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NEWS, VIEWS, AND COMMENTS

Art for Twins: Yorùbá Artists and Their Statues/Twin Research Studies: Twins' Education and Conceptions; Diurnal Preference; Inherited Eye Diseases; Ultrasound Counseling When Twins Are Conjoined/Popular Twin Reports: *Twin Sisters* (the Film); Rare Pregnancy; Diet Test; French Twins Reared Apart and Reunited

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The Yorùbá of Nigeria are well known for their high twinning rate and the statues they create to commemorate deceased twins. An impressive collection of this artwork was displayed at the University of California's Fowler Museum in Los Angeles between October 13, 2013 and March 2, 2014. An overview of this exhibit is provided. Next, twin research on maternal education and conception, diurnal preference, inherited eye diseases, and ultrasound counseling for couples with conjoined twins are briefly summarized. This article concludes with a discussion of media-based items related to twins. The topics include an award-winning twin film, a rare pregnancy, a diet test, and the separation and chance reunion of monozygotic female twins.

Art for Twins

Yorùbá Artists and Their Statues

The Yorùbá people of southwestern Nigeria are well known for their high twinning rate. A recent estimate is that twins (mostly dizygotic [DZ]) occur in 45/1,000 of their deliveries (see Olusanya, 2011). However, Nigeria overall does not have the highest twinning rate in the world, a distinction held by Benin. The current twinning rate in Nigeria is 19/1,000 whereas it is 27.9/1,000 in Benin (Smits & Monden, 2011).

The theme of duality is central to Yorùbán art, and is strongly reflected in the statues their artists create to commemorate deceased twins. An impressive collection of this artwork was displayed at the University of California's Fowler Museum in Los Angeles between October 13, 2013 and March 2, 2014. This museum is dedicated to global arts and cultures, emphasizing past and present work from Africa, Asia, the Pacific, and the Americas (see http://www.fowler.ucla.edu/about). The material that follows comes from the museum's brochure and printed descriptions placed alongside the displays by museum staff. A panoramic view of the statues is shown in Figure 1.

The exhibit, titled 'Double Fortune, Double Trouble: Art for Twins Among the Yorùbá' included over

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FIGURE 1

(Colour online) Double fortune, double trouble: art for twins among the Yorùbá. Note: Fowler Museum at UCLA, October 13, 2013–March 2, 2014. (Photo credit: Josh White)

250 carved wooden statues or memorial figures known as *ibeji*. Each of these statues or memorial figures was carved by a Yorùbán artist from Nigeria, although the styles and materials show regional differences (Fowler Museum, 2014). Statues from the northern area tend to be slender with the hair arranged vertically, while statues from the south have detachable arms allowing for the addition of beads and other ornaments. It was suggested that figures created in the southern region wear some articles of clothing, such as jackets and shoes, something that may reflect Christian influence. However, there is enormous variety to the statues created within each region.

In the Yorùbán tradition, the first-born twin is named Tafwo ('the one who comes to taste the world') and the second-born twin is named Kehinde ('the one who follows'). However, the first-born twin is regarded as the younger. Twins as a pair are considered to be 'the two who are one'. While their birth is thought to forecast either great fortune or misfortune, deceased twins among the Yorùbá are venerated. Following lengthy apprenticeships, some artists receive commissions for significant work, among them the creation of the twins' memorial statues.

Elaborate rituals are associated with these statues. The figures are presented to the families, then bathed and

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consecrated by the artist. Artists never create an exact likeness of the departed twins, but attempt to capture the human form. However, some aspects of the deceased twin are included (e.g., sex, facial markings), but it is the family that provides the twins' social identity through various acts and events that incorporate the family history and connect the twin to past and future generations.

Yorùbán twins are said to be 'fashion-conscious', such that they are adorned with beads, bracelets and other articles, and given considerable care and attention. Families also provide considerable care for photographs and dolls that sometimes substitute for the statues. Different forms of adornment signal different qualities; for example, some beaded cloaks indicate royalty, and a string of four cowries (colored shells) signifies the spirit of the departed twin. Cowries may be strands or ornaments, announcing the wealth and fortune that twins can bring.

Some artifacts in the exhibit were of particular interest. One is of a double-bladed dance wand, a symbol of Sàngó, the God of Thunder, which is closely linked to the worshiping of twins. Another artifact shows Gèlédè masquerades that pay tribute to women's mystical powers. Identical twin masqueraders dance in pairs to highlight the good fortune linked to having many progeny, that is, twins.

A final note of interest is that figures carved by the same artist may be displayed as a set of twins, when in fact they represent children from different families. It was explained that in the absence of an exact likeness or a detailed life history, it is not always possible to accurately discern family ties. However, art dealers and other collectors often pair figures together as twins if they bear some resemblance to one another.

It is impossible to capture the many fascinating aspects of the place of twins in Yorùbán culture. This exhibit will, hopefully, be shown in many places around the world.

