

NEWS, VIEWS, AND COMMENTS

The 14th Congress of the International Society for Twin Studies: Selected Highlights/Research Summaries: Twin Study of Telomere Erosion; Genetics of Monozygotic Twinning; Developmental Dysplasia; Fertility of Mothers of Twins / General Interest: Video Portraits; Separated at Birth; Childhood Actors; Adult Twin Film Villains

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Selected highlights from the 14th International Congress on Twin Studies, set in Florence, Italy in April 2012, are presented. This meeting, which traditionally occurred every three years, is now being held every two years. Reviews of research on the topics of stress and aging (telomere erosion),

the genetics of MZ twinning, developmental dysplasia, and fertility of mothers of twins follow. The final section includes several public interest items, namely an exhibit of twins' video portraits, unusual physical look-alikes, and young and adult twin television and film actors.

The 14th Congress of the International Society for Twin Studies: Selected Highlights

The year 2012 marked the first time that the Congress of the International Society for Twin Studies (ISTS) was a biennial event; prior meetings occurred on a triennial basis. This change is welcome, given the rapid progression and new developments in psychological and biological twin research. Further justification for more frequent meetings is that twinning rates have been climbing in most Western nations. The twin birth rate in the United States increased 76%, from 18.9 in 1980 to 33.2 per 1,000 births in 2009 (CDC, 2012). Similar trends were reported by ISTS Congress panelists, Catherine Derom (Belgium) and Axel Skytthe (Denmark) at a session on twinning rates. The year 2012 was also the first time that the meeting was held in

conjunction with the 2nd World Congress on Twin Pregnancy' other joint meetings have been with the Behavior Genetics Association.

The ISTS Congress took place in Florence, Italy, April 1–4, 2012. The venue for the scientific presentations was the

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EDITOR'S NOTE: Nancy Segal's book, *Born Together-Reared Apart: The Landmark Minnesota Twin Study* (Harvard University Press) was released in June 2012. The book provides a comprehensive overview of the origins, methods, findings, implications and controversies from the world-famous Minnesota Study of Twins Reared Apart (1979–1999). Visit www.drncancysegaltwins.org to learn more.

**FIGURE 1**

(Colour online) Opening ceremony. (From left to right): Isaac Blickstein, Louis Keith, Nils Lambalk, Tim Spector, and Gian Carlo Di Renzo (at the podium). Courtesy: Jeff Craig.

Grand Hotel Mediterraneo, with other events held in several spectacular locations throughout the city. The conference host was Gian Carlo Di Renzo, Chairman of the Department of Obstetrics and Gynecology at the University of Perugia. Selected highlights and other events from the Congress are summarized below in the order they occurred to best reflect the experiences of those who attended.

The conference officially opened at noon on April 1 with a tour of a magnificent exhibit, 'Twins, Art and Science', at the Istituto degli Innocenti, located in the Piazza Santissima Annunziata. Photographs by Chicago surgeon, Dr. David Teplica, displayed some striking physical similarities and asymmetries of monozygotic (MZ) twins. (I was not present at the opening, but attended the exhibit later in the week with Dr. Teplica and others.) The institute, designed by Filippo Brunelleschi, served as an orphanage in the 15th and 16th centuries. Its remarkable courtyards and arcades were created with young children in mind.

Four pre-Congress courses were held during the afternoon of the opening day. Topics included Biological Twinning (Bulmer Symposium), Twin Monitoring During Pregnancy and Labour, ICOMBO (International Council on Multiple Births Organizations): The Multiple Birth Association Studies and How to Set Up a Twin Center. I attended the first session that included an impressive series of papers on multiple gestation, multiple implantation, genetics of twinning, reproductive endocrinology, and folic acid supplementation. Among the many important and interesting findings were that 5% of the births of women undergoing fertility treatment result in MZ twins, monochorionic MZ twins have the least favorable perinatal outcome, MZ twin-

ning is more frequent than any genetic disorder and that DZ twinning appears to increase if women are given folic acid prior to conception.

