

# Education Issues; Twin Study Summaries; Famous Twin Babies and Famous Twins

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Congratulations to Nancy Segal on receiving the James Shields Memorial Award for Twin Research in Behavioral Genetics on July 2, 2005.

Two educational issues of special relevance to twins and their families are reviewed. The first concerns newly passed legislation in the state of Minnesota allowing multiple birth parents to decide if their children should be placed in the same or separate classrooms. The second concerns a professor's accusations of identical twins' academic misconduct, based upon the twins' similar test performance. Next, reviews of timely research in the areas of religiosity, disease, conjoined twinning and autism are presented. Finally, some recent events featuring well-known twins are presented.

## Education Issues

### I. New Legislation on Twins' Classroom Placement

At the start of each school year I receive requests from unhappy parents whose young twins are being placed in separate classrooms. Parents say that despite explaining to school administrators that their twin children work well together, enjoy each other's company and/or do not wish to enter a new situation on their own, school officials remain unsympathetic. The school officials' reasoning is typically that twins kept together will fail to develop a sense of individuality. Therefore, I was gratified that parents in Minnesota, namely Blane and Sandy Huppert, took it upon themselves to have this policy changed. They did so by engaging the interest and support of State Senator (and father of twins) Dennis Frederickson and his legislative assistant (and mother of twins) Wendy Haavisto. The outcome was a new bill that passed unanimously through the Minnesota House (130-0) and Senate (64-0). The bill is reproduced below:

#### S. F. No. 180, 2nd Engrossment — 84th Legislative Session (2005–2006)

Posted on March 17, 2005.

- 1.1 A bill for an act
- 1.2 relating to education; providing for parent discretion

- 1.3 in classroom placement of children of multiple birth;
- 1.4 proposing coding for new law in Minnesota Statutes,
- 1.5 chapter 120A.
- 1.6 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MINNESOTA:
- 1.7 Section 1. [120A.38] [CLASSROOM PLACEMENT; PARENT
- 1.8 DISCRETION.]
- 1.9 (a) A parent or guardian of twins or higher order multiples
- 1.10 may request that the children be placed in the same classroom or
- 1.11 in separate classrooms if the children are in the same grade
- 1.12 level at the same school. The school may recommend classroom
- 1.13 placement to the parents and provide professional education
- 1.14 advice to the parents to assist them in making the best decision
- 1.15 for their children's education. A school must provide the
- 1.16 placement requested by the children's parent or guardian, unless
- 1.17 the school board makes a classroom placement determination
- 1.18 following the school principal's request according to this
- 1.19 section. The parent or guardian must request the classroom
- 1.20 placement no later than 14 days after the first day of each
- 1.21 school year or 14 days after the first day of attendance of the
- 1.22 children during a school year if the children are enrolled in
- 1.23 the school after the school year commences. At the end of the
- 1.24 initial grading period, if the school principal, in consultation
- 1.25 with the children's classroom teacher, determines that the
- 2.1 requested classroom placement is disruptive to the school, the
- 2.2 school principal may request that the school board determine the
- 2.3 children's classroom placement.
- 2.4 (b) For purposes of this section, 'higher order multiples'
- 2.5 means triplets, quadruplets, quintuplets, or more.
- 2.6 [EFFECTIVE DATE.] This section is effective for the
- 2.7 2005–2006 school year and later.

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The bill was signed into law by Governor Tim Pawlenty on May 5, 2005.

The idea of legislation concerning twins' classroom placement was not without controversy. The St. Paul Pioneer Press (2005) published an unfavorable editorial entitled 'Micromanaging Multiples'. They argued that 'it is not state government's role to step in and cure every miscommunication or squabble at the local level' and that 'One child's trauma should not set the course for a statewide law' (p. B12). I responded with a statement for the newspaper's Viewpoints column that was ultimately not published. It is reproduced (with some modifications) below.

