

News, views and comments

Partnership with the University of São Paulo Panel of Twins: A Four-City Tour and More / Twin Research Reviews: Twin Research on Binge Eating; Twins' Physical Outcomes Linked to Different Diets; Working Conditions and Sickness Absence in Swedish Twins; Facial Morphology Differences in Monozygotic Twins / Human Interest and Importance: Michigan Family Forced to Adopt Their Own Twins; Ethics of Hiring a Surrogate to Bear Twins; Twin Survivors of the Israel-Hamas War; Twin Pregnancy with Double Uterus; Three Twin Pairs on Same Women's Soccer Team

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Abstract

This article begins with an overview of twin research in Brazil, initiated by the University of São Paulo Panel of Twins. I met with many new research collaborators and students while on a fall 2023 four-city lecture tour in that country. A meeting with a world-famous surgeon who recently separated craniopagus conjoined twin pairs is also described. This overview is followed by summaries of twin research on binge eating, twins' physical outcomes linked to different diets, working conditions and sickness absence in Swedish Twins and facial morphology differences in monozygotic twins. The final section of this article provides a sampling of human interest stories with important implications. They include a Michigan family forced to adopt their own twins, ethical issues surrounding the hiring of a surrogate to bear twins; twin survivors of the Israel-Hamas war, a twin pregnancy with a double uterus, and three twin pairs on the same women's soccer team.

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Partnership with the University of São Paulo Panel of Twins

Brazil is a largely populated, culturally diverse country, making it rich in opportunities for twin research. I have been associated with the Painel USP de Gêmeos [University of São Paulo Twins Panel] since 2016 as a collaborator and consultant. I have visited Brazil three times in this capacity, in 2016, 2017 and most recently in October–November 2023. The COVID-19 pandemic explains the 2017–2023 interval during which time international and domestic travel were prohibited. In this article, I will document the activities that took place, most but not all arranged by the USP Panel under

the direction of Professor Emma Otta. By doing so I hope to call attention to research possibilities and to foster new collaborations.

I arrived in São Paulo on October 18 and the following day presented an all-day minicourse titled 'Twin Studies: What Do They Teach Us?' This lecture was part of a psychology class taught by Professor Mirella Gualtieri. The morning session included an overview of twin methodology, illustrated with recent findings from extant research. The afternoon was set aside for discussion of my two recent books, *The Twin Children of the Holocaust: Stolen Childhood and the Will to Survive* (N. Segal, 2023a) and *Gay Fathers, Twin Sons: The Citizenship Case That Captured the World* (N. Segal, 2023b); both books have been reviewed in *Twin Research and Human Genetics* (Craig, 2023; H. Segal, 2023). That afternoon also included a presentation by Dr Gualtieri on the history of the USP twin panel and by doctoral student Vanessa Freitas on twin research and clinical cases managed by the psychoanalytic section of USP's Department of Psychology.

I left São Paulo on October 20 for the Institute of Psychology at the Federal University of Bahia, situated in the colorful city of Salvador. I was introduced to Professors Ilka Dias Bichara, (former

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director of the Institute of Psychology), Fabrício de Souza and Bianca Becker. On October 23, I delivered a lecture to students and faculty on ‘The Importance of Research with Twins for Understanding Social Interaction in Children, Adolescents and Adults’. The next morning there was an informal, but lively and informative gathering of students and professors during which time students discussed their current research projects. We considered ways in which these projects might benefit from including twins and debated the challenges of recruiting twin research participants and their families.

The next stop was Rio de Janeiro where I arrived on October 25. My host was Dr Alexandre Ghelman whom I met on my first visit to Brazil in 2016. Dr Ghelman is a general practitioner, behavioral neurologist and wellness coach. His monozygotic (MZ) twin brother Ricardo is also a physician, living in São Paulo. Ricardo Ghelman is the Founding Chair of the Brazilian Academic Consortium for Integrative Health and a member of the WHO Expert Advisory Traditional, Complementary and Integrative Medicine Panel.

