

## **Myths and Misconceptions About Behavioral Genetics And Homosexuality**

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In order to correctly understand the genetic argument that homosexuality is inborn, it is imperative to understand the basic concepts of behavioral genetics.

The nature-nurture interaction is often misunderstood by the uneducated layman or the naïve non-scientist who misinterpret the typical news headline that reads, “Gene X has been found to cause Behavior Y.”

Behavioral Genetics (BG) is the study of genetic influences on human behavior. It is the study of “how genes, operating within environments, connect to behavior” (Baker, 2004, p. 17). “Behavior” refers to “observable actions, or even emotions and moods” and can be “unconscious, automatic, or instinctual” (Baker, 2004, p. 2-3). In a broader sense, even “personality” is a behavior.

### **Environment and Biology**

Behavioral genetics always acknowledges both environmental and genetic influences on behavior—never assuming “that one or the other is omnipotent” (Plomin et al., 1980, p. 374). Employing probability statistics, researchers estimate the comparative contribution of both *genes* and *environment* in shaping a behavior.

Next, we ask, what constitutes “environment”? The environment is any non-genetic influence, including internal biological entities such as nutrients, bacteria, viruses, and medicines (Baker, 2004). Environment includes any forces that impinge upon the person (from outside) such as parenting and family life, peers, the media, climate variations and natural disasters, and disease and war.

These environment forces interact with genetic factors from the moment of conception until the time of death.

Now, what is a gene? A gene is a segment of DNA--with hundreds or thousands of nucleotides--that appear to act together in some orchestrated manner. Genes act in two primary ways: they direct the manufacture of proteins, and activate or deactivate other genes (Plomin et al, 1980).

For example, a boy may have inherited genes for superior athletic ability in the form of increased lung capacity or more fast-twitch muscles. He could be a great runner, swimmer or cyclist. Yet, his parents are poor, and he gets few chances to engage in sports. Also, his parents don't watch sports or engage in sports themselves. They prefer camping, hunting, and fishing when they have the time and the money. As a teenager, the boy must work part-time and go to school. He has little time for extra-curricular activities. Thus, he never runs the mile, swims the butterfly, or wins a triathlon!

### **Studies of Genetic Influence on SSA**

Now I turn attention to the matter at hand: the supposed genetic basis for homosexuality. “There are basically three kinds of inquires to demonstrate the genetic basis for [homosexuality]: family studies, twin studies, and adoption studies (Lewontin et al., p. 213; also see Pattatucci, 1998, p.21).

The simple idea behind all these studies is that if relatives of homosexuals report homosexuality at a higher rate than in the general population, then homosexuality must have a genetic component. The goal of such studies is to estimate, using correlational statistics, the genetic influence on homosexuality.

The Holy Grail is the “heritability” quotient. Heritability is a big deal in behavior genetics, but a concept that is difficult for most people to understand, and a concept misrepresented in the media. It simply means the correlation of a trait among relatives. But note that “Relatives resemble each other not only because they share genes but also because they share environments” (Lewontin et al., p. 99). “Heritability” is the proportion of *phenotypic variation* (in a population) that is attributable to genotypic variation (in a population). Said another way, “heritability describes the extent to which genetic differences among individuals in a population make a difference phenotypically” (Plomin et al., 1980, p. 224). Sound confusing? It is to most people!

Heritability is indicated by a numerical value that varies from 0 to 1. A heritability quotient of 0 indicates no genetic contribution to individual differences in phenotype; while a quotient of 1 indicates the behavior (the phenotype) is completely determined by genetic variations. For example, suppose that in a family study, heritability for homosexuality was found to be .40. This means that 40% of the variation in sexual preference among this family group may be due to genetic variation, and 60% of the variation in sexual preference may be due to environmental differences.

Please note: Heritability estimates do NOT indicate that for a specific person, 40% of his gayness is due to genetics and 60% is due to environment. Heritability estimates can only indicate that there is probably something in the genetic pool of this sample at this time that may increase the likelihood of a person (in this small family group) of becoming gay.