Twin Research Studies

Twins' Education and Conceptions

The question of whether more years of schooling predict fewer children and delayed childbearing was recently addressed by Amin & Behrman (2014). The within-MZ twin pairs design was applied, using twins enrolled in the Minnesota Twin Registry (MTR). The MTR includes all twins born in Minnesota between 1936 and 1955. A comprehensive questionnaire mailed to 6,638 same-sex twins was completed by 55% of the potential respondents, yielding 3,608 valid forms. Both monozygotic (MZ) co-twins in 744 pairs provided usable data. Twins who had acquired children via adoption or step-parenting were omitted from the study.

Overall, more schooling was associated with having fewer children, having a greater likelihood of being childless, and delaying the childbearing years. These findings held within pairs, with the exception of the greater likelihood of being childless. This discrepancy was explained by the possibility that different factors (e.g., early marriage) have different effects on fertility outcomes. It was also found that women who had completed more years of schooling had husbands who had also completed more years of schooling, but that the latter had no impact on fertility measures. Instead, the main factor decreasing fertility among more educated women was delayed marriage.

The researchers noted that they were unable to assign causal status to the effects of schooling on fertility, given that they had not identified the factors causing MZ twin females to differ in education. Second, they were aware that their results might be applicable only to the cohort of Minnesota mothers under study. An issue that the investigators did not address was the frequency of DZ twinning among the older mothers in their sample — the association between delayed childbearing and DZ twinning is well established (see Segal, 2000) and would have added an interesting dimension to an otherwise informative report.

Diurnal Preference

Factors affecting individual differences in diurnal preference (i.e., tendencies toward 'morningness' or 'eveningness') are of interest. A twin study of how genetic and environmental influences may be moderated by age yielded some new findings (Barclay et al., 2014). Participants were drawn from the University of Washington Twin Registry, a community-based twin sample created from the Washington State Department of Licensing, which provided data gathered between 2006 and 2008. They included 768 MZ and 674 DZ adult twins who completed five questions pertaining to preferred sleep and wake times.

Five key findings were reported: (1) The preference for morningness increased with age, consistent with extant research; (2) MZ twins showed greater resemblance than DZ twins across all three age groups (19–35 years, 30–64 years, and 65+ years), indicating genetic influence; (3) half the variability in diurnal preferences was associated with additive genetic effects, with the remaining variability explained by non-shared environmental factors; (4) age (based on the three age-categories) moderated genetic and non-shared environmental influences; genetic effects fell for

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individuals in the middle age group (30–64 years); (5) age moderated non-shared environmental influences in the continuous analysis.

The researchers underlined the decline of genetic effects on diurnal preference for middle-age adults. They suggested that work and family obligations could be responsible, implying that people have less control over these aspects of their lives while establishing their careers and raising their families. Genetic effects appear to play a larger role in diurnal preference as individuals enter the later ages during which time family and work responsibilities lessen.

Inherited Eye Diseases

It is estimated that 259,000,000 people worldwide suffer from some form of visual impairment. Thus, a current comprehensive review of twin studies of inherited eye diseases is a welcome addition to the twin-based medical literature (Nag & Hammond, 2014). The review covers the logic of the twin design, heritability studies of ocular disorders, and various approaches to discovering genes associated with them.

Genetic influence on certain eye disorders appears to be substantial. Research estimates that additive genetic effects on age-related macular degeneration range from 46–71% and are as high as 62% for intraocular eye pressure (IOP). A table summarizing heritability estimates for glaucoma and IOP is provided in the review; glaucoma appears to show the lowest heritability with an estimate of 0.13, based on the Finnish research conducted in 1987.

Only one reared-apart twin study (cited in the review) has been conducted thus far, based on data from the Minnesota Study of Twins Reared Apart or MISTRA (Knobloch et al., 1985; also see Segal, 2012). That work, which included 18 MZ and eight same-sex DZ reared-apart (DZA) twin pairs, reported genetic effects on refractive error and estropia. Additional detailed opthalmological studies of the MISTRA twins are currently ongoing by investigators at the University of Minnesota (Bitrian et al., 2014). Concordance for various eye disorders among previously studied MZ reared-apart (MZA) twin pairs has been summarized by Farber (1981).

Ultrasound Counseling When Twins Are Conjoined

Three-dimensional ultrasound can enhance visualization of fetal abnormalities, thereby improving the management of affected pregnancies. The use of this technique can also improve counseling for such families, as illustrated by a case report involving conjoined twins.

Thoracopagus conjoined twins (twins joined from the upper thorax to the umbilicus) were detected in a 24-year-old mother who had delivered two children previously. Conjoined twinning was confirmed by two-dimensional ultrasound, generating images that were shown and explained to the parents by their physicians. During this session, the parents were informed that the structural connections between the twins made the twins' survival virtually impossible. However, the couple had had difficulty comprehending the severity of their situation. Many people hear news accounts describing successful conjoined twin separations, so they may entertain unreasonable expectations as to what surgical intervention can accomplish. Next, the parents viewed three-dimensional images of the twins, which were more realistic and easier to understand. This experience assuages parental concerns, enables parental bonding with their unborn infants, and encourages more informed decision-making. The parents in this case chose to terminate the pregnancy.