#### **Microthinking Is Bad for Multiples**

It would be wonderful if decisions surrounding young twins' placement in same or separate classrooms were 'jointly made by schools and parents' as your April 21 editorial 'Micromanaging Multiples' implies. Unfortunately, this is not the case. As a developmental psychologist specializing in twin research I field numerous requests, complaints, even pleas from concerned mothers and fathers whose twins are routinely separated when they enter school for the first time. The argument from school officials usually goes that twins will otherwise fail to develop their 'individuality'. Unfortunately, this policy ignores research findings, fails to consider twins' special circumstances, overlooks the social and intellectual characteristics specific to identical, same-sex fraternal and opposite-sex fraternal twins, and implies that educators meeting twins for the first time know more about what is best for them than the parents who raised them.

I became increasingly aware of this problem between 1982 and 1991 when I was Assistant Director of the Minnesota Center for Twin and Adoption Research, at the University of Minnesota. Unfortunately, few studies were available at that time. I did read a 1991 comment from a school principal in Ohio, published by the Associated Press (1991), to the effect that research showed that twins did better in school when they were separated. However, when I contacted the principal, he admitted that there

was no such research and that his statement was based on only a few pairs that he knew. A nationwide survey in Australia found that many teachers support separating twins to promote their individual development, yet their views (while based on common sense) lacked a scientific basis (Gleeson et al., 1990). In my own survey of 63 parents from the Minneapolis–St. Paul area, nearly half of the mothers whose twins' schools had a mandatory separation policy did not endorse it (Segal & Russell, 1992). The current consensus (among both parents and investigators) is that each pair should be handled on a case-by-case basis, but apparent lack of flexibility in many schools does not allow this.

Research shows that when nontwin children enter unfamiliar situations accompanied by a familiar peer, they show more positive affect and greater motility. However, we do not demand that best friends be placed in separate classrooms — no-one appears concerned that two close friends will not develop as individuals. Twins, like all children, face the difficult task of leaving their parents (sometimes for the first time) when they go to school. So, why must twins face the additional burden of separating from their brother or sister? Why do unfounded fears of excessive interdependence dominate educators' decisions? Many young twins enjoy playing and working together and should not be deprived of this opportunity if they and their families want it.

I believe there is a middle ground. Twins assigned to the same classroom could be seated at different tables and put into different playgroups. Often, twins only need to 'check up' on each other to feel content. When I observed twins' free play behaviors during recess they often played apart—fraternals more than identicals—but even when identicals were apart, just knowing that their twin was okay was reassuring and allowed them to play comfortably on their own.

There are good reasons to separate some twins in school. Fraternal twins may show different interests and skills, so might benefit from having different teachers and experiences. Males typically mature a little later than females,

so separation may be advised for brother–sister pairs. Identical twins who are excessively independent might be encouraged to spend time with other children, but such social experiences need to be introduced gradually. Most importantly, these decisions need to be implemented by cooperative dialogues between teachers and parents, not by preset policy.

We are seeing escalating twinning rates, owing mostly to advanced reproductive technologies, but also to increased childbearing among older mothers. Thus, I believe that the Minnesota state legislature was correct to pursue legislation that will finally meet the needs of multiple birth children and their families. It would not be the first time that this issue was addressed at the state level. In 1994, the Oklahoma House passed resolution 1055, 'Education—Separation of Multiple Siblings—Development of Policy'. An article in the *Stetson Law Review* (Dean, 1999) makes another strong case for parental rights in decisions affecting their twins' education. The Pioneer Press 'is confident that, generally, parents receive a fair hearing from local school officials'. If that were indeed so, there would not be so many twins-in-school web sites with information for parents of twins. If that were so, I would not receive the number of frantic messages that come in at the start of each school year. And I would not be writing this article.

## **II. Cheating Accusations**

Several years ago I was contacted by a father of identical twin sons whose college professor had accused them of cheating on an assignment (Segal, 2000). The basis of the professor's claim was that he had detected the same unusual error in both twins' papers. The twins insisted that they had worked independently — yet, they suddenly faced the possibility of failing grades and/or expulsion from the university. The father hired an attorney and also sought my assistance as a twin researcher. He wanted to know to what extent identical twins come up with the same answers. How similar are their intellectual abilities? It was easy to cite numerous scientific papers and anecdotal accounts demonstrating that identical twins are highly

matched (albeit, not perfectly matched) in general intelligence and special cognitive skills. It was easy to understand how two identical twins could produce the same mistake. However, it was difficult to understand why university faculty were unaware of the extent of identical twins' behavioral similarities — and how they could raise such serious charges without considering twins' unique circumstances.

