

What Twins Can Teach Us About Nature vs. Nurture

The day my identical twin boys were delivered by an emergency cesarean, I noticed a behavioral difference. Twin A, who had been pushed against an unyielding pelvis for several hours, spent most of his first day alert and looking around, while Twin B, who had been spared this pre-birth stress, slept calmly like a typical newborn.

My husband and I did our best to treat them equally, but Twin A was more of a challenge to hold — we called him “our lobster baby” — while Twin B was easily cuddled. As the boys developed, we saw other differences. Twin B rehearsed all the ambulatory milestones — crawling, walking, cycling, skating, etc. — while his twin watched, then copied the skill when it was mastered.

Although they shared all their genes and grew up with the same adoring parents, clearly there were differences in these boys that had been influenced by other factors in their environment, both prenatal and postnatal.

The relative importance of nature and nurture to how a child develops has been debated by philosophers and psychologists for centuries, and has had strong — and sometimes misguided — influences on public policy.

The well-intentioned Head Start program, for example, was designed to give children from deprived environments an academic leg up. But it might have been more effective to teach their caregivers parenting and nurturing skills, as well as how to enrich the children’s environment and resist bad influences.

Children learn from what they see around them, and if what they mainly experience is violence, abuse, truancy and no expectations for success, their chances for a wholesome future are compromised from the start. As my son Erik Engquist, a fellow journalist who was Twin A, put it: “Genes define your potential, but your environment largely determines how you turn out. The few who escape negative influences are outliers.”

However, if the genetic potential is there, having even one loving, supportive adult in a child’s life can make a difference in how he or she grows up.

My sister-in-law Cindy Brody is a classic example. As she tells it, both her great-grandmother and grandmother escaped from abusive relationships and gave their children to family and friends to rear. Cindy’s mother ended up with two nurturing adoptive parents and she, in turn, nurtured and loved her two daughters. But her mother died when Cindy was only 8 years old, leaving her and her sister, she said, “with a cold, aggressive, shaming father who believed in corporal punishment” and remarried a woman with two sons who sexually attacked the girls.

Cindy fled home at 17, determined “not to let anyone hurt me ever again.” Buoyed by an inner strength and the nurturing, strength and independence fostered by the women in her life — her mother, grandmother and an aunt — Cindy said she was able to fend for herself, get a good job, live her dreams and be a nurturing, loving mother for her own son and daughter.

Decades-long studies of identical and fraternal twins — and in some cases, triplets — who had been separated at an early age and reared in what were often strikingly different environments have



documented the important interaction of nature and nurture and help to explain the relative contributions of each to how a child develops.

“A strict dichotomy between genes and environment is no longer relevant; they work in concert,” said Nancy Segal, a psychologist at California State University, Fullerton, and herself a fraternal twin who has made a career of twin studies, starting with the famous [Minnesota Twin Family Study](#). She is the author of “Born Together — Reared Apart: The Landmark Minnesota Twins Study,” published in 2012 by Harvard University Press.

The many studies of thousands of pairs of identical and fraternal twins, both those reared together and those reared apart, have made it possible to assess the relative contributions of genes and the environment to a large number of characteristics.

“It’s trait-specific,” Dr. Segal said, with different ratios depending on the characteristic in question. “In an individual person, the contributions of genes and the environment are inestimable,” she explained, “but on a population basis we can estimate how much person-to-person variation is explained by genetic and environmental differences.”

The studies of reared-apart twins have shown that in general, half the differences in personality and religiosity are genetically determined, but for a trait like I.Q., about 75 percent of the variation, on average, is genetic, with only 25 percent influenced by the environment.

Furthermore, there can be gender differences in the influence of genetics. [A study of 4,000 pairs of twins in Sweden](#) found that genetics has a stronger influence on sexual orientation in male twins than in female twins.

As I observed in my own sons and know from studies of heart disease, genes confer a potential, but the environment often determines whether that potential is expressed. For example, perfect pitch tends to run in families and may even be tied to a single gene, but without early musical training, the trait is unlikely to be expressed.

In [the documentary “Three Identical Strangers,”](#) about identical male triplets separated at birth, there were differences in their susceptibility to mental illness, with the one who was reared by an authoritarian father more seriously affected than the two with warmer, more nurturing parents.

Genetics researchers now know that while an individual’s DNA is essentially immutable, a wide range of environmental factors can confer what are called epigenetic differences. Epigenetics influences which genes in an individual’s genome may be turned on or turned off. Such factors as exercise, sleep, trauma, aging, stress, illness and diet have been shown to have epigenetic effects, some of which can be passed on to future generations.

Researchers are seeking ways to deliberately alter gene expression in hopes of finding preventives or treatments for diseases like diabetes with a strong genetic component.

There can also be changes in the genome of an identical twin when the egg divides, resulting in a defect in a particular gene, Dr. Segal said. In a pair of identical twin girls, one can experience a phenomenon called X-linked inactivation. Two of the identical Dionne quintuplets were colorblind as a result of such a genetic effect.

Dr. Segal, who has also written “Twin Misconceptions: False Beliefs, Fables, and Facts About Twins,” said the studies highlight the importance of keeping twins, especially identical twins, together when they are adopted. As was depicted in the documentary, Dr. Segal said, “The triplets deeply resented having been separated. They lost out on wonderful years they could have had together. There was an immediate bond, an understanding of one another, that was obvious as soon as they found each other.”