2017

# Do Genes or the Environment matter more in Human Development?

# Contents



## INTRODUCTION

One gets his eye color from his mother, his freckles from his father. But where did you get your thrill-seeking personality and talent for singing? Did you learn these from your parents or was it predetermined by your genes? While it's clear that physical characteristics are hereditary, the genetic waters get a bit murkier when it comes to an individual's behavior, intelligence, and personality.

Nature vs nurture is a popular cultural catch phrase used to describe an ongoing argument that dates back to the 13th century. This debate deals with the roles that heredity and environment play in human development. The basic argument has one side contending the people act as they do because of genetic predisposition or animal instinct. The other side, however, says some so called predispositions are in fact learned behavior or environmentally influenced.

In this report we will discuss about the various theories of Nature and Nurture and the differences noticed between them. There are various effects of the two which helps in developing a human being, those factors are even discussed within the report that how the theories help in developing a human being.

## NATURE VS NURTURE

The nature vs. nurture debate is the scientific, cultural, and philosophical debate about whether human culture, behavior, and personality are caused primarily by nature or nurture. Nature is often defined in this debate as genetic or hormone-based behaviors, while nurture is most commonly defined as environment and experience.

In Bryner Jeanna (2006) in her book, "Nature vs. Nurture: Mysteries of Individuality Unraveled" a publication by Live Science, critical questions arise to challenge if some occurrences are based on genetic inheritance or as a result of mere coincidence. Things like talent, intelligence and personality come to the forefront of their discussion as to whether they are inherited or acquired through environmental exposure and experience (Bryner). In her view, these questions have posed many challenges to philosophy, psychology and genetics.

Present day a study into the human genome makes it clear they both sides are somewhat correct. Nature, heredity or genetics, in other words, does endow humans with a variety of inborn traits, abilities and skills. But it is nurture, or the environment that takes the innate tendencies and molds them as we grow to adulthood and on. This does not end the nature vs nurture argument because scientists are currently embroiled in ongoing disputes about how much is nurture and how much is nature.

It's well known that genes, one taken from each parent, determines traits like eye color or hair color or which hand is the dominant hand, left or right. These traits are encoded in every human cell in the body. Scientists who espouse the nature theory also say that abstract traits such as intelligence, aggression and sexual orientation fall under their purview, too. These traits, along with intelligence, for instance are naturally encoded in a person's DNA. Scientists are on the hunt for the specific genes that may cause a person to commit crimes or lead to addiction. Perhaps the biggest modern day hunt is to find the gene that causes homosexuality. It is called the "gay gene." Most scientists believe this "gay gene" exists because nearly all homosexuals maintain knowing their difference from birth.

Studies have been done, particularly on twins to test the hypothesis. For example, if genetics play no part in sexual orientation then fraternal twins, raised under the same conditions, we be alike,

regardless of their genetic makeup. However the studies show the twin similarities manifest even when raised under different environments, tending to validate the nature theory.

In recent years, the nature side of the debate has gained more attention, with headlines trumpeting newly discovered genes for virtually every behavior. Evolutionary psychology and sociobiology are two branches of science that attempt to demonstrate the evolutionary roots of human behavior. Books authored by scientists in these fields are extremely popular. However, critics still emphasize the important role of early childhood environment, development, and cultural influences, and many have argued that sociobiology and evolutionary psychology are deterministic pseudo-sciences.

There are various differences between Nature and Nurture:

- Nature depends on the inherited skills whereas nurture depends on the improved skills.
- Nature depends on genetics whereas nurture depends on the time spent in the acquisition of skills.
- Nurture has nothing to do with heredity and lineage whereas nature has everything to do with heredity and lineage. In the same way, nature has nothing to do with time spent whereas the concept of nurture has everything to do with the time spend.

