

CHAPTER 23: BIOLOGICAL CORRELATES OF BEING GAY: BIOLOGICAL DETERMINISM?



Scientists are currently uncertain as to whether homosexuality is primarily caused by environmental or genetic factors. The uncertainty arises because much of the available data involves correlations, human behavior is likely affected by interactions (complexity) and humans are VERY difficult research subjects when it comes to sex. But evidence is pointing to a combination of genetic and environmental factors influencing sexual preference..

Introduction

Some of the most profound questions about humans address our behavior. From culture to crime, science to society, we often want to know whether our destiny and who we are is in our genes or a matter of choice and determined by our environment. Our parents went to great lengths to teach us and equip us for this world, but many of those efforts would be wasted if it was all in our genes. To some extent, genes and environment are inseparable. But when it comes to why some of us are scientists and others artists, or other differences in behavior, we can at least attempt to partition genetic effects from environmental ones. As an analogy, if we want a hunting dog to retrieve birds, there are some obvious breeds to choose and train, but many breeds will be worthless for this task no matter how much they are trained. Behavior of humans is more challenging to understand than that of other animals, but some of the same principles can be applied to both humans and other animals.

The question of whether a behavioral difference among people is due to genetic differences or environmental differences is known as the question of biological determinism, often phrased as “is it in our genes?” or as “nature vs. nurture.” Biological determinism is relevant to many issues of social relevance:

- crime
- obesity
- mental illness
- IQ
- addiction
- risk-taking

There are several reasons that answering the question of biological determinism is intrinsically difficult. One is that humans make difficult subjects, especially limiting the kinds of experiments that can be done. This limitation in turn means that we have to rely on correlations for much of our conclusions.. Finally, many of our behaviors are due to a combination of many factors, with possible interactions (complexity). Consequently, there has been little resolution of any of the nature-nurture debate.

Your generation is perhaps unaware of the dark side of biological determinism that was manifested in the past. The most notorious abuse was the eugenics program of Germany's Nazi regime in the 1930s and 1940s. The eugenics program was used to justify genocide of the Jews as well as the killing of gypsies and homosexuals and others deemed socially inferior. The U.S. was never that extreme, but throughout much of the 1900s, the eugenics movement led to sterilization (castration) of those deemed mentally inferior. The motivation for eugenics was to improve the gene pool, and castration was done to prevent the inferior individuals from having babies. Yet, if the basis of their 'inferior' minds was environmental – perhaps nothing more than a lack of education – then preventing them from having offspring did nothing to improve the gene pool.

In this chapter, the focus is on sexual preference. A person's physical sex depends on gonad type (testes, ovaries) as well as secondary sexual traits, such as genitalia (penis versus clitoris and vagina), breast development, facial hair, and so forth.. A person's sexual preference is measured by whether they prefer to have sex with someone of the same sex (= homosexual preference, known as 'gay' if male and 'lesbian' if female), or whether they prefer someone of the opposite sex (= heterosexual or straight). A separate but related behavior concerns gender identity, which is whether a person thinks of himself/herself as man or woman. Gender identity can be fully separated from sexual preference. Individuals get sex change operations because of issues with gender identity, but men who get changed into women will sometimes have sexual preferences for women (for example).

Being gay/lesbian has social consequences, especially to the individuals with the homosexual preferences. It is estimated that 2%-5% of men are gay, 1%-2% of women are lesbian, and these percentages appear to hold across cultures, as best one can tell. Despite the relative abundance of these behaviors, many states have passed referenda that disallow same-sex marriages. On a more individual level, 'gay-bashing' has led to many deaths and less brutal beatings, based entirely on widespread intolerance of homosexual preferences. Perhaps for all of these reasons, there have been many searches for correlates of gay/lesbian behavior that might provide some clues to what determines it. In the recent past, and thus likely still, it has been commonly thought that homosexual preference is a choice and even learned: a 1970 U.S. survey found that 43% thought that young gays learned their SP from older gays. Thus, if we can find anatomical or physiological correlates of being gay, we may at least settle the question of whether sexual preference is learned or a 'choice.'

Overall, there are a few patterns of association with homosexual preference, but they are weak (hence demonstrated only statistically) and prone to poor repeatability. This topic is so far a difficult one to research because of the lack of decisive patterns. Nonetheless, there is collective support for both environmental and genetic causes.

