

Publication Announcement!

The third manuscript using neuroimaging data from the Baby Brain & Behavior Project was accepted for publication! A short description of our findings is included in this newsletter.

Douglas, D. C. III, Planalp, E. M., Wooten, W., Kecskemeti, S. R., Adluru, N., Schmidt, C. K., Frye, C., Birn, R. M., Burghy, C. A., Schmidt, N. L., Styner, M. A., Short, S. J., Kalin, N. H., Goldsmith, H. H., Alexander, A. L., & Davidson, R. J. (*In Press*). Association of Prenatal Maternal Depression and Anxiety Symptoms with Infant White Matter Microstructure. *JAMA Pediatrics*.

Our second publication, "Investigation of Brain Structure in the 1-Month Infant" was featured in our Spring 2018 newsletter.

End of the Study-Fun Facts Recap!!

With the study nearing the end of data collection, we would like to formally thank you and your family for helping to make this a truly remarkable study! With your help, we collected a tremendous amount of data! Just to highlight the immense amount of information we collected, we've included a few fun facts below:

- 264 expectant women initially enrolled.
- 185 1-month MRI sessions and 135 24-month MRI sessions thus far, for a grand total of 320 sessions (and that's not including the piloting sessions).
- 660 scans acquired during the 1-month MRI session and 351 acquired during the 24-month MRI session thus far, for a grand total of 1,011 scans.
- An astronomical 28,876 total questionnaires completed with each phase contributing approximately 4,200 questionnaires.
- 114 samples collected at birth.
- 146 interview sessions at the 1-year phase, which averaged approximately 3 hours in length. This gave our interviewers 438 total hours of clinical experience for their licenses!
- 2,230 saliva tubes collected from moms and 1,380 saliva tubes collected from babies thus far, for a whopping total of 3,610 saliva samples!
- Over 6,200 Goldfish crackers eaten.
- Over 2,700 crayons given as prizes.
- Over 200 Jack in the Box surprises.

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Summer 2018

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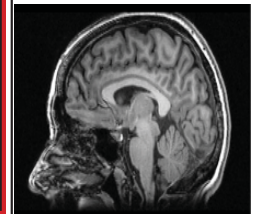
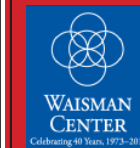
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Feature Article:

Associations of Prenatal Maternal Depression and Anxiety Symptoms and Infant White Matter Microstructure



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Research Update

Dear families,

I am delighted to report that the last toddler graduated from our study this summer! We visited with more than 100 toddlers and all of these toddlers participated in the 1-month neuroimaging session. More than 80% of the families who participated at the 1-month visit completed all four subsequent testing occasions. I know how busy family life is with a young child, having had two of my own! We are deeply grateful for your continued interest and commitment to making this research a success.

Many research analyses are underway. Our third paper was accepted for publication at the prestigious journal *JAMA Pediatrics* (see sidebar). Dr. Doug Dean, an expert in the brain's white matter microstructure, was the lead author on this paper. We examined the relationship between individual differences in mothers' prenatal experiences and variation in 1-month measures of brain white matter and remarkably we found that mother's prenatal emotional disposition was associated with variations in the white connectivity of their offspring's brain at one month of age. Our new data collection will enable us to determine if these differences persist over the first two years of life. Although, we cannot detect causal relationships between these processes, these data help us better understand the interplay of developmental sequencing and experiential events relevant to infant brain measures. These findings begin to lay the foundation for intervention studies that suggest more and more that programs to cultivate well-being in young children begin during the pregnancy of the mother.

This fall we will process the 24-month MRI and behavior data for analyses and publication. Cory Schmidt leads behavioral coding and worked with your children at age 6 and 24-months. The two behavioral visits include 259 hours of observed child behavior across 22 activities. The careful process of quantifying behavior is described in this newsletter. We look forward to sharing more research findings in the months ahead!

Warmest wishes to you and your family this fall!

