BEHAVIOR GENETICS FROM AN UPDATED PERSPECTIVE

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1. Introduction

The study of how genetic variation influences psychological phenotypes (traits), such as personality, mental disease, and social views, is known as behavior genetics. Turkheimer (2000) recognized three strong empirical regularities that by that time had arisen from the literature on behavior genetics in a major piece that was published in this magazine. These patterns became known as the "Three Laws of Behavior Genetics" by him. As follows:

1- Every aspect of human conduct is inherited. [That is, to some extent, genetic diversity has an impact on them.]
2- The impact of growing up in the same family is less significant than the impact of genes.
3- The impacts of genes or families cannot explain a sizable percentage of the diversity in complex human behavioral traits (Turkheimer, et. Al. 2014).

The study of the connection between genetic variation and psychological qualities is known as behavior genetics. Based on empirical regularities noticed in studies of twins and other kinships, Turkheimer (2000) suggested "Three Laws of Behavior Genetics." We suggest a fourth law of behavior genetics based on molecular research that directly evaluated DNA variation: Each genetic variant that contributes to a typical human behavioral feature accounts for a very small portion of the behavioral variability. This law explains a number of recurring patterns in the outcomes of gene discovery studies, including the inability of candidate gene studies to robustly replicate, the requirement for genome-wide association studies (and the reason why such studies have a much stronger replication record), and the critical significance of extremely large sample sizes (Chabris, et.al. 2015).

2. Behavioral genetics examples

Generalized anxiety disorder (GAD) has a hereditary component that makes up about 30% of the root cause and a 70% lived experience component. Researchers have also discovered that some people with genetic GAD features may never experience anxiety because of the caliber of their daily interactions with their surroundings. When identical twins are born separated, one twin may experience the symptoms of GAD while the other does not. This difference may be caused by differing environmental exposures.

The population of African Americans appears to have greater rates of mental problems, according to empirical data. Researchers hypothesize that this is caused by either genetic predispositions or exposure to environmental stressors such as systematic racism, violence, and poverty. sibling adoptions placed in the families of Due to their environmental exposure, people of different social and economic situations may develop diverse behavioral tendencies.

According to research, only one-sixth of educational attainment is genetically transmitted to offspring. One's socio-environmental experiences have the biggest impact on their academic aptitude (Pierce, 2022).

3. Types of Behavioral Genetic Studies

Exposure to the environment or genetic makeup have an impact on behaviors, personalities, and psychopathologies. Researchers have examined and quantified the relative importance of the environment and genetic makeup on behavior using data sets related to family, twins, and adoption. Whether or not environmental factors matter less than genetic features in influencing future behavior has been the subject of research (Pierce, 2022).

Behavioral genetics is what I'm interested in. It looks for genetic implications on behavioral differences between people, including why some people develop schizophrenia and certain kids struggle with literacy. Therefore, I'm curious about the reasons behind these discrepancies. For a century, psychology believed that the only factor that matters is the environment, particularly the environment that your parents created during the first few years of existence. That dates back to Freud. But using behavioral genetics, we've discovered that nearly half of individual variations are caused by changes in DNA. Genetics is important, but this effect is far larger than all the other psychological effects together. It has a significant impact on nearly all aspects of psychology, including mental health and sickness, cognitive. We refer to DNA as nature, and the environment as nurture. Therefore, the nature vs. nurture debate is the one in psychology that has persisted the longest. People once believed that everything about who we are comes from our upbringing. We've demonstrated the significance of nature and genetics. About a century ago, twin studies and adoption studies—the first behavioral genetic techniques—were created. The earliest ones were carried out in Europe in the early 1900s, mostly in England but also in other nations. The twin technique compares two different kinds of twins. Twin births make up 1% of all births worldwide. Identical twins make up one-third of those. Because they are made up of a single fertilized egg (monozygotic), They share the same DNA, making them seem like clones of one another. Two zygotes make up the second type of twins, which account for two-thirds of all twin births. They are identical to any other brother and sister, except they were born in the same womb at the same time. Comparing these two groups is what the twin approach entails. You would have to assume that identical twins share more similarities than non-identical twins if a trait like musical skill is influenced by heredity. It reminds me of an experiment in biology (Plomin, 2017).

It is simple to agree that human ailments with a solely hereditary origin include phenylketonuria, cystic fibrosis, and Huntington's disease. And you probably have little trouble accepting that your genetic makeup affects your likelihood of developing diseases like colon cancer, diabetes, or heart disease. However, when we take into account complex behaviors, the subject of heredity becomes more challenging.

