

News, views and comments

Twin Research and Human Genetics – News, Views & Comments: Memoirs and Autobiographies by Twins: Research Angles and Human Interest/Twin Research Reviews: Fetal Reduction in Twin Pregnancy; Twins’ Personality and Military Service; Growth Restriction in Twins; Advances in Conjoined Twin Separation/Media Reports: Update on Scientist Who Performed Gene Editing on Twins; Twins From 33-Year-Old Embryos; Twins’ Outcomes From Dietary Differences; Fraternal Twins With the World’s Largest Height Difference; Twin Home Experts Conquer Rat Infestation

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Abstract

Twins’ memoirs and autobiographies both enlighten and entertain. These works, often overlooked by researchers, may suggest new avenues for investigation, such as nonshared environmental events that propel twins in different directions. Of course, MZ twins’ generally parallel experiences and DZ twins generally criss-crossing paths are the bases of fascinating life stories. The following sections examined recent research on fetal reduction in twin pregnancy, twins’ personality and military service, growth restriction in twins, and advances in conjoined twin separation. This article closes with reports of a scientist who performed gene editing on twins, a twin conception from 33-year-old embryos, twins’ physical outcomes from dietary differences, fraternal twins with the world’s largest height difference and the Twin Home Experts who conquer rat infestation in New York.

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Memoirs and Autobiographies by Twins: Research Angles and Human Interest

Memoirs and autobiographies are not the same. A memoir is a nonfiction work in which an author shares recollections from a specific time in his or her life. An autobiography is a truthful narrative that chronicles the entire life of the writer (Meltzer, 2022). A number of twins have written about their lives in informative and interesting ways. These unique bodies of work suggest new ways of thinking about the bases of cotwins’ within-pair similarities and differences in behavioral, physical, and medical traits. In particular, twins may identify nonshared environmental factors that have been previously overlooked by

researchers. Such disclosures would be fruitful additions to refining the elusive search for events linked to MZ co-twin differences.

I am aware of a sizeable cache of twins’ memoirs and autobiographies — even some in progress — although I cannot claim to have read them all. This article summarizes several that I have read, as well as those deserving of attention. The idea for this topic came from MZ twin, Robert Gentle, originally from South Africa. I was in touch with Robert and his twin brother Michael several years ago. They are a closely connected pair despite living and working very far apart — Robert lives in Johannesburg, and Michael lives near Lisbon, Portugal; I described the Gentle twins in *Twin Research and Human Genetics* (Segal, 2020a). Both twins are now full-time writers. Michael has authored several books, most recently *Life Before the Internet: What We Can Learn From the Good Old Days* (M. Gentle, 2023). Robert just completed his autobiographical work, *The Scholarship Kids: Dream Big and Fly High* (R. Gentle, 2023), providing the inspiration for this essay. I will begin with his fascinating account that he classifies as a memoir, most likely because it covers only selected portions of the twins’ lives.

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Robert and Michael were born in 1957, in the Somerset Hospital of Cape Town, South Africa. They were considered 'coloured', the designation given to people of mixed race. It was the time of apartheid, so they lived in a separate neighborhood, as did whites, Indians, and blacks. Only the white people enjoyed voting rights and access to preferred restaurants and resources. Regardless, these clever twins excelled in the schools they attended, both in South Africa and in Zambia where their family lived for a time. Interestingly, both twins struggled with French, but eventually mastered the language and became adept at its use.

The twins' lives were lived exclusively in parallel from their elementary school days to their university attendance in Zambia and in France, where they focused on aviation and took a course in computer programming while living together. However, their career paths and physical proximity ended unexpectedly when Robert was offered a position he felt compelled to accept, given his penchant for writing.

This nonshared environmental event brought Robert back to Johannesburg as a journalist for *Business Day*, giving him exciting assignments abroad. As a result of this life change, he also launched a consultancy firm and authored a popular book on business writing — far from his aviation background. Michael remained in Paris, working in information technology, but has also become a writer. Both twins are now retired and traveling to Toulouse and to Paris to revisit the locations of their earlier years. After a brief diversion, the twins' lives are once again on common ground — had Robert's job offer not materialized it is possible they would have stayed on the same track.