Genetics

Several lines of evidence suggest a weak-moderate genetic component to sexual preference. A genetic basis is especially difficult to establish for human behavioral differences, both because we don't do experimental crosses with people and because there is so much parental influence on behavior that confounds environmental effects with genetic ones. One of the most useful comparisons therefore makes use of identical twins versus non-identical (fraternal) twins. Identical twins are genetically the same, so any difference between a twin pair must be non-genetic (environmental). Fraternal twins are genetically related but not identical. Both kinds of twins share the womb and are the same age, so they experience many environmental similarities that might be thought to affect behavior. As a consequence, if identical twins more often have the same type of behavior than fraternal twins, we suspect a partial genetic basis to the behavior. If the behavior was 100% due to genes, two identical twins should always have the same behavior. And if there is no genetic basis to the behavior, then identical twins should no more often be similar to each other than fraternal twins.

The twin data show that identical twins have about 50% concordance for sexual preference in some studies, 30% in others. Fraternal twins have nearly half this concordance. So these data suggest that there is a modest effect of genetics. Other data, using a combination of molecular techniques and pedigrees, suggest that an X-linked gene or region influences sexual preference, but that finding has not been confirmed in all careful studies.

Miscellaneous Correlations

Fraternal birth order: The probability that a man has homosexual preference increases with the number of older brothers he has. Each older brother increases the odds by $1/3 - 1/2$. This effect cannot have a genetic basis. Speculations for this effect focus on the mother progressively building antibodies against an unknown male protein, more so with each son.

Finger length ratio: The ratio of the index finger to the 4th finger is higher in women than men. In people with homosexual preference, there is a tendency for the ratio to be lower than in heterosexuals of the same sex. By this criterion, homosexuality is associated with overmasculinization.

Childhood gender non-conformity: Children that fail to conform to standard childhood gender roles (such as 'tomboy' girls and effeminate boys) have a higher incidence of adult homosexuality than children that conform to standard gender roles. This kind of study is difficult to do properly (prospectively). The danger of doing this kind of study retrospectively, after sexual preference is already known, is that there will be a biased tendency to selectively recall instances of childhood behaviors that fit the adult outcome.

Otoacoustic emissions (OAE): Our ears actually make sounds, though they are too weak to hear by ear. They have a characteristic frequency, starting in early childhood. The right ear's OAE is different from the left ear's, and males differ from females. A UT researcher (Dennis McFadden) is finding that gay males have slightly different OAE frequencies than heterosexual men. The direction of the difference supports an overmasculinization of gay men.

Neuroanatomy

There is a strong temptation to think or hope that a behavioral difference as strong as the difference between homosexual and heterosexual preferences will have a physical manifestation in the brain. There is an increasing number of techniques that can be performed non-invasively on a live person, but many of the most direct assays, and those that can be applied to microscopic regions of the brain, require actual brain material. There are obvious difficulties in obtaining sufficient material for those studies, and work repeating any findings work is rare. Studies have reported the following, but one should not consider any of the patterns as demonstrated beyond reasonable doubt.

Interstitial nucleus of the Anterior Hypothalamus #3. In 1991, Simon LeVay reported a search for sexual preference differences in the size (volume) of 4 brain nuclei in a brain region known as the anterior hypothalamus. Work on rodents had demonstrated that this brain region affected sexual behavior, and work on humans had already identified a male-female difference in tiny regions or 'nuclei' of the anterior hypothalamus. LeVay found a difference between heterosexual and gay men in one of these nuclei (#3); the size of INAH3 in gay men was similar to that of (heterosexual) females and smaller than that of heterosexual men.

Other studies have reported brain differences associated with sexual preference. The regions involved (in different studies) have been the suprachiasmatic nucleus, the mid-saggital plane of the anterior commissure, and the isthmus of the corpus callosum.

As mentioned above, the biological basis of sexual preference in humans is a research area in which it will be some time before we have definitive answers. The problems are

1. humans are difficult subjects
 - a. they do not readily divulge these sexual preferences
 - b. the experiments done are limited
2. because of (1), we have only correlations to work with
3. possible complexity: there appear to be many factors influencing sexual preference, none of which are strong (we don't know about interactions, but they may exist).