

Identical vs. Fraternal Twins

Parents of multiples are often asked, “are your twins identical or fraternal?” The terms identical and fraternal are common words that refer to zygosity -- the characteristics of the cell union that happened at conception. Identical (monozygotic) twins form when a single fertilized egg splits into two genetically identical parts. Identical twins share 100% of the same DNA and are usually highly similar in their physical attributes. In fact, some parents of identical infant twins find they must dress them differently or distinguish them in some other way. Physical appearance is also influenced by environmental factors, so some identical twins can look very different, especially as they reach adolescence. Except for rare instances, identical twins are of the same sex.

Fraternal (dizygotic) twins develop when two separate eggs are fertilized. **Fraternal twins are as genetically similar to each other as siblings born at separate times.** Fraternal twins may look alike, or may look very different. How do parents confirm their twins’ zygosity? The only way to know zygosity for certain is through genetic testing, when a sample of DNA is taken from each child (usually through a swab on the inside of the cheek or saliva). So why does it matter? Parents may be motivated by medical concerns or simply want to satisfy their curiosity. DNA testing is a component or research participation for some families. We refer other families to a mail order option

that provides results in about ten business days. For more information about genetic testing: <http://www.affiliatedgenetics.com/twinzygosity.cfm>



Wisconsin Twin Project
University of Wisconsin-Madison
Waisman Center
1500 Highland Ave.
Madison, WI 53705

Address Service Requested

NONPROFIT ORG.
US POSTAGE PAID
MADISON, WI
PERMIT 658

Wisconsin Twin Research

University of Wisconsin - Madison

Waisman Center • 1500 Highland Avenue • Madison, WI 53705

www.waisman.wisc.edu/twinresearch

Director:

H. Hill Goldsmith, Ph.D.

Collaborators:

UW Dept. of Psychology
UW Dept. of Psychiatry
Waisman Center
Arizona State University
Medical College of Wisconsin

Feature Articles:

*How genes and
environment promote
positive development*

Kathy Lemery-Chalfant,
Co-Principal Investigator



Funding for research is provided by grant awards from the National Institute of Health, National Alliance for Autism Research, Waisman Center & private foundations.



Waisman
Center



*“If you think our hands are
full, imagine our hearts.”
~Author Unknown*

Research Update

Nicole Schmidt, Research Program Manager

I recently posed the question “What is the impact of our research publications?” Dr. Goldsmith has produced more than 150 publications. ISI Web of Knowledge contains a tool to investigate how many

times one’s work is cited, and while it does not capture every

Total citations: 3,155
Average citations per item: 24.65

publication, it is a fun tool nonetheless. Results from this online search are below, which show **over 3,100 citations** (over 90 citations per year). Dr. Goldsmith’s most cited work is his roundtable discussion on

temperament published in the Journal of Child Development in 1987 and has been cited more than 372 times. A second article with a lot of impact concerns the neural circuitry of face processing in autism, published in Nature Neuroscience in 2005 and has already been cited more than 275 times, approximately 39 times per year! Textbooks

represent another important impact, given the thousands of young adults enrolled in courses who represent a wide range of individuals. Anyone that has taken a course in child development has almost certainly read text where Dr. Goldsmith was cited. His work has undoubtedly shaped the understanding of children, emotions, and development for countless people. This new generation of teachers, service workers, scientists and parents has a richer perspective of young people, perhaps benefiting young people the most. I personally have a richer conceptualization of children and their individuality. We appreciate all the twin families who make our science possible! Dr. Goldsmith’s full curriculum vita is linked on our website at

<http://www.waisman.wisc.edu/twinresearch/researchers/goldsmithcv.shtml>

With gratitude,

Nicci

Featured Results

How genes and environment promote positive development

Kathy Lemery-Chalfant, Co-Principal Investigator

Resilience is a process of successful adaptation to adversity. Advances in our understanding of genetics and brain function permit closer study of biological factors that contribute to resilience. The excitement, and the challenge, is in understanding the interplay of personal, environmental, genetic, and neurobehavioral factors. These factors do not operate in isolation, but rather in concert. For instance, genetic factors may suggest a propensity towards anxiety in early childhood. Yet, only a proportion of individuals with this genetic risk experience anxiety. Features of the environment, such as a supportive parent relationship, or other personal characteristics such as happiness interact with genetic variables. Genetic factors also interact and promote or inhibit a propensity towards a behavior and change over time. **Developmental systems are dynamic and highly complicated, and twin studies are uniquely positioned to untangle these relationships in a meaningful way.**