Popular Twin Reports

Twin Film

The 2013 documentary film *Twin Sisters* tells the story of identical Chinese twins, Mia and Alexandra, separated at birth and reunited as young children. Mia was raised in Sacramento, California, a lively city whose population exceeds 475,000. In contrast, Alexandra was raised in the quiet town of Fresvik, Norway, whose population numbers 234. The film won the Audience Award at the International Documentary Film Festival in Amsterdam in November 2013, and the Audience Award at the Göteborg International Film Festival in Sweden in February 2014. A photo of the twins taken during their reunion at age 6 years and displayed on the film's web page is shown in Figure 2 (see http://twinsisters.no/passord/). A photo taken of the twins during the later filming is displayed in Figure 3.

A brief synopsis of *Twin Sisters* is provided in an interview with the film's Norwegian director, Mona Frils Bertheussen. The interviewer notes that

> [the twins] were never denied information about their family ties, and the girls communicate regularly by letter and telephone. The film follows the twins as they meet for the second time in Norway, at age 8 years, to spend the summer together. (Cunningham, 2014)

Mia and Alexandra took part in my prospective study of Chinese Twins Reared Apart at age 3 years, several years

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FIGURE 2
(Colour online) Twins' first reunion at age 6 years in Sacramento, California. (Photo credit: Nancy L. Segal)

prior to their reunion, and again at age 6 years (Segal, 2010). The twins were first reunited at age 6 years in Sacramento when I brought this interesting case to the attention of the BBC in London; a program chronicling their first meeting and first separation (when Alexandra and her family returned to Norway) was broadcast in 2010.

The story of Mia and Alexandra offers a compelling look at the behavioral similarities of identical twins that can emerge despite their separate rearing in different cultures. It is also an informative take on the behavioral differences that may be linked to their rearing circumstances.

Rare Pregnancy

A Washington state mother of two, pregnant for the third time, faced the prospect of losing custody of her three children (Noble, 2014). Having separated from her husband and filed for financial assistance, a DNA test was required

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FIGURE 3
(Colour online) Photo of the twins taken during the filming of *Twin Sisters* in Fresvik, Norway. (Courtesy: Mona Friis Bertheussen)

by law to prove maternity. However, the DNA test showed that she could not have conceived her three children.

It turned out that a mother in Massachusetts was experiencing a similar situation, in which her DNA showed no biological link to two of her three sons. Further research by her physicians and genetic analysis of a removed thyroid nodule showed that the Massachusetts woman was, in fact, the mother of all three sons. She was a chimera, an organism carrying two cell lines originating from separate sources. In her case, chimerism had apparently resulted from her absorption of a DZ co-twin in the early stages of her own mother's pregnancy. A report by Yu et al. (2002) in the *New England Journal of Medicine*, read by one of the prosecutors, eventually resolved the Washington woman's situation. Her twin's cells were found only in her ovaries, making her twin the 'mother' of her children; and she was, in effect, her own 'twin'.

Twin Diet Test

Identical twin physicians, Chris and Alexander van Tulleken, decided to follow drastically different dietary regimens to determine whether high fat or high sugar levels were more closely linked to weight gain (Weir, 2014). The project was partly prompted by Alexander's weight of 245 pounds, making him the 'fat version of his twin'. A film crew tracked the twin's progress for a BBC2 documentary that was aired on January 29, 2014 (van Tulleken, 2014).

Chris followed an extremely low fat diet, while Alexander followed an extremely protein-rich, low carbohydrate diet. Both twins ate as much food as they liked, and followed the same exercise routines. After a while, their different diets produced some clear physical and behavioral effects. Chris rarely felt satiated and experienced minimal weight loss. Alexander lost nine pounds, but lost energy and felt sluggish. He was close to experiencing ketosis, a condition in which the body produces high levels of ketones that can promote weight loss, but also lead to kidney failure.

The twins concluded that the best diets include monitoring calories, reducing portions, and eating whole foods as much as possible. Their co-twin control experiment was informative, but possibly hazardous as well.

Twins Reared Apart and Reunited

Identical twin sisters, Siam and Fabienne, were born in Hanoi, Vietnam on March 4, 1992 (Melvin, 2014). They were adopted separately as infants by French families living in different parts of France. Siam hopes to become a restaurateur, while Fabienne plans to become a nurse.

Just prior to their 22nd birthday, a friend of Siam's saw a woman who showed a remarkable resemblance to Siam. Siam agreed and contacted Fabienne, who ignored her messages at first — Fabienne worried that someone was attempting to hack into her Facebook page. However, Siam persisted and eventually the two women corresponded and met. They learned that the doctors who had delivered them

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had hidden their twinship from their families because it would have complicated the adoption process.

DNA tests have not yet been completed; however, the two women look very much alike. Both have small birthmarks above their lips and both experienced periodic nosebleeds as children.

This is not the first time that Facebook has reunited twins. Twenty-five-year-old identical twins, Samantha Futerman and Anais Bordier, met after Anais's friend came across a video of Samantha posted on the Internet. The physical similarities between Samantha and Anais were striking, prompting Anais to contact her look-alike via Facebook. The two women corresponded for a while, then DNA tests confirmed their monozygosity (Segal & Cortez, in press). It will be fascinating to see how many more reunited twins emerge over the years to come.

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