### **Identifying Inherited Factors in Particular Individuals**

Studies of twins (both identical and fraternal), and adoption studies are most often used to investigate heritability. A typical twin study works this way. Identical (monozygotic) and fraternal (dizygotic) twins, where at least one of the twins is homosexual, is recruited through gay and lesbian publications, websites, or gay support groups (Bailey & Dawood, 1998). The volunteer twins are asked to identify their sexual preference, sexual fantasies, etc. The results usually show that if an identical twin is gay, his brother is very likely to be gay, maybe a 40-50% chance. If a fraternal twin is gay, then his brother has about a 1 in 4 chance of being gay. In a family with a gay biological child, an adopted brother may only have a 3-5% chance of being gay--which is about the incidence of male homosexuality in the general population. The inference is then made that homosexuality must be genetic because the closer the blood tie (thus the more genes in common) between brothers, the more likely that a gay boy will have a gay brother.

The ideal heritability study is one involving identical twins that were separated early in life and raised in different families. Then if you find a high concordance (or agreement) rate between these brothers reared apart, then we can assume that homosexuality is caused by genes. Yet even these studies have limitations. First, there are very few (maybe 6-10) sibling pairs of homosexual boys reared apart reported in the literature. Replication is almost impossible. Second, researchers provided little information on why and when the siblings were separated and who actually raised the siblings. The sibling may have been separated for only a few years and even raised by relatives. For example, in many cases of IQ studies done on twins, the separated twins were raised by kin: divorced parents, aunts and uncles, or grandparents and the twins had occasional or frequent interactions (Lewontin et al., 1984). Thus the psycho-social, economic, and ideological environments of the “separated” twins may have been more similar than assumed.

Even if the twins are raised in the same home “there is abundant evidence that the environments of MZ [monozygotic or identical twins] are very much more similar than those of DZs [dizygotic or fraternal twins]” (Lewontin et al., p. 214). In other words, identical twins are often dressed alike, play together more than other brothers, are treated alike by teachers and peers, and are therefore more likely to share the same environment.

### Data on Environmental Influences is Lacking

With all of these family studies, the critical limitation is the absence of detailed environmental information such as family's sexual values, the social and political ideology of family members, their exposure to the media, the occurrence of mental illness in family members, the incidence of abuse and incest or neglect, and a detailed examination of the parent-child relationships. In most of these family studies, environmental factors have not been adequately measured, so one cannot rule out environment as an important contributor to homosexuality. This is the most serious limitation of heritability studies.

Heritability quotients have other limitations. Estimates are not constant numbers but can change over time and in different populations. Many large samples are needed to obtain valid heritability estimates. This is seldom done. Heritability is a population parameter like the mean. The average height of a population tells you nothing about the tallness or shortness of any particular individual! Likewise a heritability quotient tells you nothing about why a particular person is gay. A heritability quotient cannot be used to predict who may become gay or lesbian.

Another limitation of these studies is the authorship. Most of this research has been done by gays that have a vested interest in the outcome. The fourth caveat is the use of biased samples. Volunteers from gay groups may only participate if they have a gay brother or sister. Even gay advocates such as J. Michael Bailey (in Bailey & Dawood, 1998) admit: "If, for example, a gay twin who sees an advertisement for a [twin] study may be less likely to call if his twin is heterosexual, this would cause concordance-dependent bias" (p. 10).

The last limitation is the fact that "correlation does not indicate causation." Heritability estimates are correlations regardless of what statistical test is used, be that an ANOVA or a path analysis. Correlations cannot rule out the third variables problem: that there is something else, not observed and measured, that is causing the correlation.

Michael Rutter (2006) gives an example of how this type of genetic research works, using the example of schizophrenia. Based upon meta-analysis of twin studies he asserts: "The proband-wise concordance rate for schizophrenia in monozygotic twin pairs was [on average] 41-65 percent, as compared with 0-28 percent for dizygotic twin pairs, giving rise to a heritability estimate of approximately 80 to 85 percent" (p. 65). This means that 80% of the variation in schizophrenia--in a specific population at a specific point in time--is due to genetic variation in the sample population. This does not indicate that 80% of the reason why a particular person is schizophrenic is genetic. It simply means that there is probably "something" passed down from parents to children through genetic mechanisms that increase the offspring's chance of developing schizophrenia. But what that "something" is--the elusive gene--has never been identified.

Let me provide my own example of heritability and see what you think. According to Samuel Cartwright, "drapetomania" is a heritable disease. His research was published in the *New Orleans Medical and Surgical Journal*. He examined several small groups of African-American families, both nuclear and extended members, and recorded the incidence of this "abnormal" behavior. Cartwright did not have use of correlational statistics, but I would guess that heritability quotient for this disease would be about .50--similar to the heritability quotient for homosexuality according to J. Michael Bailey. This implies that the phenotype of the disease--fear, anxiety, and a desperate desire to flee--is probably due to genes. This disease was thought to explain the tendency of black slaves to run away and flee captivity. In 1851, Dr. Cartwright proposed the manifestation of this genetic disease was treatable: simply "whip the devil out of them" at the first sign of the slave acting sulking or dissatisfied. Thus, environmental correction may ameliorate the disease, but it won't cure the disease which was thought to be genetic.