Does having a positive outlook on life depend on your genes? What if you are a pessimist - is it a trait you inherited? Could your early rise or late bedtime, obsessive neatness, inability to empathize with others, or other characteristics be influenced by your genetic make-up? What percentage of our temperament is inherited?

How much of our intelligence—our capacity for language acquisition, reading comprehension, and spelling—is influenced by our DNA code? What about psychological conditions like

depression, bipolar disorder, and schizophrenia? Are those brought on by our environment or by our innate makeup?

The response is "both" Our conduct is influenced by both nature and nurture, our genetic make-up, as well as our environment and experiences. However, we believe that the genetic component may be more significant than most of us think (Fields and Johnston, 2021).

Take Susan Middlebrook from Colchester, Vermont, as an illustration. She typically sleeps for seven to eight hours every night, but Middlebrook goes to bed at 10:30 p.m. after the late-night news and wakes up at around 6:30 a.m. Very early in the evening, say 6:30 p.m., go to bed. And between 1:30 and 3 in the morning, right when you're fast asleep, Middlebrook is eager to start going. You may feel very alone as a result, she told National Geographic News in 2005. "Who wants to go out and have fun at three in the morning? Nobody I know, and I have no plans to check out the neighborhood pub. Instead, Middlebrook gets her daily tasks underway. Middlebrook has familial advanced sleep phase syndrome (FASPS), which causes her sleep patterns to deviate significantly from the norm. Sleep researchers give people a series of questions about their sleep habits in order to identify the norm and the abnormal exceptions: When do you feel your best in the day? Your ability to wake up in the morning is how simple? If you had total control over your schedule, what hour would you go to bed? What hour of the evening do you start to feel sleepy? Are you more of a "evening" or "morning" person? (The questionnaire was created by Swedish scientist Olov Stberg and British scientist James Horne.) Most of us fall somewhere in the middle of a broad bell-shaped curve of scores, but FASPS patients lie at the far "morningness" end of the scale, scoring higher than more than 99 percent of other respondents. The answers to these and other questions produce a score that lies on a scale running from extreme "eveningness" to extreme "morningness." (Fields and Johnston, 2021).

Because Middlebrook's condition is caused by a malfunction in her circadian rhythm, which is derived from the Latin words circa-, "cycle," and dies, "day," circadian literally means "the cycle of one entire day." This circadian clock regulates not just when we sleep and wake up but also several physiological, metabolic, and behavioral functions like blood pressure, mood, alertness, and hormone levels. Exposure to sunshine resets our biological clocks each day, putting us in tune with our surroundings. However, Middlebrook's internal clock has a faster cycle and is generally four hours ahead of everyone else's, allowing her to go to bed at the same time as her neighbors do (Fields and Johnston, 2021).

In the Middlebrook household, Middlebrook's sleep-wake cycle is about as uncommon as oatmeal for breakfast. Two of her three sisters, one of her parents, and her own child all maintain the same peculiar hours. Middlebrook's sleep-wake cycle may seem unusual to you because it deviates greatly from the statistical average. The word "familial" in the name of the disease may have hinted to the fact that this syndrome is definitely caused by a variation contained in the personal DNA code of these family members rather than by any external factor. Even though only three out of every thousand people have FASPS, understanding its genetic underpinnings was very worthwhile. Findings about this condition could help explain other, more prevalent sleeping disorders like narcolepsy and insomnia, or they could lead to treatments for seasonal affective disorder (SAD), in which sufferers' moods are significantly impacted by the absence

of sunlight in the winter, and they may offer health support and advice to millions of shift workers. Understanding human circadian cycles may even make it possible to time medical treatments for greater effect or offer solutions for lowering nocturnal traffic accidents (Fields and Johnston, 2021).

A individual can have 0, 1, or 2 copies of the minor allele at a certain SNP since every DNA sequence is inherited twice, one from each parent. The individual's genotype at that SNP can be described by the quantity of minor alleles. The average effect of gene replacement is the line that best represents the entire genotype-phenotype connection (Lee, et. Al. 2014).

However, the slope of the best-fitting straight line is equal to a weighted average of the phenotypic changes resulting from potential gene replacements. The genuine genotype-phenotype relationship will almost likely not be precisely linear. The nonlinear effects of genotype, as well as interactions between genes and their environments, can theoretically also be estimated. To choose a subset of SNPs that should be further explored, it will typically be a good initial step to estimate the average impact in practice due to the startling combinatorial explosion of potential ideas (Rietveld, 2014).

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