The opening ceremony was held that evening at the spectacular Salone dei Cinquecento, Palazzo Vecchio, shown in Figure 1. Welcoming remarks from the host, Gian Carlo Di Renzo, and Tim Spector were followed by talks from Louis Keith and Isaac Blickstein (Honorary Presidents). Next, Paolo Parisi (former ISTS President) treated us to a talk on the history of the society, and Lord Robert Winston discussed 'The Story of God: Twin Studies on Religion'. An opening reception followed.

Panels and presentations on April 2 covered cerebral palsy, twinning rates, epidemiology, obstetrical issues, and complex diseases. A keynote lecture, 'Systems Biology and Twin Studies', was delivered by Gert Jan van Ommen, from the Netherlands. A late afternoon highlight was the viewing of a documentary film, 'The Lone Twin', directed by the acclaimed Belgian filmmaker, Anna van der Wee. 'The Lone Twin' was inspired by Anna's tragic loss of her twin brother, Dirk, at age 20. That loss left her with many unanswered questions, in particular, 'Am I still a twin?' However, the film is about much more than loss—it is also about the unique relationships shared by twins. It is also one of the rare films of its kind to include the voices of fraternal twins, not just identical twins. To the director's credit, it also presents the only filmed footage of a Yoruba ceremony acknowledging the loss of a twin.

Anna was available after the viewing to address questions and comments from the audience. One investigator admitted that even after studying twins for years, he was

**FIGURE 2**

(Colour online) Row of twins (unplanned) at an ISTS evening session. (From left to right): Mónica del Ray Jordá (MZ, Spain), Anna Van der Wee (DZOS, Belgium), Nancy Segal (DZSS, USA), Louis and Donald Keith (MZ, USA), and Ádám and Dávid Tárnoki (MZ, Hungary). Courtesy: Nancy Segal.

unaware of the unique features of their social relationship. Interestingly, soon after returning home, I received an inquiry from another investigator, requesting literature on twin relations: 'I feel a bit silly being a twin researcher, but I have no idea where to look for good literature about this'. Films like Anna's should be required viewing for all twin researchers and it is my hope that future congresses will include such events in their programs. 'The Lone Twin' is available from Wildheart Productions (Belgium) and Storyline Entertainment (Canada).

April 3 was another day of excellent talks. Two dominant themes of this year's congress were evident, namely (1) epigenetics and how twin studies in this area can inform us about pre- and postnatal events and their consequences, and (2) obstetrical issues in twin pregnancies and how to manage them. Sessions on epidemiology and psychosocial issues were also included. A general meeting of the membership took place in the afternoon, at which time it was announced that the society's journal, *Twin Research and Human Genetics*, would be published in the future by Cambridge University Press. Venues for future congresses were also discussed, and ISTS President Tim Spector received the *James Shields Award for Lifetime Contributions to Twin Research*. ICOMBO also held a business meeting, chaired by Kimberly Weatherall of Canada.

An evening session, 'Books, Media and Twins', included discussion of recent books on twins and a presentation by

Dr. Teplica on his photographic studies of anatomical mirroring in MZ pairs. Interesting, the front row of the audience was comprised solely of twins from the ISTS membership, shown in Figure 2.

The last conference day, April 4, included morning presentations on obstetrical issues, epigenetics, and monozygotic twinning. A final highlight was a keynote address, 'The Origins of Social Behavior', by Dr. Henrik Cronqvist, Professor of Finance at Claremont McKenna College in Claremont, California. Dr. Cronqvist presented data from Swedish twins showing a heritability of 0.33 for savings. Parenting influences on savings behavior were substantial for children in their 20s, but declined to zero by middle age. Savings behavior was genetically correlated with income growth, smoking, and body mass index, suggesting that the genetic component of savings behavior reflects innate time preferences and lack of self-control. A session on the use of twins in behavioral genetic research followed Cronqvist's talk.