Here is another example. Let's say that I do a heritability study for the "talent to succeed" gene. It's an important gene. The gene would predict whether you will get a good education and have a high paying job. I would survey all your families, nuclear and extended including your first cousins. I would probably find that a lot of people in your family system appear to have the "talent" gene, because the heritability

quotient turns out to be .72. Remarkable: what a strong genetic effect! You are very lucky to be part of a gene pool that has a high incidence of the “talent” gene. But of course no one studies the heritability of good, healthy, or positive traits, so we will never know if you possess the amazing talent gene.

### **Nature and Nurture Together**

Now I cut to the chase: It is reasonable to assume that sexual behavior—in any and all of its manifestation—is directed by the activity of many, possibly hundred of genes. But the exact and specific type of sexual expression is also influenced by countless environmental forces that interact with the genes in complex ways (Hubbard, 1997; Ridley, 2003). Except for the rare physical abnormalities (such as Huntington’s Disease) at the present time, there is no evidence of a direct causative link between a single gene and complex psycho-social behavior such as sexual preference (Collins, 2006). This is not my mere idiosyncratic opinion but read any book on behavior genetics or molecular biology and the authors will unanimously agree that, at present, there is no gay gene. Lewontin et al. stated this explicitly:

“Up to the present time no one has ever been able to relate any aspect of human social behavior to any particular gene or set of genes, and no one has ever suggested an experimental plan for doing so. Thus, all statements about the genetic basis of human social traits are necessarily purely speculative, no matter how positive they seem to be” (p. 251).

Dr. Francis S. Collins (MD and PhD) head of The Human Genome Project has said:

There is an inescapable component of heritability to many human behavioral traits. For virtually none of them is heredity ever close to predictive...An area of particularly strong public interest is the genetic basis of homosexuality. Evidence [indicates] that sexual orientation is genetically influenced but not hardwired by DNA, and that whatever genes are involved represent predispositions, not predeterminations. (2006).

Stein (1999), a psychologist explains:

Genes in themselves cannot directly specify any behavior or psychological phenomenon. Instead, genes direct a particular pattern of RNA synthesis, which in turn may influence the development of psychological dispositions and the expression of behaviors. There are many intervening pathways between a gene and a disposition or a behavior, and even more intervening variables between a gene and a pattern that involves both thinking and behaviors...No one has presented evidence in support of such a simple and direct link between genes and sexual orientation.

Baker (2004) a behavioral psychologist agrees:

Most physical traits and conditions such as height, blood pressure, weight and digestive activity stem from many genes that vary in activity depending on environmental contexts. The same is true of all complex [psycho-social] behaviors. Each is affected by multiple genes interacting with multiple environmental influences...Unfortunately; many people have a different impression. They think that a gene controls a behavioral trait. This is genetic determinism, the belief that the development of an organism is determined solely by genetic factors. Genetic determinism is a false belief. It comes from misunderstandings of scientific research... The fact is that so far, scientific research has not confirmed any one-to-one correspondence between a gene and a [complex] human behavior. Behavior results from the activity of multiple genes amidst the influence of multiple environmental factors (p. 17-18).

Two scientists, McInerney and Rothstein, who have worked on the Human Genome Project, caution us when interpreting research on genetic “causes” of behavior:

How do genes influence behavior? No single gene determines a particular behavior. Behaviors are complex traits involving multiple genes that are affected by a variety of other factors. This fact often gets overlooked in the media report hyping scientific breakthroughs on gene function, and unfortunately, this can be very misleading to the public” (2007).

Evolutionary anthropologist Sarah Blaffer Hrdy adds:

Nature cannot be compartmentalized from nurture, yet something about human imaginations predisposed us to dichotomize the world that way...Complex behaviors like nurturing, especially when tied to even more complex emotions like “love,” are never either genetically predetermined or environmentally produced” (from Hrdy’s 2000 book “Mother Nature”, cited in Ridley, 2003, p. 246).