Separated DZ twins, Allison Kanter and Michele Mordkoff, met one another in 2018 at the age of 54. They were one of several twin pairs purposely separated by the New York City adoption agency, Louise Wise Services (LWS). Their adoptive parents and those of the other separated pairs were never told that their child was a twin. The MZ twins, but not the DZ twins, were secretly studied until they turned 12. Finding nonshared environmental factors linked to DZ twin differences is problematic, given the confounding of different genes and different environments. However, the twins' family structures and places of residence are worth noting — Allison was raised in California with an older adoptive sister, while Michele was raised in New Jersey with two younger brothers (one just 18 months younger), both of whom were the biological sons of her adoptive parents.

As I described in my book, *Deliberately Divided: Inside the Controversial Study of Twins and Triplets Adopted Apart* (Segal, 2021), Michele learned about the 2018 documentary film, *Three Identical Strangers* — the story of the separation of MZ triplets by LWS and the chance reunion of the three identical males — and felt compelled to learn if she might be a separated twin. This was a reasonable concern, given that she was born in the mid 1960s while the study was recruiting twins for participation. Michele's efforts led her to Allison and the twin sisters formed a remarkably close connection despite living on opposite coasts of the United States. Sadly, their relationship ended when Michele passed away from cancer in June 2021. Prior to her loss, the twins had been working on a memoir designed to reveal their unjust separation and to celebrate the brief time they enjoyed together. Allison has now taken on this task on her own — the final work will be a heartbreaking, but insightful addition to what we know, and can know, about twins' lives.

Books by other reared-apart twins are revealing with reference to nonshared environmental events. Two of my favorite works are *Separated @ Birth: A True Love Story of Twin Sisters Reunited*, by

Anais Bordier and Samantha (Sam) Futerman (2014), and *Being You* by Mary Holmes (2008), twin to Elaine Alin. *Separated @ Birth* describes events leading to the reunion of MZ twins, Anais and Sam, born in South Korea and adopted by different families in France and the United States, respectively. Sam was an aspiring actress and posted a video of herself on the internet that was viewed by one of Anais's friends. Impressed with the physical resemblance and matched behaviors between his friend and Sam, he urged Anais to contact her — she did, and the two young women met in London as identical twin sisters. I was thrilled to disclose the results of their DNA test to them, an event that was captured on film — Sam had the foresight to record the process of finding her twin and their reunion, leading to a popular documentary, titled *Twinsters*.

Anais and Sam completed a comprehensive research protocol in my laboratory, published as a case study (Segal & Cortez, 2014). Both similarities and differences were observed between the twins. Their most notable differences were in general intelligence, personality, self-esteem, and activity level, which may be plausibly linked with various life experiences and cultural factors they did not share. Both twins had completed college degrees; because Anais was a recent graduate, she was expected to outperform her sister. However, the opposite result occurred with Sam scoring 17 points higher. It is possible that this difference was attributable to the memory, social comprehension and/or problem-solving abilities required by Sam's acting and waitressing. In contrast, Anais was working in fashion at the time, an occupation that may have required less diverse skills. It was also noted that Anais scored higher in neuroticism and lower in self-esteem, possibly tied to her unfavorable experiences as the only Asian member of her exclusive Parisian suburb. In contrast, Sam was raised in a more diverse community. Anais's activity level was also lower, possibly due to the reduced emphasis on female sports participation in France, relative to the United States.

Mary Holmes and Elaine Alin from the United Kingdom participated in the Minnesota Study of Twins Reared Apart. Some years later, Mary authored an insightful book about their separate lives, and their reunion and its aftermath. The twins' different religious backgrounds suggest that nonshared experiences explain their later attitudes. Religion assumed a moderate role in Elaine's childhood home, but a major role in Mary's childhood home. As time passed, Elaine wondered if a belief in God came from freedom of choice, whereas Mary turned away from religion entirely. Clearly, nonshared experiences operate in unpredictable ways, explaining why they are difficult to identify.

Other memoirs and autobiographies authored by twins deserve research attention. In an earlier article in *TRHG*, I surveyed the lives of MZ male twins, George and Frank Engel, and Norris and Alan (Ross) McWhirter (Segal, 2020b). George Engel (1975) and Norris McWhirter (1976) both described the loss of their twin, but differences between them while together were apparent. Other autobiographical works include *Divided Minds: Twin Sisters and Their Journey Through Schizophrenia* (Wagner & Spiro, 2005), *Her: A Memoir* (Parravani, 2013) and *Twin: A Memoir* (Shawn, 2010); this sampling is not exhaustive. My chapters on the reared-apart 'fireman twins', Mark Newman and Jerry Levey from New Jersey; George Holmes and Brent Tremblay from Canada; and Oskar Stohr Germany and Jack Yufe from Germany and California, respectively, but born in Trinidad, also identify nonshared environmental factors that may explain their observed co-twin differences (Segal, 2005/2007).