With deep gratitude,



Richard J. Davidson,
William James and Vilas Professor of Psychology and
Psychiatry Founder, Center for Healthy Minds



Featured Research

Associations of Prenatal Maternal Depression and Anxiety Symptoms and Infant White Matter Microstructure

Doug Dean III, PhD

We continue to investigate early brain development with images collected at the 1-month MRI visit. As you may recall from the Spring 2017's newsletter, we have been studying infant white matter microstructure. White matter undergoes tremendous prenatal development and continues to develop into late adulthood. White matter connects different parts of the brain and enables different brain regions to communicate, making it very important for brain function and behavior. In one of our previous studies, we looked at age-related change during the first weeks of life. Building upon this work, we wanted to study individual differences in prenatal experience and white matter at 1-month.

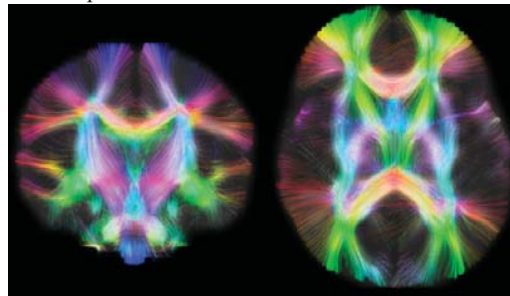


Figure 1: This image depicts the 1-month white matter microstructure, the "wiring" of the brain. Each individual line represents an estimate of a white matter fiber. The color represents the direction of the fiber. Green fibers correspond to white matter traveling front-to-back, blue fibers travel top-to-bottom, and red fibers travel right-to-left.

We reviewed 1-month white matter data and mothers' prenatal surveys at 28 and 35-weeks. Some white matter regions, including the right hemisphere corona radiata, external capsule, and dorsolateral prefrontal cortex, were associated with mothers' prenatal surveys, suggesting that the development of these white matter regions may be sensitive to different prenatal experiences. Our analyses also suggested that these patterns were different in boys and girls, which may be related to boys and girls having different rates of white matter development during early life. Importantly, this study raises new questions about white matter development and how it may be influenced by broader aspects of one's life experiences. See the "Publication Announcement" section for a complete citation of this article.

Many more studies will be conducted using the wealth of data collected from this project. We are beginning to explore how brain measures at the 1-month may be related to observed infant behavior at the 6-month study visit. Additionally, we will investigate continued brain and behavioral maturation with the 24-month MRI data. We are deeply thankful for your continued participation and commitment to this study. It is only with your participation that we have these data which will generate new knowledge about the impact of early experience on brain and behavior development.

Behavioral Visit-End of Study Update

Cory Schmidt, BS

The 6 and 24 month behavioral visits collected 259 hours of child behavior across 22 activities. The activities sample the young child's exuberance, frustration, persistence, inhibition, and activity level.



The coding procedures tell an important story about individual differences in the time course of emotion-related behavior. Each activity yields approximately 10 variables coded in 10-second intervals. Children show different levels and duration of behaviors. Moreover, even at a very young age, infants and toddlers display a variety of regulatory behaviors. Toddlers might distract themselves or use self-talk when asked to wait alone before opening a present. Individual differences are captured across a variety of contexts similar to what the child may experience at home, while shopping, or at a playground. Activities are adapted for different ages to provide continuity.

These activities were developed for broad research use by Dr. Hill Goldsmith, co-investigator for the project and are used throughout the world. Future analyses for this project will relate observed behavior to parents' observations and structural and functional neuroimaging data.

Fun Facts

At one year of age, a baby's weight has tripled since birth. They have also grown 50% of their newborn size, and their brain is about 60% of its adult size.

Recent findings showed that during pregnancy, cells from the fetus can migrate into the brains of their mother and a baby's DNA can show up in the mother's brain.

Contact Us

Help us keep our records up to date. Please email or call us with your current telephone number/s and address.

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