Over the years I have encountered other such cases. The details differ, but all twins and families have described the terrible strain that this imposes

upon them. Parents are especially concerned with how such charges may affect their twin children's future school and career plans.

All schools maintain guidelines and standards for appropriate student conduct. It would seem reasonable to include an addendum referring to situations in which twins produce the same answers on tests or assignments. Cheating accusations must surely be based on more than just turning in similar work. Many identical twins study together, as do pairs of friends, an activity that is generally encouraged. To suggest that twins avoid

working together to avoid the appearance of cheating, or to hold their close relationship responsible for their matched academic progress, would be unfair. Educators at all levels should be aware that because abilities, talents and interests are partly genetically based, identical twins are expected to perform in similar ways, more so than other pairs of students. There will, of course, be some exceptions.

Researchers, twins and families with twins who have dealt with cases involving cheating accusations are invited to contact me.

## Twin Study Summaries

### Religiosity

The finding that religiosity (frequency of religious activities, membership in religious organizations) has a genetic component was surprising at first (see Waller et al., 1990). However, attempts at replicating this finding using other twin samples have been successful; a special issue of *Twin Research* (Vol. 2, 1999) included a series of informative papers on this topic. The most recent study, conducted by Koenig et al. (2005), administered a self-report measure to 169 monozygotic (MZ) twin pairs and 104 dizygotic (DZ) twin pairs, with a mean age of 33 years. Participants were part of the Minnesota Twin Registry.

MZ and DZ twins showed comparable agreement with respect to how they rated themselves and how their twin rated them on the various measures, although DZ twins showed slightly lower agreement. MZ and DZ twins' ratings of their parents' religiosity also showed comparable agreement.

Genetic effects on retrospective ratings of religiosity were not apparent — correlations were .69 and .59 for MZ and DZ twin pairs, respectively. However, genetic effects were observed for current ratings — correlations were .62 and .42 for MZ and DZ twin pairs, respectively. Genetic factors were estimated to account for only 12% of the variance in adolescence, but 44% of the variance in adulthood. In con-

trast, shared environments accounted for 56% of the variance in adolescence and 18% of the variance in adulthood. Further research on sources of individual differences in religiosity, especially longitudinal studies, was suggested.

### Lesch-Nyhan Disease

The first case of MZ female twins discordant for Lesch-Nyhan Disease (LND) was recently reported (De Gregorio et al., 2005). LND is an inborn error of metabolism linked to a mutation on the long arm of the X chromosome. Its features include learning disabilities, dystonia (postural difficulties associated with muscle spasms) and compulsive self-injurious behaviors beginning between infancy and adolescence (e.g., biting the lips and fingers; Plomin et al., 2001). LND has a recessive mode of genetic transmission, so occurs with greater frequency in males (1/20,000) than in females, in whom it is quite rare. The few female cases have involved a mutation in one allele and nonrandom inactivation of the X chromosome with the normal gene variant.

The twins, who were 19 years of age at assessment, were born after 39 weeks' gestation by cesarean section. The pregnancy was unremarkable. Early symptoms in the affected twin included orange crystals in her diapers, fisting at age 3 months, cerebral palsy at age 6 months and severe biting of the lips, cheeks and arms. Two normal

hypoxanthine guanine phosphoribosyl transferase assays (HPRT; HPRT activity is typically defective in LND individuals), plus the female sex of the patient did not suggest LND; her HPRT levels matched those of her mother and unaffected co-twin. This case was puzzling, given that the affected twin displayed the classic symptom picture of LND. Her situation was resolved following detection of skewed inactivation of the X chromosome in her fibroblasts (cell in connective tissue), such that the X chromosome carrying the abnormal HPRT allele was more often expressed than the X chromosome carrying the normal HPR allele.

The X chromosome can work in intriguing ways to lead to phenotypic differences between MZ female co-twins. De Gregorio et al. (2005) suggested that nonrandom X-inactivation may be a cause of delayed MZ twinning. This theory, which has been proposed previously, is still awaiting confirmation.

