The Michigan State University Twin Registry (MSUTR): Opportunities for Collaboration

Fall 2013 Newsletter

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MSUTR Statistics

Table 1
N by Age at Recruitment

Age Range	# of Twins Enrolled
3-7*	10,748
8-17	11,550
18-25*	544
35-45*	1,412
Total	24,254

*Recruitment is on-going.

Table 2
MTP Demographics

Twins	%
Male	51%
Female	49%
White	83%
Black	8%
Hispanic	2%
Asian	1%
Multiracial	5%
Other	1%
Same-sex MZ	30%
Same-sex DZ	36%
Opposite Sex	34%

The MSUTR: A useful addition to your research program?

The Michigan State University Twin Registry (MSUTR) is a large, population-based twin registry that is co-directed by Drs. S. Alexandra Burt and Kelly Klump in the Department of Psychology at Michigan State University (MSU). Twin studies are exceptionally strong tools for examining the etiology of a trait or disorder, as they allow for the examination of genetic influences across multiple levels of analysis (latent and molecular) and layers of risk (environmental, biological, epigenetic). The MSUTR capitalizes on the inherent strengths of twin methodology to build a leading resource for faculty and trainees and foster innovative scholarship in health and genetic research. The specific goals of the MSUTR are to:

1) ***Significantly enhance health research infrastructure at MSU by providing a unique resource for subject identification and recruitment; and***
2) ***Immediately generate new knowledge through the analysis of collected twin data that can examine genetic risk, environmental risk, and gene-environment interplay in the development of major medical and psychiatric conditions.***

These goals are achieved by recruiting child, adolescent, and adult twins born in Michigan into the MSUTR. The majority of recruitment into the registry occurs through the Michigan Twins Project (MTP), a mail-in survey with questions about basic demographic characteristics, twin zygosity, birth variables (e.g., birth weight, birth complications), and family history of over 45 medical and psychiatric illnesses. By answering a future participation question, twins and their families indicate whether they would be interested in participating in future research studies (>96% of twins/families say yes). In addition to the potential for recruiting these twins for further research, answers on the health questionnaire can be immediately analyzed to examine genetic and environmental influences on major health conditions.

We welcome researchers to use the MTP in their research programs, and invite collaborations for data collections and/or analysis of archival data. For more information on collaborative opportunities, please see the "Accessing the Registry" section on page 3. For more information about the MSUTR and MTP, please see the following papers:

- Burt, S.A., & Klump, K.L. (2013). The Michigan State University Twin Registry (MSUTR): An update. *Twin Research and Human Genetics, 16 (1),* 344-350.
- Klump, K.L., & Burt, S.A. (2006). The Michigan State University Twin Registry (MSUTR): Genetic, environmental and neurobiological influences on behavior across development. *Twin Research and Human Genetics, 9 (6),* 971–977.

MSUTR Seminar: 3/19/14

The Directors of the MSUTR will be presenting a seminar on the basic conceptual and statistical model used in twin analyses on Wednesday, March 19th from 12:00-2:00pm in room 230 in the Psychology Building. All interested faculty and trainees are encouraged to attend!

MTP Recruitment – History and Current Status

As noted above, the majority of recruitment into the MSUTR has occurred through the MTP. Recruitment for this project began in 2008 in collaboration with the Michigan Department of Community Health (MDCH). Recruitment efforts first focused on child and adolescent twins (ages 3-17 years), and over 24,000 twins have been enrolled in the registry to date. While this recruitment is on-going, the majority of the original target population has been recruited, so we are now focusing on the following recruitment efforts:

- **Enroll new cohorts of 3 year-old twins each year** to keep the registry active and increase the number of twins available for follow-up studies.
- **Re-assess the youngest twins (ages 3-7) every 5 years** to ensure updated health/family information and to allow for longitudinal analyses of MTP collected data.
- **Expand recruitment of young adult twins (ages 18-25)**, with the goal of enrolling 5,000 twins in this age group.
- **Expand recruitment of twins in middle adulthood (ages 35-45)**, with the goal of enrolling 6,000 twins in this age group. This cohort includes assessments of the twins as well as information about their spouses and children that can be used for expanded twin analyses capable of examining intergenerational transmission of genetic and environmental risk.