The final conference event was an award ceremony chaired by Gian Carlo Di Renzo, ISTS Vice President Nils Lambalk, and Tim Spector. Student awards for outstanding presentations were given to Line Gjerde ('Genetic and environmental contributions to long-term sick leave and disability pension—a population based study of young adult Norwegian twins'), Livia Veselka ('Alexithymia and trait emotional intelligence: a behavioural genetic

investigation'), Claire Steves ('Cognitive ageing in women using a computerized battery: a longitudinal quantitative genetic twin study'), and Esther Kuijper ('Perinatal reproductive endocrinology in twins'). A special award was also given to Joan Woodward (in absentia) by ICOMBO for her superb contributions to research on the experience of losing a twin.

The ISTS is a remarkable association that attracts individuals from a wide range of twin-related disciplines. Future congresses will, no doubt, continue the pattern of presenting high quality, cutting edge research.

Research Summaries

Twin Study of Telomere Erosion

Associations between childhood stress and aging have been of considerable interest in recent years. A longitudinal twin study by Idan Shalev (2012), in the Department of Psychology and Neuroscience at Duke University, and colleagues examined this important relationship (Shalev et al., 2012). The sample included 236 5- to 10-year-old twin children from the Environmental Risk Longitudinal Twin Study in the United Kingdom. The length of the telomeres (a DNA region at the end of the chromosome that protects it against erosion) was measured at ages 5 and 10 by examiners blind to the degree of each child's stress and violence exposure. Stress and violence measures, based on parental and/or caregiver reports, consisted of domestic violence, bullying victimization, physical maltreatment, and cumulative violence exposure.

It was determined that children who experienced two or more kinds of violence showed greater telomere erosion than children who experienced less. The researchers noted, however, that the small number of discordant twin pairs prevented comparative analysis of telomere erosion in MZ co-twins whose stress and violence exposure differed. This comparison would have highlighted the negative effects of stress and violence more dramatically and definitively. Nevertheless, this study represents an important step toward uncovering the underlying biological mechanisms and negative consequences of stress and violence exposure during childhood.

Genetics of Monozygotic Twinning

Conventional wisdom has been that MZ twinning lacks a genetic component, making its occurrence equally likely across families. Thinking on this topic has started to change, given the identification of families in selected geographical regions that show increased frequencies of MZ twinning. Bruno Reversade, at the Institute of Medical Biology in Singapore, has been examining the possible genetic transmission of MZ twinning among selected families. He recently studied 13 MZ sets spanning five generations in a family in Hamamy, Jordan; since then another three sets were added. He presented findings at the 2012 ISTS Congress (see

above). Specifically, he noted that a single allele (expressed only at the blastocyst stage) was shared among 13 of the 16 MZ twin pairs. The gene is associated with a protein, raising the question: how does this gene trigger MZ twinning? He suggested that the inner cell mass (ICM) may grow too large, eventuating in two ICMs.

Upon returning to the United States I spoke with 39-year-old Christian Fernandez, an identical twin who delivered a set of MZ twin girls and whose twin sister delivered a set of MZ twin boys approximately one year later. These twin parents and children attract considerable attention when they are together in public; see Figure 3.

Fernandez indicated that twins run in her family, mostly on her father's side. Uncles on her father's side who appear to be MZ, whereas second cousins on her mother's side who appear to be DZ. Additional study of the members of this family would be well worth pursuing.

Developmental Dysplasia in Twins

Developmental dysplasia of the hip (DDH) is a congenital condition involving the hip joint (Lucille Packard Children's Hospital, 2012). Individuals affected with DDH have a hollow hip socket, such that the femoral head ('ball' of the long leg bone) may slip in and out of the socket. First born females with close affected relatives are at highest risk for this disorder.