### Conjoined Twinning

There is considerable interest in success rates of survival following surgical separation of conjoined twins. However, virtually little is known about twins' postsurgical behavioral and physical progress and adjustment. A recent survey of families that included 14 surviving twins from 10 conjoined pairs (five male and five

female) is a significant addition to the relevant medical and psychological literature (Votteler & Lipsky, 2005). The 10 twin pairs were separated between 1978 and 2000, so range in age from 5 to 27 years. All pairs were separated in Dallas hospitals. A questionnaire that included six open-ended items was completed by both twins and their families — questions concerned physical health, disabilities, educational issues and family functioning.

All 14 twin survivors had required further operations to correct various physical difficulties. However, the four oldest twins have graduated from college, and the next oldest have graduated from high school. The nine younger twins are all enrolled in age-appropriate classes at school. The parents and older surviving twins were very willing to discuss their experiences with the investigators. Parents of four pairs had divorced, but only three of these marital separations were associated with stresses posed specifically by conjoined twinning. Interestingly, the family whose male twins had the least severe physical difficulties underwent the greatest psychological disturbances. These male twins were actually triplets with a DZ female co-triplet who was doing well. The triplets were conceived via in-vitro fertilization (IVF), but the authors note that links between IVF and conjoined twinning are speculative.

This series of mini case reports is fascinating. In addition to medical and life history information, photographs

of the twins in infancy and beyond are provided.

Stop press: Just as this article was nearing completion I received good news from Dr. Votteler about one of the older twin pairs: 'The first twin married in March and the second is due to be married in December 2005' (Vottler, personal communication, May 13, 2005).

### Autistic Traits

A study comparing the frequency of autistic traits in twins and nontwins was recently conducted by Ho et al. (2005). This investigation was prompted by some studies suggesting that twins are overrepresented among populations of autistic children.

Nontwins in this study ( $n = 255$ , ages 4 to 18 years) came from a large metropolitan school district in St. Louis, Missouri. The 802 twin pairs were comprised of 232 same-sex male sets, 320 same-sex female sets and 250 opposite-sex sets between 7 to 15 years of age. They were identified from the Missouri Twin Study. One member from each pair was randomly selected for the study to avoid lack of independence in the data set. The Social Responsiveness Scale (SRS) was mailed to the parents of 500 randomly selected nontwins of which 255 (51%) were returned. The response rate for the parents of twins was 60.7%. The SRS is intended to quantitatively assess autistic traits. It requests information about children's social behavior, language use and other characteristics.

The researchers found that nontwin females scored below nontwin males on the SRS, but the difference was not statistically significant. However, the mean SRS score was significantly higher for male twins, relative to male nontwins. Another interesting result was that male twins from same-sex pairs had significantly higher SRS scores than male twins from opposite-sex pairs. SRS scores did not differ between MZ and DZ male twins. Female twins did not differ from female nontwins.

The investigators concluded that twinning poses an environmental risk for subthreshold autistic rates in male–male pairs. However, it is unclear what the authors had in mind because the prenatal situation is typically more hazardous for MZ than DZ twins. Ho et al. (2005) are aware that their lack of difference between MZ and DZ male twins is at odds with some previous research that found a greater frequency of autistic-like symptoms among MZ twins. They suggested that the narrow age range of their subjects might explain these differences. In particular, they were unable to test whether assisted reproductive technologies could be linked to autistic behaviors.

The researchers also noted the lower SRS scores of female twins and nontwins, relative to the scores of male twins and nontwins. They suggested that females may be more sensitive to environmental factors fostering social competency. Clarification of this explanation would be welcome.

## Famous Twin Babies and Famous Twins

### The Tiniest Twin

The smallest infant on record is a twin (Ruethling, 2005). Rumaisa Rahman, born near Chicago, Illinois in September 2004, weighed only 8.6 ounces at birth. When she was released from the hospital in February 2005 she weighed 5 pounds 8 ounces and was 16.8 inches long. Rumaisa's twin sister, Hiba, who remained in the hospital until January 2005, weighed 1 pound 4 ounces at birth ('Rumaisa Rahman', 2004). The twins

were born after 26 weeks' gestation by cesarean section. Prior to Rumaisa's birth, the smallest surviving infant (born at the same hospital in 1989) weighed 9.9 ounces.