Please note that parents of twins between the ages of 3 and 17 years complete the enrollment questionnaire for the entire family, while adult twins (ages 18-25 and 35-45) each receive and complete their own survey.

Recent Findings

Data from the MSUTR are already generating new information via analysis of archival data and new data collections. There currently are eight independent research groups (Dr. S. Alexandra Burt, MSU Dept. of Psychology; Dr. Kelly Klump, MSU Dept. of Psychology; Dr. Nigel Paneth, MSU Dept. of Epidemiology; Dr. Christopher Hopwood, MSU Dept. of Psychology; Dr. Jason Moser, MSU Dept. of Psychology; Dr. James Pivarnik, MSU Dept. of Kinesiology; Dr. Melisa Moore, the Children's Hospital of Philadelphia; Dr. Christopher Trentacosta, Wayne State University) making good use of the MSUTR in their research programs. MSUTR data is also being used in collaborative efforts with international consortia studying the genetics of antisocial behavior and the heritability of anthropometric traits.

Examples of recent findings include:

- **Dr. James Pivarnik's lab** investigated sex differences in the genetic and environmental influences on percent body fatness and physical activity, using male and female adolescent twins drawn from the MSUTR. Body fatness was found to be mainly influenced by genetic effects for males and females, while physical activity was influenced solely by environmental effects for both sexes, with greater shared environmental influences found for boys and greater nonshared environmental influences found for girls.
    - White, E., Slane, J.D., Klump, K.L., Burt, S.A., & Pivarnik, J. (in press). Sex differences in genetic and environmental influences on percent body fatness and physical activity. *Journal of Physical Activity and Health*.
- **Dr. Jason Moser's lab** investigated maladaptive perfectionism as an etiologic mechanism for anxiety, using young adult female twins drawn from the MSUTR. Results suggested that genetic factors are primarily responsible for the phenotypic association found between anxiety and maladaptive perfectionism, indicating that perfectionism may function as an endophenotype for anxiety, mediating the relationship between genotype and disease. This was the first study to demonstrate the primary role of genetic factors in this relationship.
    - Moser, J.S., Slane, J.D., Burt, S.A., & Klump, K.L. (2012). Etiologic relationships between anxiety and dimensions of maladaptive perfectionism in young adult female twins. *Depression and Anxiety, 29*, 47-53.

- **Dr. Klump and colleagues** used MSUTR twins to examine ovarian hormone interactions in the prediction of within-subject changes in emotional eating in the largest sample of women to date. Results confirmed that changes in ovarian hormones predict changes in emotional eating across the menstrual cycle, with a significant estradiol × progesterone interaction that helps explain midluteal increases in emotional eating.
    - Klump, K.L., Keel, P.K., Racine, S.E., Burt, S.A., Neale, M., Sisk, C.L., Boker, S., & Hu, J.Y. (2013). The interactive effects of estrogen and progesterone on changes in emotional eating across the menstrual cycle. *Journal of Abnormal Psychology, 122(1)*, 131-137.
- **Dr. Burt and colleagues** used MSUTR twins to study the etiologic mechanisms behind the reduction in non-aggressive antisocial behavior associated with increased levels of prosocial peer affiliation during childhood. Results suggested a gene-environment interaction in which prosocial peer affiliation suppresses genetic influences on antisocial behavior, providing support for the theory that protective environmental experiences may exert their influence by promoting resilience to genetic risk.
    - Burt, S.A., & Klump, K.L. (in press). Prosocial peer affiliation suppresses genetic influences on non-aggressive antisocial behaviors during childhood. *Psychological Medicine*.

