

Publication Announcement!

The second 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., Schmidt, C. K., Kecskemeti, S. R., Frye, C. J., Schmidt, N. L., Goldsmith, H. H., Alexander, A. A., & Davidson, R. J. (2018). Investigation of Brain Structure in the 1-Month Infant. *Brain Structure and Function*. doi: <http://doi.org/10.1007/s00429-017-1600-2>.

Our first publication, "Mapping White Matter Microstructure in the One Month Human Brain" was featured in our Spring 2017 newsletter.

Meet the Scientist-Walker Pedersen

I am a postdoctoral researcher who studies how the brain processes emotion and how emotion impacts cognition and social evaluation. I started working at the *Center for Healthy Minds* last summer, shortly after receiving my PhD from the *University of Wisconsin – Milwaukee*. I specialize in a variety of neuroscience techniques including functional, structural and resting state MRI, as well as EEG and other psychophysiological measures. Much of my recent work has focused on the bed nucleus of the stria terminalis, or BNST, a small region of the brain that is not well understood. I am very excited to be working on this project, as it is very uncommon to have access to such a rich dataset, with so many different measures across the same participants. I am grateful for the dedication of our participants in coming to the lab for multiple sessions and completing numerous tasks to allow us to conduct this research.



Baby Brain & Behavior Project
University of Wisconsin-Madison
Waisman Center
1500 Highland Avenue
Madison WI 53705

Address Service Requested

NONPROFIT ORG.
US POSTAGE PAID
MADISON, WI
PERMIT 658

Baby Brain & Behavior Project

University of Wisconsin-Madison

Waisman Center * 1500 Highland Avenue * Madison WI 53705
<http://conte.wisc.edu/bbb/>

Spring 2018

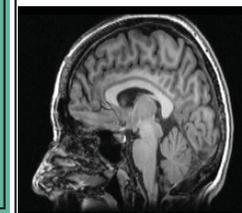
Director:
R. Davidson, Ph.D.

Collaborators:
UW Dept. of Psychology
UW Dept. Psychiatry
Waisman Center

Feature Article:
*Brain Structure Development
in the 1-Month Infant*



Funding for Research is provided by grant awards from the Silvio O. Conte Center for Basic Mental Health Research from the National Institute of Mental Health via grant P50-MH100031, Waisman Center, & private foundations.



Center for
healthy minds
UNIVERSITY OF WISCONSIN-MADISON

Research Update

Dear families,

This spring brings us to a very important chapter of our research activity. We have nearly completed the 18-month testing occasion and the last 2-year-olds will graduate from the study this summer. Over 120 toddlers celebrated their 2-year birthdays! Our second paper featuring our 1-month neuroimaging data was accepted for publication (see sidebar). These results are some of the earliest neuroimaging data to capture sex and age-related change in the first weeks of life. Every day I experience a moment of awe when I consider the tremendous richness of these early neuroimaging data collected from such sweet and precious sleeping newborns. And it is delightful to welcome them back to the Waisman Center as toddlers! Toddlers are incredibly fun – they are deeply observant and demonstrate growing independence even as they snuggle in with their dinosaur or butterfly pajamas.

Thank you so much for responding to our emails and for your continued interest in our research. Over 80 toddlers completed the 2-year scan to date. Each session is customized to your toddler's preferences. Toddlers are scanned in their natural sleep position after completing their typical bedtime routine. Toddlers enjoy all aspects of the behavioral sessions from seeing the buses on the way into the building, pressing the button on the elevator, and all of the activities during the visit. Each new survey, sample, and session adds tremendous scientific value. Your research participation will generate new knowledge about the impact of experience on early brain and behavior development for many years.

Warmest wishes to you and your family this spring!

With deep gratitude,



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

Fun Facts

One reason for a mother's impulse to kiss her newborn baby: the mother ingests bacteria/viruses on baby's skin, then her immune cells create antibodies that go into her breast milk, thus protecting the baby from imminent infection.