Dr Alexandre Ghelman arranged for me to present a lecture to students and faculty at the Pontifical Catholic University (PUC) of Rio de Janeiro on October 26, held in conjunction with the university’s Department of Philosophy. The title of my talk was ‘Twins: The Science and the Fascination’. One focus of the lecture requested in advance concerned twin studies of spirituality. That request was most likely prompted by the large number of religions and belief systems in Brazil, many of which originated in African nations. (In Salvador, I was taken to Dique do Tororó, a lake in which eight statues, representing African orishes [divine Spirits] have been placed.) I began the discussion of spirituality and religiosity by citing the early work of Nichols (1978) that showed a lack of genetic influence on religious interests and belief in God. We know now that the failure to find genetic effects on religiosity was largely because the twins in his study were children under the guidance of their families, with little opportunity to express their individual inclinations. Later work by Waller et al. (1990) and Bouchard et al. (1999) among others did find evidence of genetic influence on religious interests, attitudes and values in older reared-apart and reared-together twin populations.

The next day, October 27, I was scheduled to visit Rio’s Memorial to the Victims of the Holocaust for a tour of the building and exhibits, followed by discussion of my book on the twins of Auschwitz-Birkenau. That visit would take place in the late afternoon. However, I was very interested in having a morning meeting with Dr Gabriel Mufarrej, one of the two surgeons who had successfully separated Brazilian craniopagus twins, Arturo and Bernardo Lima. This case is a landmark event in conjoined twin surgery because the twins were separated at four years of age, later than any other craniopagus twin pair. Dr Ghelman had contacted Dr Mufarrej’s office prior to my arrival, but there had been no response. As we left PUC, I asked him to try once more and this time he was successful.

Dr Ghelman and I met with Dr Mufarrej on the morning of October 27. He spoke at length about the Lima twins who, at nearly age seven years, are progressing well. That operation was performed in conjunction with Dr Noor Ul Owase Jeelani of London, invited by Dr Mufarrej to take part — Jeelani is famous for his successful separations of conjoined twins and the founder of London’s *Gemini Untwined* in 2011. Its mission is ‘providing hope and treatment for cranially conjoined twins globally through pioneering research and treatment’ (Gemini Untwined, 2023). The operation, which took place at the Instituto Estadual do Cérebro Paulo Niemeyer, in Rio de

Janeiro, was the launch of Gemini Untwined’s first global partnership.

The twins were diagnosed by ultrasound at the 12th week of pregnancy, with greater detail emerging from an MRI at the 23rd week. It was an extremely complex case that presented numerous challenges to the surgeons, in particular a heart defect in one of the twins; however, they agreed to do the operation, encouraged by the twins’ parents, but also because Mufarrej always believed in the surgery. Four surgeries had been planned, but the doctors eventually performed seven. Expenses were covered by the Brazilian health system, known as Sistema Único de Saúde (SUS).

Dr Mufarrej called Jellani a ‘soul brother’ and a very special person. The medical staff in attendance commented on the striking rapport that evolved between these two surgeons. However, as the operation progressed, they did not always agree as to the next step. At one point they took a brief break, drank some coffee and studied the 3-D models of the brain once again. They eventually found their way. The twins turned out to set a world record — they are the oldest craniopagus twins to have been operated on and to have survived.

I asked Dr Mufarrej to describe his emotions when the twins were finally separated. At first he said he could not — then he said it was a great personal ‘win’ because some colleagues did not believe it could be done. It was ‘fantastic . . . I started to cry. I could feel the presence of God, it was very spiritual’. Mufarrej had separated a second set of craniopagus twins just two months prior to my visit. He described it as an easier operation to perform because of the structure of the common anatomy, but his emotions were the same. A photograph of Drs Mufarrej and Ghelman, and me is displayed in Figure 1.

In the afternoon of October 27, I met Dr Sofia Débora Levy, clinical psychologist and Director of Rio’s Holocaust Memorial. Dr Levy is also the author of the 2023 book, *Sobre Viver*2 (*About Living: Nine Accounts Before, During and After the Holocaust by Men and Women Sheltered in Brazil*). Following a private tour of the center — one of the most impressive I have visited — I delivered a presentation about my book to guests and staff.

The next stop was the Federal University of Juiz de Fora where I arrived on October 29. Juiz de Fora is a relatively small city located approximately 80 miles from Rio de Janeiro. I was hosted by Professor Nara Cortes Andrade in the Department of Psychology. On October 30 I presented a lecture to students on twin research designs and recent research findings. In the afternoon I discussed two of my recent books, *Deliberately Divided: Inside the Controversial Study of Twins and Triplets Adopted Apart* and *The Twin Children of the Holocaust*. Afterwards, Professor Emma Otta (University of São Paulo), coordinator of the USP Twins Panel, and Professor John Fontenelle Araújo (Federal University of Rio Grande do Norte) joined Professor Andrade in a roundtable, ‘Building Research Networks in Neurodevelopment: The Twins Research’. The afternoon ended with an impressive musical performance by students.