Barr and Rehm (2012) from the Department of Trauma and Orthopaedics, at Adenbrooke's Hospital in Cambridge, UK, reviewed multiple birth records between January 2004 and December 2008 to determine if twins were at elevated risk for DDH, relative to nontwins. There were 990 twin and multiple births between those years, of which 267 had ultrasound scans. The majority of scans showed no abnormalities. Exceptions included one DDH diagnosis detected by scan and two late-presenting cases for which scans had not been indicated; these two cases would have been detected by scan. It was concluded that the cost-effectiveness for the screening of DDH among multiple birth infants remains to be determined.

Fertility of Mothers of Twins

Robson and Smith (2011) reported data from the Utah Population Database, supporting the hypothesis that mothers of twins, born between 1807 and 1899, showed a greater capacity to bear the cost of twinning than mothers of nontwins. This conclusion was based on their findings that mothers of twins show lower postmenopausal mortality, shorter average interbirth intervals, later ages at last birth, and higher lifetime fertility, relative to mothers of nontwins. Their conclusions were recently challenged by Rickard et al. (2012), who suggested that mothers of twins simply have more opportunities to twin than mothers of nontwins. However, new analyses by Robson and Smith (2012) further support their original claims. Specifically, they showed that for a

**FIGURE 3**

(Colour online) Christian Fernandez and her identical twin sister Jennifer with their identical twin children. Courtesy: Christian Fernandez.

given parity, mothers of twins were more likely to progress to an additional birth than were mothers of nontwins.

General Interest

Video Portraits

Candice Breitz, a Berlin-based artist, has created dual-channel video portraits of seven MZ twin pairs and one MZ triplet set. She began this project from an artistic perspective, but 'was pulled deeper and deeper into the work and ended up believing, very strongly, that twins give us access to a very nuanced understanding of how individuality is constituted'. I have reviewed some of these portraits and they are captivating and informative. Here is a link to one of them: <http://vimeo.com/album/259786/video/13514467>.

Separated at Birth

Every once in a while there appear stories and photographs of people who look very much alike, but are unrelated genetically. Such pairs of individuals are often labeled 'separated at birth'. A volume with the title, published by *Spy Magazine* (1998), includes striking photos of numerous look-alikes, e.g., George Shultz (U.S. Secretary of State under President Ronald Reagan) and the Cowardly Lion (played by Bert Lahr, in *The Wizard of Oz*) (*Parade Magazine*, 2012). The two most recent members of this unusual population are actors Tommy Lee Jones and Josh Brolin. These men play the same character (Agent K) in the 2012 film *Men in Black-3*, but impersonate him at ages 40 years apart. Jones and Brolin are described as being the same height and having large heads, shared features that enhance their resemblance.

Brolin spent time studying Jones's voice and the similarity has been described as uncanny. Of course, there is no plausible biological link between appearance and behavior; see my abstract (Segal, 2012) from the ISTS Congress.

Childhood Actors

Three sets of MZ twins play the same character in the HBO television series, *Boardwalk Empire*, set in Atlantic City during Prohibition (Ferrari, 2010; *Los Angeles Times*, 2012). Lucy and Josie Galina play Emily Schoeder, Brady and Connor Noon play Tommy Darmody, and Declan and Rory McTigue play Teddy Schroeder. Laws concerning the length of time minors are permitted to be on set make using young MZ twins a viable option since one twin can substitute for the other. Interested and talented twins may benefit considerably from such opportunities.

Adult Twin Film Villains

Twenty-six-year-old French identical twins, Alec and Victor Carrill, were street brawlers when they were recognized and cast in a short film, 'Bebé Requin' ('Baby Shark') that competed at the 2005 Cannes Film Festival (Brown, 2011). Most recently, they played villains in the 2011 film, 'Sherlock Holmes: A Game of Shadows'. The twins' other interests include making hip-hop music videos and developing their fashion line, 'Is Not Dead'.

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