## HOW NATURE AND NURTURE AFFECTS MENTAL HEALTH?

Nature, or genetics, has been proven to be an important factor in the development of some mental health conditions, such as schizophrenia, bipolar, and major depression: Bipolar, for example, is four to six times more likely to develop when there is a family history of the condition. However, although the importance of genetic factors cannot be denied, the development of mental illness is not entirely genetic. Take identical twins, for example: They share genes, yet if one twin develops schizophrenia, the other twin only has a 50% chance of also developing the condition. This shows that nature, while it plays an important part, is not the only contributing factor.

Another area where researchers may place more emphasis on nature than on nurture is that of addictions. Studies show that alcohol addiction, for example, can recur in families and that certain genes may have an influence over the way alcohol tastes and the way it affects the body.

Certain genetic factors may create a predisposition for a particular illness, but the probability that a person develops that illness depends in part on environment (nurture). When a genetic variant indicates the possibility of development of a mental illness, this information can be used to direct positive (nurturing) behavior in such a way that the condition may not develop or may develop with less severity. Similarly, the basis for addiction is not thought to be entirely genetic by most researchers. Environmental aspects, such as the habits of parents, friends, or a partner, might also be significant factors contributing to the development of an addiction. A genetic predisposition to alcohol addiction may be far more significant if one is routinely exposed to binge drinking or other forms of alcohol abuse and comes to view this as normal alcohol use.

Researchers at the University of Liverpool recently found that while a family history of mental health conditions was the second strongest predictor of mental illness, the strongest predictor was in fact life events and experiences, such as childhood bullying, abuse, or other trauma, supporting the idea of nurture's significant role in the development of mental health issues.

## THE NATURE THEORY: HEREDITY

The Nature Theory takes things a step further to say those more abstract traits such as intelligence; personality, aggression, and sexual orientation are also encoded in an individual's DNA.

- The search for "behavioral" genes is the source of constant debate. Many fear that genetic arguments might be used to excuse criminal acts or justify divorce.
- The most debated issue pertaining to the nature theory is the existence of a "gay_gene," pointing to a genetic component to sexual orientation.
- An April, 1998 article in LIFE Magazine, "Were Born That Way" by George Howe Colt, claimed that "new studies show it's mostly in your genes."

- If genetics didn't play a part, then fraternal twins, reared under the same conditions, would be alike, regardless of differences in their genes. But, while studies show they do more closely resemble each other than do non-twin brothers and sisters, they also show these same striking similarities when reared apart - as in similar studies done with identical twins.

## THE NURTURE THEORY: ENVIRONMENT

While not discounting those genetic tendencies may exist, supporters of the nurture theory believe they ultimately don't matter - that our behavioral aspects originate only from the environmental factors of our upbringing. Studies on infant and child temperament have revealed the most crucial evidence for nurture theories.

- American psychologist John Watson, best known for his controversial little Albert experiments with a young orphan named Albert, demonstrated that the acquisition of a phobia could be explained by classical conditioning. A strong proponent of environmental learning, he said: Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select...regardless of his talents, penchants, tendencies, abilities, vocations and race of his ancestors.

- Harvard psychologist B. F. Skinner's early experiments produced pigeons that could dance, do figure eights, and play tennis. Today known as the father of behavioral science, he eventually went on to prove that human behavior could be conditioned in much the same way as animals.
- A study published by faculty at the Twin Research and Genetic Epidemiology unit at St. Thomas' Hospital in London in 2000— A Twin Study System —suggests that a sense of humor is a learned trait, influenced by family and cultural environment, and not genetically determined.

- If environment didn't play a part in determining an individual's traits and behaviors, then identical twins should, theoretically, be exactly the same in all respects, even if reared apart. But a number of studies show that they are never exactly alike, even though they are remarkably similar in most respects.

