MINNESOTA CENTER FOR TWIN & FAMILY RESEARCH
DEPARTMENT OF PSYCHOLOGY
UNIVERSITY OF MINNESOTA

# MCTFR update

Minnesota Center for Twin & Family Research

## INSIDE:



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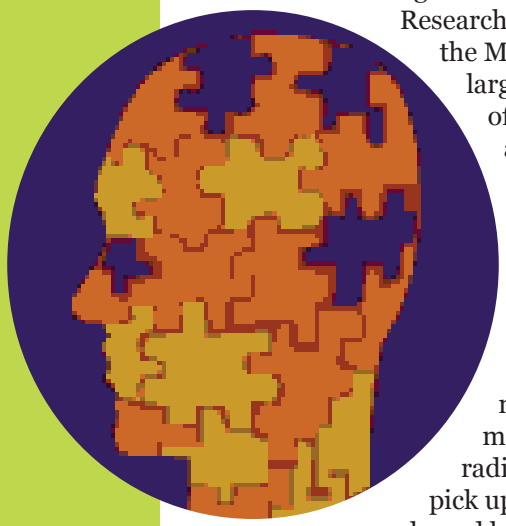
## *What's new at the MCTFR?*

## THE ADOLESCENT BRAIN STUDY

The MCTFR is pleased to introduce the Adolescent Brain Study (AdBrain), a new research initiative that began in January 2008. This study focuses on the development of the adolescent brain in identical twins. AdBrain differs from all other studies under the MCTFR umbrella because, in addition to an interview and lab session, the 48 families in the AdBrain study complete additional neuropsychological tasks as well as magnetic resonance imaging (MRI) to help us explore how genes and environment contribute to brain structure and function. *(Please note: The MCTFR does not intend to integrate MRI into the visits that most of our participants are used to. That is, if you have not done an MRI with us in the past, we will not ask you to complete one in the future.)*

AdBrain marks the MCTFR's first opportunity to utilize MRI technology at the University of Minnesota's Center for Magentic Resonance Research. How does the MRI work? A large portion of our bodies are made up of water, which contains hydrogen atoms, and the MRI scanner uses magnetic and radio waves to pick up signals released by these hydrogen atoms. This makes it possible to produce pictures of almost all the tissues in the body, including brain tissue. Researchers can also observe how we think via functional magnetic resonance imaging (fMRI), a newer technology that measures the tiny metabolic changes that take place in active parts of the brain. Magnetic resonance imaging has been around for decades, however, its use for psychological research is still in its infancy.



Since certain portions of the brain are still developing during adolescence, AdBrain participants visit us twice over the course of two years so we may observe how their brain structure and functions have changed. What makes AdBrain an especially informative imaging study is the participation of identical twins. Because identical twins are genetically the same, any brain differences between them reflect a difference in environmental factors. It is our research goal to determine which environmental differences or behavioral choices may be responsible for the development of brain functions such as planning, reasoning, judgment, foresight, and memory.

Presently, AdBrain is in its second phase in which all 48 families are returning to complete their final visits with us. We are excited to be working with them again and we look forward to delving into all the interesting and valuable information we have gathered!

*Chrissy Evensen (AdBrain Coordinator), Daniel Bedford (Data Analyst), and Allie Savela (Family Recruiter) all contributed to this article.*

# MEET THE STAFF: DR. MARGARET KEYES

***By: Lisa Legrand, PH.D.***

Why do some people fret and worry about the future while others remain as cool as cucumbers? Why do some people seek out risky and exciting situations while others do everything in their power to avoid them? In short, why do people differ in the various ways that they do?

Dr. Margaret (Meg) Keyes has always been intrigued by this question of the origin of individual differences, and she has devoted her career to trying to answer it. In 1972, Meg moved to the Twin Cities and enrolled at the University of Minnesota. After completing her B.A., she began a Ph.D. program in Differential Psychology, a field seemingly tailor-made to her curiosities. Differential Psychology uses simple yet brilliant research designs to try to understand why people differ so dramatically in their personalities, interests, and abilities.

The study of identical twins adopted into separate families is one such elegant research design. These individuals have matching DNA, yet distinct rearing environments, and so allow for an unusually precise analysis of nature versus nurture. As many of you know, Minnesota's Psychology Department is famous in part because of Professor Tom Bouchard and his extensive Study of Twins Reared Apart. As Tom's graduate student, Meg was involved with this project from the beginning. In fact, it was Meg who first read a newspaper article about "the Jim twins," a pair of identical twins adopted into different families and yet given the same name by their rearing parents. What was astonishing about this pair was not that they had matching names, but that they had led eerily similar lives. Intrigued by the newspaper clipping and all that it suggested about human nature, Meg presented it to her advisor. Almost without delay, Tom then embarked on this now-legendary project, which involved bringing together and testing all the reared-apart twins that he could locate.

Meg took up the post of Tom's Assistant Director and proceeded to spend the next several years administering personality, vocational-interest, political, and ability questionnaires to reared-apart twins. Since they often came from other states and even countries, the laboratory visits extended over an entire week. Not surprisingly, Meg got to know many of these research participants quite well. When asked about this, she has said, "I could see the strong effects of genes. But despite the sometimes remarkable similarities, there were always also important differences. I saw how the same behaviors and choices could have very different consequences in different families. I also came to appreciate how a nurturing home environment could buffer the effects of a difficult temperament, for instance, by helping an anxious child make a smooth adjustment to school or to other changing circumstances."