Other labs have collected new data using the MTP as the recruitment pool. Examples of these studies include:

- **Dr. Christopher Trentacosta's lab** is recruiting MSUTR twins to investigate the development of executive functioning, including working memory, attention control, and the ability to regulate one's own behavior, in children ages 3-5 years old. This study is funded by a grant from the Michigan Bloodspot Environmental Epidemiology Project (BLEEP).
- **Dr. Christopher Hopwood's lab** collected longitudinal, pilot data from adolescent twins recruited from the MSUTR for a study on the etiological influences on stability and change in different features of personality, including traits, disorders, and self-narratives. This study was funded by a grant from the Michigan State University Competitive Discretionary Funding Program.
- **Dr. Jason Moser's lab** collected pilot data from late adolescent/early adult female twins recruited from the MSUTR for a study of genetic and environmental factors influencing anxiety and brain activity. This study was funded by a Building Interdisciplinary Research Careers in Women's Health Scholar Training Grant (K12) from the National Institutes of Health.
- **The OWL (Outcomes, Wellness and Life course in Cerebral Palsy) project** recruited twin pairs from the MSUTR to study the origins of cerebral palsy. A particular interest was in twins discordant for cerebral palsy, which is the case for nearly 90% of twin pairs. This project selected twins with CP from the MTP Health Questionnaire and then conducted in-depth, follow-up assessments with each family. This study was funded by a Research Project Grant (R01) from the National Institutes of Health.

Accessing the Registry

We welcome inquiries from scientists interested in accessing the MSUTR for use in their own projects, whether as a resource for the identification and recruitment of participants or as a pre-existing source of data on health conditions, demographics, and behavioral characteristics of twins and their families. Researchers interested in using the registry are asked to submit a data use proposal that outlines the study aims, the target subject population, project timelines, and the resources needed. Proposals

Partial List of Screening Items:

- **ADHD**
- **Alcoholism**
- **Anxiety Disorders**
- **Asthma**
- **Autism**
- **Bipolar Disorder**
- **Cancer**
- **Cerebral Palsy**
- **Conduct Disorder**
- **Depression**
- **Diabetes**
- **Drug Abuse**
- **Eating Disorders**
- **Heart Problems**
- **Learning Disabilities**
- **Schizophrenia**
- **Stuttering**

may be submitted for data analysis of existing data only, or for targeted recruitments from the registry. All proposals will be evaluated by the MTP Advisory Committee (Current members: Drs. Burt, Klump, Hopwood, Moser, and Paneth), particularly with regard to potential overlap in subject recruitment with other projects. Once approval is received, access to the data will be granted or the recruitment process begun, depending on the needs of each investigator.

Twins may be selected for recruitment based on age, sex, twin type, and development status, in addition to the screening items listed on the health survey (please page 3 for a partial list). Recruitment mailings to the selected twins will be prepared by MTP staff and delivered to the MDCH for mailing. Up to four mailings will be sent to those who do not respond to prior mailings, with the fourth mailing using certified letters. Using these methods, studies recruiting from the MTP have observed excellent response rates (57-86%; mean response rate is 70%) that include subjects who are representative of the state of Michigan in terms of racial/ethnic background and socioeconomic status (see Burt & Klump (2013) paper listed on page 1).

In order to cover expenses associated with subject selection and recruitment mailings, each project will be charged a Registry Access fee (for details, please contact MTP Project Coordinator Eric Gernaat: gernaate@msu.edu). These fees cover the cost of mailing preparation, all mailing expenses (including a certified, fourth mailing), and staff time at both MSU and MDCH. Please note that costs are higher for the recruitment of adult than child twins since adult recruitment requires mailing two separate recruitment packets (one to each adult twin) whereas recruitment of child/adolescent pairs requires only one packet sent to the twins' parents. There is no charge for analyzing existing MSUTR data.

If you would be interested in accessing the MSUTR for use in your own project, or you would like to learn more about the MSUTR, please feel free to contact us using the information provided below:

General Inquiries: msutr@msu.edu

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