

TEDS

SPRING 2009

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THE NEWSLETTER FROM TEDS [TWINS EARLY DEVELOPMENT STUDY]

An Exciting New Award for TEDS

TEDS HAS BEEN SELECTED to be included in a £16-million project to identify genes for common disorders. Funded by the largest UK charity, the Wellcome Trust, the project will use new DNA techniques to identify genes for 25 common diseases and disorders for nearly 100,000 cases. The 25 diseases include many medical disorders such as problems with breathing (asthma), skin (psoriasis), eye (glaucoma), brain (stroke), and mental illness (schizophrenia). A much smaller forerunner of the Wellcome Trust Case-Control Consortium 2 led to one of the most highly cited publications in all of science in recent years published in the journal *Nature* in 2007.

TEDS was included in this prestigious project to allow us to use the latest DNA techniques to study learning abilities and

disabilities (reading and maths) rather than traditional medical disorders. DNA donated by 4000 twins in TEDS will be genotyped for 2 million DNA markers using the latest technology at the Wellcome Trust Sanger Centre. DNA for another 2500 TEDS twins will be used to follow-up on initial findings. The DNA came from those cotton bud cheek swabs that many of you have returned to us. When we get our data back from the Sanger Centre we at TEDS will compare the 2 million DNA markers with the web-based test data that TEDS twins completed at age 12 in order to find genes that are related to learning abilities and disabilities. If we had done the genotyping ourselves, this would have cost more than a million pounds.



Charles Curtis, PhD student, delivers DNA to the Sanger Centre



Wellcome Trust Sanger Centre

In recent newsletters, we told you about some of our previous DNA work along these lines, including the first such studies of learning abilities and disabilities. (See references, right.) What we learned is that finding genes will require the latest technology which is very expensive and we are very pleased to be able to do it! We will let you know the results next year.

*Meaburn, E. L., Harlaar, N., Craig, I. W., Schalkwyk, L. C., & Plomin, R. (2008). Quantitative Trait Loci association scan of early reading disability and ability using pooled DNA and 100K SNP microarrays in a sample of 5760 children. *Molecular Psychiatry*, 13, 729-740.*

*Butcher L.M., Davis, O.S.P., Craig, I.W., & Plomin, R. (2008). Genomewide QTL scan of general cognitive ability using pooled DNA and 500K SNP microarrays. *Genes, Brain and Behavior*, 7, 435-446.*



TEDS makes a difference!

THE PURPOSE OF SCIENCE is to make discoveries that can be shared with the world via publication in scientific journals. TEDS has been making very good use of the results of your work over the years. In 2007-2008, the TEDS team has been incredibly successful in publishing 43 papers. Here is a sample of some of our other recent papers to give you a flavour of the wide range of topics that TEDS has addressed, in addition to the important papers we described in last year's newsletter. The entire list of TEDS publications and abstracts of any papers can be found on the TEDS website: www.teds.ac.uk/information/publications.asp. Copies of any of these publications can be sent electronically so please feel free to get in touch if you would like to read more.

From learning to read to reading to learn



Nicole Harlaar

Using TEDS data on reading achievement from National Curriculum teacher ratings at 7, 9 and 10 years, we found that genetic influences on reading are substantial and stable despite the shift from learning to read to reading to learn.

Harlaar, N., Dale, P. S., & Plomin, R. (2007). From learning to read to reading to learn: Substantial and stable genetic influence. Child Development, 78, 116-131.

Doing well in science at school: less nature, more nurture



Claire Haworth

For most learning abilities – such as reading and mathematics – environmental influences become less important as children become adolescents.

However, for school science performance, environmental influences become significantly more important as children progress through school and genetic influences become less important.

Haworth, C. M. A., Dale, P. S., & Plomin, R. (2009). The Etiology of Science Performance: Decreasing Heritability and Increasing Importance of the Shared Environment from 9 to 12 Years of Age. Child Development.

Finding genes for reading disability



Emma Maeburn

TEDS has shown that reading ability and disability are highly heritable even in the early years. We conducted the first study trying to find the specific genes responsible for this genetic influence by looking at 100,000 DNA markers. Ten DNA markers showed links with reading that were repeated in another sample.

Maeburn, E. L., Harlaar, N., Craig, I. W., Schalkwyk, L. C., & Plomin, R. (2007). Quantitative Trait Loci association scan of early reading disability and ability using pooled DNA and 100K SNP microarrays in a sample of 5760 children. Molecular Psychiatry, 13, 729-740.

What about maths?



Yulia Kovas

Much genetic research has studied reading but TEDS is the first major study to consider maths.

Using three different maths tests that you completed as part of the web-based tests at age 10, we show not only that genetic influences are important but also that the same genes largely affect these different maths tests.

Kovas, Y., Haworth, C. M. A., Petrill, S. A., & Plomin, R. (2007). Mathematical ability of 10-year-old boys and girls: Genetic and environmental etiology of typical and low performance. Journal of Learning Disabilities, 40, 554-567.

Generalist genes



Oliver Davis

Do you remember the web-based tests you completed when you were age 10? Our major paper on these data finds that many of the same genes

affect reading, maths and general learning ability.

Davis, D. S. P., Kovas, Y., Harlaar, N., Busfield, P., McMillan, A., Frances, J., Petrill, S. A., Dale, P. S., & Plomin, R. (2008). Generalist genes and the internet generation: etiology of learning abilities by web testing at age 10. Genes, Brain and Behavior, 7, 455-462.

