

Can behavior be passed down genetically?

Psychology, Behaviorism



There is currently a substantial body of research supporting the argument that there is a genetic influence on numerous human behaviors, such as homosexuality, intelligence and personality. One indication that behavior has a genetic basis is that behavior is often species specific. Examples include the warning behavior of prairie dogs or the mouth to mouth sharing of blood amongst vampire bats. The closer our genetic resemblance is to a certain species, the more behaviors we have in common. Since long it has also been known that behavior can be bred true, which is the reason why some breeds display specific behaviors.

Behavior is also known to change in response to changes in biological structures or processes. Examples include the use of the SSRI drug which alters the reuptake of serotonin in the synapses and consequently our mood, or the loss of important cognitive functions due to brain damage. As the anatomical structure and the physiological processes depend on our DNA we can infer that genes indirectly influence our behavior. It is important to bear in mind that the brain can alter its structure from experience, but this capacity must clearly be genetically determined.

Most researchers agree that all behaviors are more or less indirectly influenced by genes. Where they disagree is the extent to which genes influence behavior. Some behavior also seems to be more influenced by genes than others. The influence of cognitive, social and cultural factors on behavior cannot be denied, and even though there may be a genetic predisposition for many disorders, the extent to which the genotype is expressed in its phenotype will depend on environmental influences.

The stress-vulnerability model, for instance, assumes that the onset and symptoms of mental disorders are influenced by three interacting factors; biological, environmental and protecting factors that may protect the individual against development of a disorder. A study that illustrates the interaction of genes and environment on behavior is a molecular genetics study by Caspi et al. (2003). Caspi et al. investigated the relationship between the 5-HTT gene and occurrence of depression in 847 New Zealanders. The 5-HTT gene is responsible for the production of serotonin in the body, which in turn has an influence on our mood.

A DNA sample was taken of each participant, who also was asked to answer a questionnaire on depression. In order to ensure the participants' honesty in their self report, their responses were cross checked with a friend of their own choice. The researchers also controlled for levels of stressful life events. The results showed that participants with a short allele on the 5-HTT gene had an increased vulnerability for depression between the ages of 21 to 26. The study also found that the participants only had developed depression if they had suffered from stressful life events, no matter whether they had a propensity for the disorder or not.

Replications of the Caspi study in different countries by Chiao and Blizinsky (2010) further support a gene – environment interaction for depression. They investigated the prevalence of the short allele in the 5-HTT gene in different populations and found that there are higher frequencies in populations that are considered to have a “collectivist” culture, such as Asians, and that there are lower frequencies in populations with an “individualist” culture,

such as Europeans or North Americans. This seems counter-intuitive, considering that depression is more common in individualist cultures than collectivist cultures.

Asians should genetically be more prone to depression than Europeans and North Americans, yet Europeans and North Americans are more likely to suffer from it. The research is suffering from several methodological problems. It is possible that depression is as common or in the East as in the West, but that it is underreported. If the data is to be trusted, it suggests that Asian cultures may have better protective factors against the development of depression compared to Western culture, such as better social support.

These findings raise potential ethical issues of discrimination and prejudice. Because of the methodological weaknesses of the research, the findings are not conclusive. Most research supports an interaction between genes and environment on behavior. Genetic research on twins and families usually measure the degree of similarity in characteristics, such as intelligence, between genetically related and unrelated individuals. From this comparison, a concordance rate between 0 and 100 is calculated.

If the rate is close to 100, the behavior is assumed to have a strong genetic basis. On the other hand, if the rate is low, environmental factors are thought to play a major part. Some of behaviors that have the highest concordance rates are homosexuality, schizophrenia, alcoholism, general mood levels, and intelligence, with average concordance rates between 60

and 70. Behaviors with lower concordance rates include depression, personality, religious values, political beliefs and vocational interests, with average concordance rates of around 30 %.

It may seem curious that some of the latter behaviors have a small genetic component, and it is possible that the concordance rates are flawed by methodological issues. The concordance rates fluctuate between studies of the same behavior. This may be due poor control of confounding variables. Some relationships may be purely coincidental, such as in a famous study by Bouchard where two identical twins raised apart had a wife with the same name and in addition had named their son by the same name.

Even if monozygotic twins that are raised in different families exercise similar behavior, it can also be because they are raised in similar social and cultural settings, because they look similar and therefore are treated the same, or because they exercise similar behavior patterns of adopted children. Also, one cannot rule out that researcher expectancies and small sample sizes can influence the concordance rates. Finally, there is a construct validity problem of the studied behaviors. Concepts such as intelligence lack an agreed upon definition, and some mental disorders are viewed differently in different countries.

It is therefore difficult to compare concordance rates between such studies, as they are measuring different concepts. Even so, it is possible that if personality and talent has a genetic component, individuals may be biologically more inclined to some interests than others, and thus may be

more likely to adapt a certain value system or vocation. Even though there are methodological problems involved in genes and behavior research, there is overwhelming evidence that there is an influence of genetic inheritance on most behaviors. The extent of this genetic influence is however still controversial, and may vary depending on the behavior.