Happiness appears to be the central factor in resilience and well-being. Happy people live longer, have stronger immune systems, and show greater self-regulation and coping skills. In the past 30 years, research has summarized characteristics that facilitate and enhance resilience across the lifespan: positive emotions (e.g. optimism, humor), cognitive flexibility, active coping style, meaning (e.g. spirituality, altruism), and social support. Furthermore, **research worldwide has concluded that each of these variables is influenced to some degree by genetics factors and may be different as a function of gender, age, and culture.**

Association studies examine whether there is a statistical association between particular genetic variants and an observed characteristic (e.g. optimism). You may hear or read shorthand language of “gene for…” These labels mean very little without specifying the context or environmental circumstance. For instance, a gene may confer risk in one context and be protective in another context. For instance, a functional polymorphism in the catechol-O-methyltransferase (COMT) gene illustrates this idea. One allele is associated with *enhanced* cognitive processing but exaggerated stress reactivity, whereas the other allele is a risk factor for cognitive *dysfunction* but protective in stressful environments. COMT is a key enzyme that metabolizes dopamine in the prefrontal cortex. Dopamine is critical for adjusting cognition, and impacts behavior and emotion.

Genetic influences are probabilistic, and we should guard against explaining health, well-being, and resilience in a reductionistic “genetic engineering” manner. **It is important not to classify genes as “good” or “bad,” without specifying the environmental circumstance.** A central concept of evolution is that individual differences are adaptive; there is no single prototype that is ideal for all conditions. Some genetic variations are more successful than others depending on the environment and life stage. Thus, it is largely diversity, rather than good genes or bad genes that matters. The Wisconsin Twin Project is currently examining COMT and related genes to improve our understanding of the interplay between genes, environment, and behavior at first grade and early adolescence.

Lemery-Chalfant, K. (2010). How genes and environments work together to promote resilience. In J. W. Reich, A. J. Zautra & J. S. Hall’s *Handbook of adult resilience* (pp. 55-78). Guilford: New York.

Twins and Research on Autism

We estimate that there are as many as 200 pairs of twins in Wisconsin under the age of 18 in which one or both twins has autism or some other form of pervasive developmental disorder (PDD-NOS or Asperger Syndrome). We have great personal and scientific interest in these disorders. In the first phase of our current work, parents are interviewed via telephone about their children’s developmental and medical history. The interview takes 45-60 minutes and families are paid \$25. Some families may be invited for a follow up. All participation is scheduled at your convenience.

In order to accurately assess the prevalence of autism in twin pairs, we would like to know if your family or someone you know has a family where one or both twins have some form of autism, even if they choose not to participate. Thus far, we have located about 160 twin pairs in which one or both has autism or a related challenge. **We would appreciate a phone call or email from parents of twins with autism living in Wisconsin.** It is not important if the twins are identical or fraternal, boys or girls, or even if the co-twin has any behavioral issues or not; we are interested in all aspects of the autism spectrum.

Please contact Bret Vlach for more information: tap@waisman.wisc.edu

☎ (866) 230-2560 (toll-free)
☎ (608) 262-5574 (local)



Fun Facts

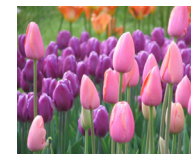
273 = number of students trained in the lab (since 1999)

118,755 = total enrollment and training hours from undergraduate students

356 = most number of interviews conducted by one student before graduation (Patrick Belling, class of ‘10)

\$323,745 = total money paid to research participants (1999 – 2010)

Thank you



Thank you for participating in home visits, telephone interviews, and questionnaires! Your perspective is invaluable to our research. We enjoy meeting so many wonderful families. Thank you to all the families who have called to participate in our ongoing studies of culture and family background. Your participation contributes to advances in child development research and improves our understanding of individual differences and the complexities of personality and behavior. ☺ Enjoy your twins!

Moving? Want to get involved? Contact us now!

☎ (866) 230-2560 (toll free)

✉ Email: wisconsintwins@waisman.wisc.edu
<http://waisman.wisc.edu/twinresearch>