It is also worth revisiting the biographical sketches and life histories of the reared-apart twins appended to the quantitative

findings in the three early studies by Newman et al. (1937), Shields (1962) and Juel-Nielsen (1965/1980), with an eye toward nonshared experiences and their impact on the twins' subsequent behaviors.

Twin Research Reviews

Fetal Reduction in Twin Pregnancy

Two related but distinctive terms are used with reference to fetal reduction in twin pregnancy. *Selective termination* refers to the elimination of an abnormal fetus, whereas *elective termination* is performed upon parental request, due to maternal medical conditions, low socioeconomic status, and/or psychological factors. Thus, the outcomes are generally comparable, but the underlying motivations differ (Bardin et al., 2022). Israeli investigators conducted a meta-analysis across six studies, comparing outcomes in mothers who had terminated one twin and those who did not. Their research efforts yielded some important favorable findings, among them reduced rates of premature delivery, hypertensive disorder, and cesarean delivery. Note that there are caveats to this study that require attention.

The authors acknowledged that their results warrant replication with larger maternal samples. There was, in addition, a noticeable lack of attention to parents' psychological reactions to the loss of a twin, especially among the elective group. Of course, this study focused on physical outcomes, but behavioral consequences deserve mention — simply listing positive outcomes from reduction may transmit the wrong message to families and physicians, namely that twin pregnancies should be reduced on a more routine basis. There are also families who do have the financial means to care for twins, yet undergo elective reduction regardless for various reasons. Greater study of this specific group of parents is important to further understand and manage this consequential reproductive decision.

Twins' Personality and Military Service

Studies of twins' occupational choices have brought clarity to our understanding of why people enter the professions that they do (Segal, 2012, 2017). A recent longitudinal twin study focused on factors affecting entry into a specific area, namely the military (Nedelec et al., 2020). The study was motivated by the concern of genetic confounding in prior studies showing heritable features of military service. Twin participants were drawn from the National Longitudinal Study of Adolescent to Adult Health (241 MZ pairs and 375 DZS pairs). Twins had responded to the question: Have you ever been in the military? This dependent variable was coded dichotomously (1 = yes, 2 = no). Various behavioral traits in adolescence and adulthood were examined vis-à-vis military service, among them self-esteem, self-control, intelligence, agreeableness, neuroticism, and a general personality factor. Upon correcting the data for familial confounding, it was observed that twins with higher scores on extroversion and the general personality factor were more likely to join the military than those with lower scores. Attention to family factors and the use of genetically informative research strategies were encouraged for future research.

Growth Restriction in Twins

The idea that twin-specific growth curves reduce the number of twins incorrectly classified as growth restricted was recently addressed by researchers from California and New York

(Blumenfeld & Anderson, 2023). They begin by defining small-for-gestational age (SGA) and fetal growth restriction (FGR), terms that have been used interchangeably and, as such, inappropriately. SGA refers to a fetus or neonate whose estimated fetal weight is below the 10th percentile. FGR denotes a fetus that fails to achieve its full growth potential, either before or after 32 weeks of gestation. The researchers asserted that individual assessment is a more effective strategy for diagnosing twins' growth, as compared with population statistics. They also argue that greater attention should be directed toward monochorionic twins who are at especially increased risk for adverse outcomes.

Advances in Conjoined Twin Separation

A review of advances in the surgical separation of conjoined twins is an informative addition to this literature (Shafarenko et al., 2022). Since the 1950s, improvements have been made in imaging modalities, adjuncts to abdominal wall closure (such as mesh and tissue expansion), and three-dimensional modeling. All these advances have led to improvement in patient care. A chart listing anatomical issues specific to each type of conjoined twinning (e.g., pygopus, craniopus) is provided. Photographs of conjoined twins undergoing surgical separation also assist understanding of these complex surgeries.