In an effort to ascertain their claims, twin studies were used. The purpose of the study was to determine whether genes play a significant role in influencing some common behaviors such as addiction, violence and talent. In addition, the possibility of genes as contributing factors to diseases was also investigated. Through research, it was realized that smoking was influenced by a gene known as CYP2A6 which varied among individuals (Bryner). Along the same line of argument, alcoholism also emanates from genetic influences. Though this has a positive implication on nature, nurture could also worsen or reduce smoking and drinking capacity of an individual. Talent for instance in athletics, has a major bearing in genes but the environment plays an important role in promoting or discouraging it. It was found that, some people have genes that facilitate muscle contraction in motion (Bryner). The same was observed for risk predisposing factors for diseases. Genes expose individuals to higher risks of contracting some disease. A good example of such diseases is Alzheimer's disease. In conclusion and with respect to Bryner's (2006) article, talents, addiction and diseases among others do not entirely depend on genes rather on the environment. It is thus sufficient to assert that environmental factors enhance genes influence on behavior and diseases.

## TWIN STUDY

Several studies done on twins separated shortly after birth reveal that genetics do play a significant role in the development of certain personality characteristics, sexual orientation, and religiosity. The bond between identical twins was also suggested to be genetic by these studies, as 80% of identical twins reported that they felt closer to their twin than they did to their closest friends, despite having just met their twin. One study also suggested that genetics play a significant role in the development of personality: Environment had little effect on personality when twins were raised together, though it did have an effect when they were raised apart.

One of the major methods used in quantitative genetics to estimate genetic and environmental influences is the twin method. This design allows researchers to investigate the causes or influences that affect phenotypes (i.e., their aetiology). Twinning provides naturally occurring quasi-experimental comparisons. To estimate both genetic and environmental parameters of individual differences, the twin method requires both identical twins (monozygotic [MZ]) and non-identical twins (dizygotic [DZ]). MZ twins are 100% genetically similar, whereas DZ twins are on average only 50% similar for segregating genes. At a crude level this means that if a trait is influenced by genetics, then within-pair resemblance for that trait should be higher in MZ twins than in DZ twins.

There are two types of DZ twins: same-sex (DZss) and opposite-sex (DZos). Most twin studies focus on DZss because they provide a more appropriate comparison to MZ twins, who are always of the same sex. However, as discussed later, DZos make it possible to assess sex differences in twin analyses.

We investigated for the first time the genetic and environmental origins of teacher reported science performance, based on NC standards, using a large and representative cohort of twins aged nine years. In addition, we have considered three types of sex differences in science performance: mean differences, variance differences, and individual differences. Based on the Gender Similarities Hypothesis, we expected to find no mean or variance differences in science performance. Using same-sex and opposite-sex twins, we investigated the extent to which genetic and environmental influences differ for boys and girls; that is, whether the aetiology of individual differences in science performance differed between the sexes. We predicted that the genetic and environmental origins of individual differences in science performance are similar for boys and girls. Based on previous findings concerning the aetiology of other academic skills, we expected to find that individual differences in science performance are moderately influenced by genetics and have minimal influence of shared environment.

## CONCLUSION

Some characteristics or approaches are considered elements of nature, while others include traits that are derived from a nurturing environment. The biological approach favors a naturalistic view

of human and animal traits. This approach uses biological rationale to explain the inheritance and genetic dispersal of key characteristics that allow humans and animals to reproduce, perform actions, make decisions and move. Those who follow the biological approach ascribe these qualities to genetics, hormones and neurological chemicals.

This report discusses about all the points which needs to be considered for the nurture and nature of the gene and the environment which could help you to work accordingly. Therefore, the results suggest that, across the distribution, boys and girls do not have different influences affecting their science performance. In addition, there are no mean differences in performance between males and females, and only slightly greater variance in scores for males compared with females. However, later on in life there is still an under-representation of women in scientific careers. It is not impossible that genetic and environmental influences change throughout development, and therefore this cannot be ruled out. Alternatively, the differential representation of the sexes in scientific careers may be more influenced by society and adverse environmental factors that impact on women in science, such as the difficulties in returning to research after an extended career break. Only future research throughout development and later life will allow these issues to be investigated.

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