Given her research background and strong interest in environmental effects, it was a natural move for Meg eventually to join our study. Meg became a part of the MCTFR eight years ago, right when our twin study was expanding to include our adoption study (SIBs). SIBs almost perfectly complements her interests and convictions, as it is an equally fascinating, yet polar opposite, parallel to the reared-apart project. Reared-apart identical twins share all of their DNA but none of their family environment, while adoptees share with their siblings all of their family environment but none of their DNA. Not only has Meg's research come full circle, but it has landed her at a place of special interest: she herself is an adoptive parent.

Over the past eight years, Meg has played an integral role in the development and progress of the MCTFR. She oversees the coding of the family-interaction tasks, works on a number of data-accuracy projects, assists with grant writing, and conducts her own research analyses. To date, Meg's publications have focused on the emotional adjustment of adopted youth and on the effects of parents' nicotine and alcohol use on their adolescents' substance-use experimentation. She is delighted that we are now collecting participants' DNA, as she thinks this is the path of the future. She believes this will finally allow scientists, including herself, to figure out exactly how the environment interacts with varying genetic predispositions. She thus looks forward to the day when humans' great psychological diversity becomes something less of a mystery.

*Lisa Legrand is a Behavioral Geneticist and Clinical Psychologist who received her degree from the University of Minnesota in 2003. She has worked with the MCTFR since 1993.*

# RESEARCH perspective

## The Importance of Your Return Visits with the MCTFR

*By: Bente Hartwig*

Have you ever wondered why we keep asking you to come back to the study, even after you haven't been here for a few years? We ask you to return year after year because The Minnesota Center for Twin and Family Research is a longitudinal study. This means a study that follows a group of participants over a span of time and measures changes in data. Using this type of data collection, investigators can see how variables change over time. All of our participants have been encouraged to return several times to repeat old tasks, as well as new ones, that are included in either the interviewing or psychophysiology component of our study.

When you come in for your follow-up visits, we often have you do tasks that you have done before. A very familiar one in the lab may be the "Begleiter Task," or the task with the nose and ears. This task asks that you press the correct button that corresponds to which side the ear appears on the head. While you do this task, we have you set up in a brain wave cap and we measure your brain waves. This measurement is called the electroencephalogram, or the EEG, and it has been used in many research studies. Our study looks at a particular wave, the P300, that has been linked to decision-making. Each time you return to our study, we have you complete this task and we measure the P300 amplitude, or height. We can then look at this measure as it changes from visit to visit and assess the factors that play a role in its formation.

We know that sometimes it may not be obvious why we ask you to repeat the same task over and over again. However, such repetition is very important to the success of a longitudinal study. By having you repeat certain measures we can determine two very important statistical variables: reliability and validity. Reliability refers to the ability of some task or person to consistently produce the same results. This would be the same as retaking a test at school: if you got a 90% the first time, could you get a 90% if you took the test again? Validity refers more to making sure the test is measuring what it is designed to measure.

When we have you return at different ages, we can also take into account changes in your life or lifestyle. We can ask the question, "what in your environment has changed that may have affected certain measures?" By looking at twins, we can see how different environmental factors may affect individuals with similar genetic make-ups. If the first time a participant does the Begleiter task they have a high P300 amplitude and it decreases the next time the participant does the task, researchers at the MCTFR can look at what variables have changed between visits. Alternatively, if twins show the same trend in their P300 levels, perhaps we can conclude that there is a strong genetic influence on this measure.

There are also several measures for which we anticipate change with age, such as eyesight, height, and weight. We can keep track of these shifting variables with each visit. Additionally, performance on certain memory tasks increases until a given age and then tends to level off, or even decline, from that age on. Having you repeat all these tasks helps us define the turning point for age-related performance.

As you can see, it is very important that we collect multiple measures for each test to see what environmental and genetic factors play a role. We know that coming to the study is a big commitment, but we hope this information gives more meaning to your participation-and helps keep your visits interesting throughout the years!

*Bente Hartwig is a Psychophysiologist at the MCTFR.*

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Address Service Requested

Did you know that the likelihood of having identical twins is about 1 in 285? And the likelihood of having fraternal twins can be as high as 1 in 37!

# TWIN*arithmetic*

One of our participants - an identical, female twin - let us know she gave birth to fraternal twins. What's more, they were born on her own birthday! Now, assuming that being an identical twin, giving birth to fraternal twins, and giving birth on one's own birthday are all independent events, the probability of all these things happening simultaenously is about 1 in 3.8 million!

**Do you have a story to share with the MCTFR? Email us with your twin stories at:**
**doubles@tfs.psych.umn.edu**
**Email us with your adoption or sibling stories at:**
**sibs@tfs.psych.umn.edu**

# thank you

We can't say it enough! Your participation is invaluable. If you would like to see how your participation has helped, please visit our website at:

www.mctfr.psych.umn.edu

Here, you can see what we have recently published. You can also update your contact information if you have recently moved!