### Quintuplet Surrogacy

A 25-year-old surrogate mother, Teresa Anderson, delivered five male quintuplets — Enrique, Jorge, Gabriel, Victor and Javier — for a childless couple, Luisa Gonzalez and Enrique Moreno ('Arizona: Surrogate Mom',

2005; 'Five Baby Boys', 2005). The families live in Phoenix, Arizona. The infants were delivered at 33 weeks' gestation by cesarean section. One of the infants was born with a heart defect, but the rest appear healthy.

Mrs. Anderson decided to forfeit the \$15,000 payment from the other family for acting as a surrogate — she reasoned that they would have enough expenses with which to contend. On a morning talk show program she indicated that was happy for the family

and is considering becoming a mother again herself (she has two children) and/or a surrogate for somebody else.

### Chimera?

The elite cyclist Tyler Hamilton was recently accused of undergoing a blood transfusion to increase his oxygen-carrying red blood cells (Kolata, 2005). This charge, which followed tests showing that Hamilton had two distinct cell lines, led to his suspension from the sport for 2 years. In his defense, Hamilton has argued that his extra cell line is due to a vanishing twin with whom he had exchanged blood some time during gestation. What Hamilton described is real and was the subject of a detailed review in an issue of *Twin Research and Human Genetics* (see Segal, 2005). However, it is less certain that Hamilton has a twin. Examination of his mother's medical history would be important in this case and is, presumably, taking place. Hamilton is now 34 years of age, so he was born in 1971. The first suggestion that vanishing twins were possible was raised in 1945, and the first major review paper cited medical cases published mostly in the 1970s (Landy et al., 1982). Therefore, physicians at that time may have been less aware of this phenomenon and less likely to note its occurrence. An updated review indicates that approximately 30% of twin conceptions result in single births, and that less than 10% result in no births at all (Landy & Keith, 1998).

Tyler Hamilton may well have been a twin. If he was not, we are seeing a very unusual application of twin research findings. Given the widespread interest in twins we may see other remarkable and creative uses of findings from our field in the future.

### Baseball, But Not the Minnesota Twins

In 2001, identical twins Jose and Ozzie Canseco were accused of beating two men in a Miami Beach, Florida nightclub ('Canseco Brothers', 2005). A jury recently found the twin brothers liable for damages — the two victims suffered physical injuries and emotional scars. The jury also found that neither twin acted in self-defense.

Events like this receive considerable attention if they involve famous people, a twin, or both — and this case involved both. It is not surprising that the twins reacted the same way in a tense situation, especially if they sensed that their brother might be in danger.

Jose has played baseball for the major leagues, while Ozzie has played mostly for the minors. At one point in their careers, the twins suffered fractures of the left wrist hamate bone, just 2 months apart (Segal, 2000).

### Ethical Careers

The lives of identical twins, Harold T. Shapiro, PhD, and Bernard J. Shapiro, PhD, exemplify twins' matched life histories, talents and interests (Segal, 2000). Most noteworthy is the fact that each held the rare prestigious position of university president, in different, but overlapping years — Harold Shapiro at the University of Michigan and at Princeton University, and Bernard Shapiro at McGill University (where university presidents are called principals). Both twins have since stepped down from these roles.

Harold Shapiro also served as Chair of the National Bioethics Advisory Commission (NBAC) during the Clinton administration. During his tenure, he was involved in drafting a response to the birth of Dolly, the cloned lamb, born in 1996. I recently corresponded with Harold Shapiro — during our exchange he reminded me of his service and noted that his twin brother, Bernard, is now Canada's first Ethics Commissioner, in charge of handling conflict of interest issues for Canadian Parliament members. As Dr. Shapiro said, 'the beat goes on!' (Shapiro, personal communication, April 21, 2005).

Several weeks later I received a newspaper clipping from my father. Acting New Jersey Governor Richard J. Codey had appointed Harold Shapiro to the state's governing panel for the new Stem Cell Institute ('Trenton: Codey Appoints', 2005). In April he had appointed Dr. Shapiro to a state ethics board overseeing biomedical research in New Jersey. Yes, the beat goes on . . .

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