Matt Ridley (2003) concurs:

Genes are enablers, not constrainers. They create new possibilities for the organism; they do not reduce its options...The new possibilities are open to experience, not scripted in advance. Genes no more constrain human nature than extra programs constrain a computer...Genes, unlike gods, are conditional. They are exquisitely good at simple if-then logic: if in a certain environment, then develop in a certain way...Don’t be frightened of genes. They are not gods, they are cogs” (Ridley, p. 250).

In summary, there is no undisputed evidence that same-sex behavior is hard-wired in the brain. Genes are complex strands of DNA that through the processes of transcription and translation, direct the synthesis of amino acids into larger proteins that influence cell structure and functioning (How Genes Work, 2007; Schwartz & Azar, 1981). Complex social activities such as sexual behavior cannot be directly traced to the activity of a single gene (Parens, Chapman & Press, 2006; Peele, 1995; Rutter, 2006).

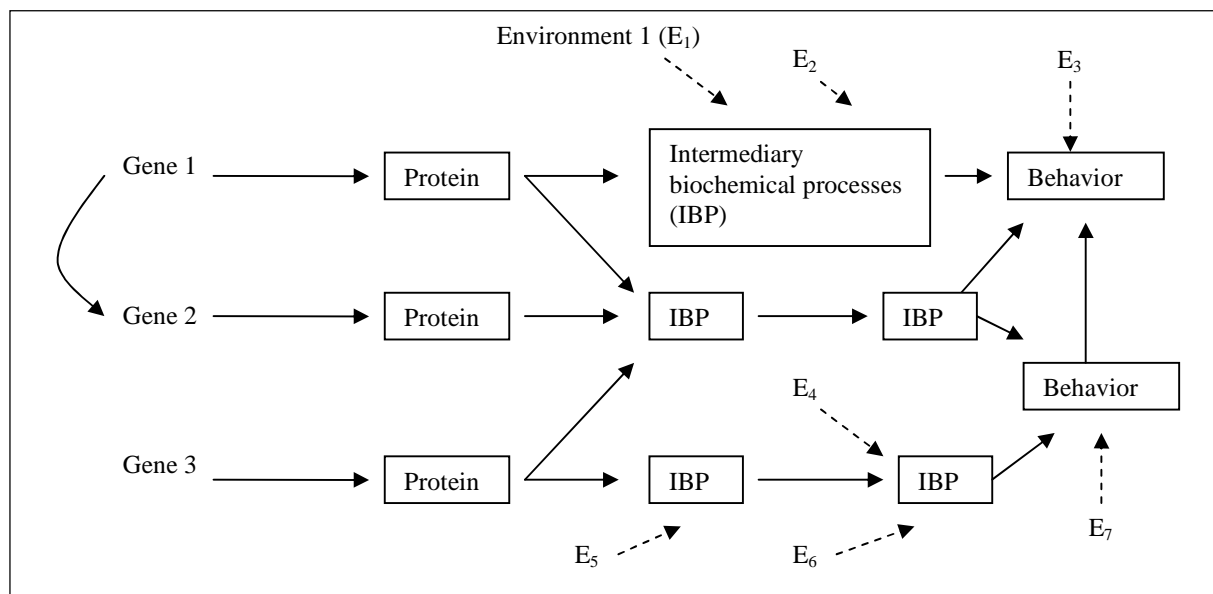
Many uninformed people take a simplistic view of behavioral genetics: they believe that one gene controls and determines a specific behavior. This is true for a very few, abnormal physical conditions including Huntington’s disease, cystic fibrosis, PKU, and achondroplasia (Dwarfism). This fact has led some to believe that there is an alcoholic gene, a manic-depression gene, or a gay gene. However, “Genes do not act as master puppeteers within us. They are chemical structures that control the production of proteins; thereby indirectly affecting behavior...Genes do not determine one’s destiny” (Plomin et al., 1990, p.13). “It is an oversimplification to say that any gene is ‘the gene for a trait’. Each gene simply specifies one of the proteins involved in the process [of gene-environmental interaction], notes Hubbard (Hubbard & Wald, 1999, p. 44).

Complex psycho-social behaviors such as sexual preference are not determined by a single gene, but by a gene-environmental process involving possibly hundreds of genes acting through complex environmental factors (Rutter, 2006). “The fact is that so far, scientific research has not confirmed any one-to-one correspondence between a gene and a [complex psycho-social] behavior. Behavior results from the activity of multiple genes amidst the influence of multiple environmental factors” (Baker, 2004, p. 18). Figure 1 shows how complex and convoluted is the interplay between genes, environment and behavior (Diagram adapted from Plomin et al., 1980, p. 7).