Chickens and eggs



Henrik Larsson

How parents feel about their children correlates with how their children behave but which is cause and which is effect?

Because you have contributed data to TEDS over so many years we can answer this question. The answer is both! But the more surprising answer is that genetic factors in parents and children contribute to this correlation as well.

Larsson, H., Viding, E., Rijdsdijk, F. V., & Plomin, R. (2008). Relationships between parental negativity and childhood antisocial behavior over time: A Bidirectional effects model in a longitudinal genetically informative design. Journal of Abnormal Child Psychology, 36, 633-645.



Attention Deficit + Hyperactivity Disorder = ADHD?



Grainne McLoughlin

Diagnoses of ADHD in children assume that these two components – poor attention and hyperactivity – are part of the same syndrome. This assumption was tested for the first time in TEDS. Although there is some genetic overlap between these two components of ADHD, there are also significant genetic differences.

McLoughlin, G., Ronald, A., Kuntsi, J., Asherson, P., & Plomin, R. (2007). Genetic support for the dual nature of attention deficit hyperactivity disorder: Substantial genetic overlap between the inattentive and hyperactive-impulsive components. Journal of Abnormal Child Psychology, 35, 999-1008.

Identical twin girls are genetically different on the X chromosome



Caroline Loat

Girls have two X chromosomes; boys have only one. To balance this out, one of the X chromosomes in girls is inactivated but this is a random process early in life. As a result one member of a female identical twin pair will have their father's X chromosome active in parts of their body and their co-twin will have their mother's X active. We showed that this process makes identical twin girls less similar in behaviour.

Loat, C. S., Haworth, C. M. A., Plomin, R., & Craig, I. W. (2008). A model incorporating potential skewed X-inactivation in MZ girls suggests that X-linked QTLs exist for several social behaviours including Autism Spectrum Disorder. Annals of Human Genetics, 72, 742-751.

Identical twins see their classrooms differently



Bonny Oliver

Even though identical twins are genetically identical – even when they are in the same classroom with the same teacher – they see their classrooms differently, for example, in terms of general satisfaction and in their relationship with the teacher. These differences within pairs of identical twins predict how teachers rate each twin's adjustment – students who see their classroom more positively are rated by their teachers as better adjusted.

Oliver, B. R., Pike, A., & Plomin, R. (2008). Nonshared environmental influences on teacher-reported behaviour problems: Monozygotic twin differences in perceptions of the classroom. Journal of Child Psychology and Psychiatry, 49, 646-653.

Nasty stuff



Essi Viding

Early onset antisocial behaviour is a bad sign especially when it comes with a type of personality called callous-unemotional which means that children don't seem to notice when they are hurting other people. For the first time TEDS has shown that antisocial behaviour and callous-unemotional personality in childhood are affected to a large extent by the same genes.

Viding, E., Frick, P. J., & Plomin, R. (2007). Aetiology of the relationship between callous-unemotional traits and conduct problems in childhood. British Journal of Psychiatry, 190, S33-38.

Obesity is highly heritable in TEDS



Jane Wardle

TEDS is the first twin study to investigate genetic influence on obesity since the 'obesity epidemic' in children. Although children on average are heavier in our 'fast food nation', whether a child becomes obese is still mostly due to genetic factors.

Wardle, J., Carnell, S., Haworth, C. M. A., & Plomin, R. (2008). Evidence for a strong genetic influence on childhood adiposity despite the force of the obesogenic environment. American Journal of Clinical Nutrition, 87, 398-404.

Obesity gene influences appetite

Previous studies have demonstrated that a particular gene known as FTO is associated with obesity. However, it was not known how the gene affects weight. Our study suggests that the gene works by making people less aware of being full.

Wardle, J., Carnell, S., Haworth, C. M. A., Farrow, I. S., O'Rahilly, S. & Plomin, R. (2008). Obesity associated genetic variation in FTO is associated with diminished satiety. Journal of Clinical Endocrinology and Metabolism, 93, 3640-3643.

The TEDS team

Stay in touch

NEIL WORKED INITIALLY for TEDS as a Research Worker, going into the homes of our families when the children were four and a half to do our in-home study. Neil now works in the office full-time as Professor Robert Plomin's Personal Assistant. **Our new PhD student, Ken**, studied psychology at Goldsmith's College. He is interested in the interplay between nature and nurture and how this might affect, for example, educational achievement.

- Why, for instance, even identical twins can respond quite differently to the same environment, like being in the same classroom or having the same teacher.
- Why, under certain conditions, some children may not do as well, while others are unaffected.
- And why even measures of the environment may show genetic influence – the 'nature of nurture'.

Please help us stay in touch with you by letting us know any change of address or phone number.

You can also call us free on **0800 317 029**

or e-mail us at **teds@iop.kcl.ac.uk**

Send to: TEDS , PO83, FREEPOST LON7567, London, SE5 8YZ

Have you changed your address or phone number?

Your name:

The children's names:

New address:

Postcode:

Telephone no:

Mobile no:

Email address:



Neil and Ken

WE HAVE A SMALL STAFF at TEDS and most of them have been in the team for many years: Andy, [data manager] 7 years; Jane, [web co ordinator] 6 years and Tricia, [project co ordinator] 11

years. Many of you will have spoken to them over the years and they certainly value this personal contact. They feel privileged to have seen 'their' TEDS twins growing up.



Jane, Tricia and Andy

Keep an eye on our website, we'll be updating it as activities arise. Here you can also find answers to frequently asked questions about TEDS. Go to www.teds.ac.uk/information/faqs.htm to find out more

