributions of early brain development to psychopathology because clinical onset often occurs in late adolescence/early adulthood when later neuromaturational processes may have already obscured early prenatal development.

However, specific features of the brain develop at different stages; features like gyrification (cortical folding) reflect prenatal development, while features like gray matter volume change in adolescence and early adulthood. And so, gyrification, if stable in adolescence, may provide a more direct metric of early brain development and added insight into abnormal neurodevelopmental processes underlying

psychopathology. A recent study from Katherine Damme and Vijay Mittal found that gyrification was different in typically developing adolescents compared to those at clinical high risk for psychosis. This study also found that gyrification measured in late adolescence and early adulthood was relatively unchanged by adolescent neuromaturational processes (over a one-year follo (/https://devsci.northwestern.edu/files/2018/04/Katherine-Damme-2-newsletter-1xsd564.jpg) w up). This relative stability suggests that gyrification metrics may provide unique insight into the contribution of early development to risk for psychosis. Furthermore, gyrification metrics could be combined with other brain features (e.g. myelination and cortical thickness) which change in adolescent neurodevelopment to elucidate how risk may build over development. For more information on how biomarkers of prenatal development (i.e. gyrification) may provide insight into the contribution of early developmental insult and mark risk for psychosis, please see our recent publication (Damme et al., 2018



(/https://devsci.northwestern.edu/files/2018/04/Damme-article-photo-23065qr.png)

Differences in Local Gyrification Index (Left panel); Group averages High-risk for psychosis (blue) and healthy control subjects (gray) are displayed in the center panel, and Group surfaces are overlaid to show differences in the right panel (Damme et al., 2018)

(/https://www.sciencedirect.com/science/article/pii/S245190221830017X)).

In addition to examining features of brain development, Damme examines individuals at high risk for psychosis and bipolar disorder during the critical developmental time of illness onset. This approach allows Damme et al. to differentiate markers that relate to risk for illness from features of illness progression. In a recent study, Damme and Robin Nusslock found that adolescent/early adult development (i.e.

cortical volume) may distinguish healthy adolescents who have trait extreme reward sensitivity and mood volatility from individuals with a bipolar spectrum disorder (in prep).

Damme joined DevSci because she believes development is a critical perspective often overlooked in both traditional cognitive and clinical neuroscience while DevSci provides developmental insights from diverse perspectives.

Graduate students interested in the DevSci Cluster can learn more information about how to get involved in order to be eligible for seed funds can learn more on the **Center for Transdisciplinary Training Page. (/https://devsci.northwestern.edu/training-center/)**

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