If the reader is still unconvinced that scientists have not found the “gay gene,” let me share with you one final bit of knowledge about behavioral genetics. Suppose you could isolate a segment of DNA that you thought was related to homosexuality. You could then specify the exact, let’s say 183,000 base pairs, that make up this portion of DNA. The “gene” would look something like this sequence: TA, GC, TA, TA, GC, CG, AT, AT, AT, GC, GC, CG, TA..... The letter A, T, G, and C stand for the four nucleotides that make up DNA: adenine, thymine, guanine, and cytosine. Now you get DNA samples of other gay men and examine this exact 183,000 base-pair sequence on the same chromosome. You compare the

sequencing of TA, CG, GC, and AT along the whole length of the gay gene. Surprise: The sequences from 10 gay men don't nearly match! Some portions are similar, but most are dissimilar.

Figure: Nature-Nurture Interaction



But you don't give up. You recruit the brothers of the original 10 gay men. You code their nucleotides at the same foci on the suspected gay gene. You find that the DNA sequences of the gay/non-gay brothers are more similar than that of the gay/gay men. In other words, the non-gay brothers' DNA sequence is more similar to their gay brothers than is the sequencing of the gay men to each other! You are persistent so try once more. You recruit another 20 gay men and code their DNA. Again, you find that there is more dissimilarity in the sequences of base pairs between the gay men than similarities. Undaunted, you write another grant and keep looking. Scientists have actually done what I have just described but with only few inherited diseases like hemophilia (Lippman, 1991). Hubbard concluded that most scientists believe that "base sequences can vary a great deal without any change being apparent in the corresponding trait" (1999, p. 55; also see Gianelli, 1990). That's an amazing fact and puts the crimp in anyone's plan to discover the elusive gay gene.

### Critique of Past Research

The genetic theory of homosexuality rests on a foundation of three seminal studies in the early 1990's-- which all have serious methodological, sampling, and interpretation problems. Simon LeVay (1991) dissected the brains of 19 gay men and supposedly 16 non-gay men and found, on average, a slighter smaller area of the hypothalamus (INAH-3) in the gay men. He then "suggests that sexual orientation has a biological substrate." There were several major flaws with his research: (a) the sample was small, (b) the control group was inappropriate, (c) there is no evidence that the INAH-3 part of the brain had anything to do with sexual preference, (d) AIDS could have caused the brain differences, and (e) the study has never been replicated.

Michael Bailey and Richard Pillard (1991) concluded there must be a genetic cause to homosexuality because they found higher rates of homosexuality among identical than fraternal twins and even less concordance (similarity) among adopted siblings. These quantitative genetic studies have similar limitations. First, the samples may be biased because researchers usually recruit a volunteer sample from gay publications and organizations. Second, such studies require a large sample in order to make valid heritability estimates, and samples are usually small. Third, environmental factors are usually not studied

so its effects are unaccounted for. Forth, there are obvious interpretation problems because only about half of identical twins reared in the same family have a gay brother. If genes determined homosexuality then both brothers should be gay. Fifth, other twin studies have not supported their claim of a strong genetic component to homosexuality (see Hershberger, 1997).

Dean Hamer and his colleagues (1993) examined a small section of the X chromosome in the families of 40 gay men. In a complicated pedigree analysis, Hamer claims that homosexuality is transmitted through the maternal side and is genetically linked to the X chromosome region known as Xq28. His conclusion has been criticized by several authors (Baron, 1993). If homosexuality were a simple Mendelian trait (like eye color) then Hamer should have found a higher incidence of homosexuality among brothers. There is no evidence that the Xq28 section of the chromosome has anything to do with sexual behavior! Hamer did not assess this genetic marker on the heterosexual men in the sample to see if they possessed it also. Rice, Anderson, Risch and Ebers (1999) did a similar but larger study (N=52) and found no support for an X-linked gene underlying male homosexuality. Hamer's study has never been replicated. Thus, none of these studies proves a direct causation between a gene and the complex psychosocial behavior of sexual preference (Dailey, 2003; Lasco, Jordan, Edgar, Petito & Byne, 2002). The more amazing point is that all of these men (LeVay, Bailey, and Hamer) readily admit they there research does not prove there is a gay gene and that environment is a major factor in homosexuality!