I left Juiz de Fora on October 31 to return to São Paulo, the final stop. Professor Briseida Dôgo de Resende had organized the XL Annual Meeting of Ethology at USP (October 30–November 1). I participated in the only English panel, discussing ‘Studies on Twin Behavior’. Other panel participants were Dr Tania Lucci (University of São Paulo-Butantan campus), Prof. Patrícia



Figure 1. Drs Alexandre Ghelman (L), Nancy L. Segal and Gabriel Mufarreji at the Instituto Estadual do Cérebro Paulo Niemeyer, in Rio de Janeiro. Photo Courtesy: Dr Nancy L. Segal.

Monticelli (University of São Paulo — Ribeirão Preto campus), Prof. John F. Araújo (Federal University of Rio Grande do Norte) and Prof. Suemi Tokumaru (Federal University of Espírito Santo). Professor Emma Otta (University of São Paulo-Butantan campus) has always played a major role in this conference.

When lunch was served, I had an unusual twin-related experience. The chef looked very familiar, so I greeted him warmly. He appeared not to recognize me. I then realized that he looked a lot like a salesperson in a shop I had visited in June, in Aberystwyth, Wales. I regret not following up this event at the time, knowing that some MZ twins reared apart have met through such extraordinary circumstances. Regardless, Brazil has a bright and productive future ahead in twin research and I look forward to being part of it.

Twin Research Reviews

Twin Research on Binge Eating

Clump et al. (2023) introduce this review article with reference to observed ovarian hormonal contributions to binge eating (BE) in humans and nonhumans. In a section titled ‘Gene × Hormone Interactions’, the investigators suggest ways in which twin studies may be utilized to inform research on this topic. Given the large number of genes linked to BE, they propose using twins to examine all genetic effects, not just specific risk genes. This approach would

reveal whether the heritability of BE varies with hormone levels. Gene × environment interactions are evidenced by findings of increased heritability in high-risk hormonal environments.

Twins’ Physical Outcomes Linked to Different Diets

It is impressive that researchers continually find novel ways to insert twins into projects of interest. A team composed of investigators in California compared selected health measures in 22 pairs of MZ twin adults (17 female, 5 male) in which one co-twin followed a vegan diet and the other co-twin followed an omnivorous diet for 8 weeks. At the conclusion of the study the twin on the vegan diet showed significantly lower low-density lipoprotein cholesterol concentration, fasting insulin level and body weight. This outcome has relevance for clinicians assisting clients with dietary problems, health issues, and weight control. It should also be useful to individuals wishing to improve their health and lifestyle. One caveat is that methods for assessing the zygosity of the twins were not described. The twins were volunteers recruited from the Stanford University twin registry, making it likely that their twin type was assessed by objective scientific means; nevertheless, such information should be provided.

Working Conditions and Sickness Absence in Swedish Twins

A prospective Swedish twin study examined possible links between pain and/or common mental disorders and psychosocial working conditions and absence from work due to illness (Ropponen et al., 2022). The final sample included 2408 complete MZ twin pairs and 3252 complete same-sex dizygotic (DZ) twin pairs. The twins were born between 1925–1958 and 535 sets were female. The data were collected via surveys administered at two time points. Statistical analyses revealed no significant associations between psychosocial working conditions and sickness absence, but familial confounding, that is, shared genetic and environmental factors, could not be ruled out. The researchers suggested that findings from such studies may depend on how sickness absence is defined or on characteristics unique to particular occupations.

Facial Morphology Differences in Monozygotic Twins

Researchers in Turkey conducted a unique test of similarities and differences in twins’ facial morphology (Ozbilen et al., 2023). Specifically, their approach was based on the facial surface, whereas most previous studies focused on specific facial ‘landmarks’. They explained that a surface-based approach uses ‘point-to-point distance on the entire point cloud of the 3D images of the two structures’. Soft tissue comparison of the twins in 3D stereophotogrammetric images was made using the 3dMDface system, developed in Atlanta, Georgia. The participant sample was small, consisting of 14 MZ twin pairs (6 male, 8 female) recruited from Marmara University in Istanbul, Turkey. Zygosity was established by genetic testing completed for a different study. It was reported that the largest MZ co-twin differences were in the lower facial third and chin regions. This suggested that genetic effects differ as a function of facial location.