A baby is born on its predicted due date just 4% of the time

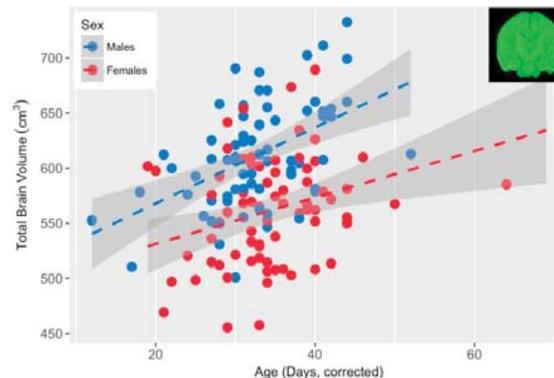
Featured Research

Brain Structure Development in the 1-Month Infant

Doug Dean III, PhD

Throughout early development, the brain undergoes rapid and systematic maturational change. Our study is one of the first in the world to consider very early development, particularly in those under 3 months of age. We looked at overall brain size and different brain regions during the first weeks of life. We also investigated how these changes were different in boys and girls.

As expected from previous work on the adult brain, we found that **boys had larger total brain volumes than girls**. We also found that several brain regions were different in size on the left and right sides of the brain. In particular, **sub-cortical structures involved in the processing of emotion detection, memory, and self-awareness were larger in the right hemisphere than the left**. **White-matter structures that connect many important areas of the brain were larger in the left hemisphere** as well. We also found that **areas involved with emotions and decision-making were larger in females than males at one month of age**.



This study was recently published in the journal *Brain Structure and Function* and highlighted by the *British Psychological Society* (<https://digest.bps.org.uk/2018/01/31/sex-differences-in-brain-structure-are-already-apparent-at-one-month-of-age/>).

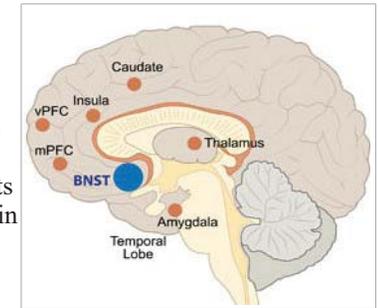
In sum, data from your MRI and laboratory visits has generated new knowledge about early brain development. We are grateful for the time and energy your families have contributed and continue to contribute to the success of our project. We are excited to examine developmental trajectories in these same children after the 2 year visit.

See the "Publication Announcement" section for a complete citation of this article!

The BNST: Area of Investigation

Walker Pedersen, PhD

The bed nucleus of the stria terminalis, or BNST, is a small brain region, about the size of a pea. The BNST sits deep within the brain, in a region known as the basal forebrain.



It has been greatly under-studied in humans, because its small size has made it difficult to investigate with magnetic resonance imaging. Because of this, the function of the BNST is not well characterized, especially in infants and toddlers. **It is believed that the BNST acts as a relay center between areas of the brain that process reward, stress, and anxiety**. Because of this, we are interested in the contributions the BNST may make to personality and patterns of behavior.

While the small size of the BNST presents researchers with challenges, recent work has demonstrated that activity in the BNST can be examined using a set of analysis techniques geared toward working with small brain regions. A key step in this type of analysis is having researchers define the BNST by hand in individual anatomical MRI scans. This hand-defined BNST can then be applied to functional MRI scans to assess the activity of the BNST. Hand-defining the BNST can take approximately 15 minutes per brain, so while it doesn't take a long time per brain, with 149 brains the time adds up! This process of identifying the BNST in individual brain scans is currently underway.

It is thanks to the MRI data acquired at 1-month that we are able to examine such a unique structure in early development. We hope to extend out investigation into the 2-year scans, so we appreciate all your efforts and dedication with scanning at this difficult age.

Contact Us

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

babybrain@mailplus.wisc.edu

(608) 890-3073 (local)