Media Reports

Update on Scientist Who Performed Gene Editing on Twins

In 2018, Chinese scientist He Jiankui performed gene editing on a pair of twins, Lula and Nana, and on a nontwin known as Amy (Ungar, 2023). He had disabled a gene allowing HIV to enter the cells. The general health and medical progress of these three individuals has not been disclosed. He Jiankui spent three years in prison for his unauthorized activities. Upon his release, he described plans to continue developing gene therapies for Duchenne muscular dystrophy and various rare diseases in a laboratory he opened in Beijing. He also announced that he had received a visa from Hong Kong and might wish to work there; however, his visa was revoked several hours later. The scientific community is divided over whether He Jiankui should continue to conduct scientific studies and whether he should be invited to speak so that colleagues can better evaluate his ideas and methods.

Twins from 33-Year-Old Embryos

Modern assisted reproductive methods can lead to unexpected outcomes. It was announced that on October 31, 2022, Rachel and Philip Ridgeway of Vancouver, Washington became the parents of opposite-sex twins, Timothy and Lydia (Hopkins, 2023). The 30-year-old embryos appear to have been frozen for a longer period of time than any others. However, the surprising and puzzling aspect of that implantation was that Rachel, now 33, was just 3 years old when the embryos were created. The answer is that the embryos were created and donated by another couple. The couple had a family history of genetic disorders, a likely explanation for why the embryos had remained frozen for such a long time.

Twins' Outcomes from Dietary Differences

In a co-twin control study identical twins, Hugo and Ross Turner, followed dramatically different diets, that is, meat and dairy versus vegan (LADbible Team, 2023). They followed these dietary regimens for 12 weeks as part of a Kings College London

investigation. At the end of the study period, Hugo, who followed the vegan diet, contracted illnesses less often, added 10 pounds of muscle, and increased his body fat from 13% to 15%. Ross, who followed the meat and dairy diet, reduced his body weight from 185 pounds to 181 pounds and reduced his body fat from 14% to 12%. An interesting observation is that Ross experienced periods of energy and lethargy, whereas Hugo's energy levels remained fairly consistent. Overall, the different diets did not lead to significant difference in physical health between the twins. In fact, photographs do now show discernable differences in their features or form.

Related findings from participants in the Minnesota Study of Twins Reared Apart are worth noting. Cholesterol levels were matched in a pair of female identical twins, even though one twin maintained a macrobiotic diet, eating mostly grains and vegetables. Perhaps this is not unexpected, given that cholesterol levels have a substantial genetic component at 55%. A second separated pair, labeled a 'junk food addict' and 'healthy eater', matched across most body measures except for weight, again, underlining contributions to individual differences in body measures from genetic sources (Segal, 2012).

Fraternal Twins With World's Largest Height Difference

Fraternal female twins in Okayama, Japan, born in 1989, have become *Guinness World Record* holders for having the largest height difference between twins (Senda, 2023). Yoshie is five feet four inches (162.5 cm), while Michie is two feet, ten and a half inches (87.5 cm). Their height difference is 75 cm, or approximately 29 and a half inches. The explanation for this observation is that Michie was born with a rare condition known as congenital spinal epiphyseal hyperplasia, a bone disorder that does not allow her to grow. It is an autosomal dominant genetic condition associated with skeletal abnormalities and vision and hearing problems, in addition to short stature (Medline, 2016).

Michie lives at home with her parents, while Yoshie started a family of her own. Michie was shy and introverted until she learned about Chandra Bahadur Dangi, from Nepal, the shortest man on record, who turned his height into an advantage. Once acknowledged by *Guinness World Records* (GWR), Dangi received gifts and worldwide recognition (Swatman, 2015). Michie realized that the height difference between herself and her sister was unusual and GWR confirmed this. Michie still struggles with unkind comments from onlookers, but wishes to help other people with disabilities.

Twin Home Experts Conquer Rat Infestation

New York City is experiencing difficulties with rat control (Wang, 2023). To this end, a pair of identical twins, David and Jim Schuelke, known as the 'Twin Home Experts', have created a device that mitigates the problem. They have also created a popular video with information to assist troubled homeowners and apartment renters. A photograph of the twins shows Jim holding a rat bait station and David holding a Ratvac device. The twins operate according to a plan that closes rat entries and places traps in the home as rats become hungrier. However, rat traps may not be effective — so the twins place peanut butter in the trap along with a razor blade. Another strategy is the Ratvac (shown in the photograph) that switches on when a rat is in the area. The rat is then sucked into a bucket with the scenario captured on video.

The Schuelke twins are not the focus of the lengthy article describing their work. However, the information about them illustrates their shared interest in home management, their shared

ingenuity in problem solving and the ease with which they collaborate professionally. In short, they illustrate what twin researchers have been observing in their occupational data for years (Segal, 2017).

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