Human Interest and Importance

Michigan Family Forced to Adopt Their Own Twins

In 2015, Tammy Myers from Michigan was diagnosed with breast cancer (Young, 2023). She decided to have her eggs extracted,

create embryos with her husband's sperm, and identify a surrogate to carry the pregnancy. Tammy was unaware that a 1988 Michigan law would force the couple to adopt their own biological twin children because surrogacy contracts are not legal in her state. With the support of House Representative Samantha Steckloff, who had a similar medical and reproductive history, Michigan law appears to be changing in favor of families like the Myers. Attorney Courtney Joslin (co-author of the December 2019 professors' brief, filed on behalf of a same-sex couple whose twin son was denied U.S. citizenship; see N. Segal, 2023b) testified in favor of new legislation to protect couples seeking surrogacy (Breen, 2023). At present, all nine bills of the Michigan Family Protection Act were approved by the House and are awaiting passage by the Senate.

Ethics of Hiring a Surrogate to Bear Twins

The *New York Times* (2023) Ethicist column received a question from a couple inquiring about ethical issues surrounding the hiring of a surrogate to carry twins. They raised this issue in light of the elevated physical risks to twin fetuses and newborns, as well as the health of the surrogate. Kwame Anthony Appiah, who responds to these questions, cited current guidelines issued by the American Society for Reproductive Medicine that favor limiting assisted pregnancies to one implanted embryo, rather than two or more. (In the past, multiple embryos were used to increase the chances of at least one successful outcome, but improved reproductive techniques have reduced this need.) Appiah tends to prefer single pregnancies, while admitting that nothing guarantees a healthy infant or pregnancy, and that 'most twins — and their mothers — end up just fine'. He also raised ethical concerns about compensated surrogacy, which is used in the United States, but not in Canada, where a policy of altruistic surrogacy (in which surrogates are compensated for expenses only) is in effect; see N. Segal (2023b). That is a key issue, but one that is more tangential to the question posed by the couple. My view is that if all parties (prospective couple and surrogate) fully understand the physical risks of multiple birth, then securing a surrogate to carry a multiple pregnancy is appropriate.

Twin Survivors of the Israel-Hamas War

Scores of lives have been sacrificed in the ongoing Israel-Hamas War. Among them are twins. The members of an Israeli 10-month-old twin pair were hidden by their young parents just before their parents were brutally murdered by Hamas terrorists. Fourteen hours later, Israeli soldiers discovered the twins, who appeared to be in good condition — they are now being raised by their grandmother (Steinbuch, 2023). In another case, 23-year-old identical Palestinian male twins were videotaped mourning the loss of their entire family (YouTube, 2023). These stories are heartbreaking — we can only be grateful that the twins will grow up knowing each other and can lean on each other for emotional comfort and support.

Twin Pregnancy with Double Uterus

Kelsey Hatcher, a prospective mother of twins in Alabama, is experiencing a unique twin pregnancy (Rudy, 2023). She has a double uterus and has conceived one twin daughter in each. It is estimated that this condition, known as uterus didelphys, occurs in approximately 0.3% of the population. Combining that condition with bearing twins may occur once in an estimated 50 million pregnancies. The pregnancy has progressed well thus far. Kelsey and her husband are currently the parents of three children.

Three Twin Pairs on Same Women's Soccer Team

Rowan University in Glassboro, New Jersey has the distinction of maintaining a women's soccer team with three sets of twins (Wiley, 2023). They include identical twin sophomores Julianna and Olivia Giordano; fraternal twin juniors Hayley and Jillian Jankowski; and identical twin sophomores Lauren and Lianna SanFelice. These three pairs comprise 20% of the 30-player team. Interestingly, only one set (the Giordano twins) had planned to attend college together. It happened that one twin in the two pairs that had separated either felt isolated or believed they could accomplish more together than apart. Consequently, these twins transferred to Rowan and are happy with their decision. Several of the twins explained that their athletic skills are enhanced by playing with their twin sister — because they understand what their twin is thinking, an advantage that helps them to respond appropriately on the field. I have always maintained that virtually all sports competitions would benefit from having twins on their teams (N. Segal, 2000).

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