Even if biogenic factors have a weak, but indirect, affect on sexual orientation on some individuals, Valenstein (1998) explains:

Most recent claims that a gene has been discovered that causes alcoholism, schizophrenia, [or] homosexuality...have proven illusory... genes do not produce behavioral or mental states. Genes carry the instructions and template for producing and assembling amino acids and proteins into anatomical structures. Behavior and mental traits; however, are the product of an interaction between anatomical structure and experience...Even where there is compelling evidence that some behavioral or mental trait is influenced by genetic factors it is almost always a predisposition, not a certainty... a predisposition is not a cause. (p.140-141, 224).

Even advocates for a genetic explanation of homosexuality such as Szuchman (2002), concluded that the scientific evidence for a biological cause of homosexual behavior is "remarkably flawed, such that no unbiased view for or against many of these factors [i.e., biogenetic causes] is possible...We still have no good evidence of biological influences on sexual preference or sexual orientation" (p. 212). Gay advocates Parker and DeCecco (1995) conceded that "research into possible biological bases of sexual preference has failed to produce any conclusive evidence" (p. 427).

Genes or hormones may make it more likely that a person will display certain temperament characteristics or atypical gender role behaviors. These outcomes may make the child more vulnerable to child trauma (e.g., sexual abuse, negative fathering, and rejection by same-sex peers). The child's psycho-social sequelae may, in turn, set up conditions where the child is more likely to consider the homosexual option (Stein, 1999). Bancroft (1990) has stated that biological factors that may influence sexual orientation "need to be understood as interacting with the effects of social and cognitive learning rather than having direct effects of their own" (p. 109). Thus, genetic factor may indirectly influence sexual orientation, but there is no evidence of a direct casual link between a gay gene and homosexual behavior.

I like the analogy of gene-environment interaction provided by Robert Plomin et al. (1980):

A sailboat needs both sails [environment] and a hull [genes]. The 'behavior' of a sailboat (speed, turning ability and direction) depends on the design of its sails and the design of its hull. The aerodynamic shape of the sails, their number and size, and their positioning are important. The depth, width, length, and shape of the hull are also important. Obviously, for sailboats, there can be no behavior without both sails and hull, but this does not restrict us from asking about the

independent contributions of sail design and hull design to the behavior of sailboats...Behavior requires both genes and environment (p. 359).

Yet, even this example is flawed. The missing factor in Plomin's analogy is the "captain" at the helm of the ship. That captain is "agency," "free will" and "choice"! Regardless of sails (environmental factors) and hull design (genetic predispositions), the captain can make moral decisions independent of both sails and hull. The captain may be constrained by genes and environment—but he is not absolutely determined by them. Agency intervenes, on many occasions, at various times and places, in the interplay between genes and environment.

The British poet William Ernest Henley (1849-1903), in his famous poem "Invictus" (Latin for unconquerable) penned this famous line: "It matters not how strait the gate, how charged with punishment the scroll. I am the master of my fate: I am the captain of my soul." There is clear evidence that many men and women are at the helm controlling their sexual behavior and making choices regarding sexual preference.

I believe that the hypothetical evidence for genetic determinism of homosexuality is overstated and overrated. Most people do not have the knowledge to understand the research and are simply hoodwinked by the pro-gay activists. It is obvious to me, and to many others, that environmental factors play the major role in same-sex behavior, if this were not so how does one explain the thousands of men and women who have left homosexuality.

Consider the recent example of Michael Glatze, founder of *Young Gay American Magazine*, film producer, pro-gay lecturer and author, and well-recognized leader in the gay movement. At age 14 he believed himself to be "gay," but at age 30 he "seriously began to doubt" what he was doing (Moore, 2007). He explains:

Knowing no one who I could approach with my questions and my doubts, I turned to God...It became clear to me that homosexuality prevents us from finding our true selves...I was leading a movement of sin and corruption... Now I know that homosexuality is lust and pornography wrapped into one. I'll never let anybody try to convince me otherwise...Healing from the wounds caused by homosexuality is not easy—there's little support. In my experience, coming out from under the influence of the homosexual mindset was the most liberating, beautiful and astonishing things I've ever experienced...I believe that all people, intrinsically know the truth. I believe that is why Christianity scares people so much. It reminds them of their conscience, which we all possess. Conscience tell us right from wrong and is a guide by which we can grow and become stronger and freer human beings (in Moore, 2007, p.3-5).

In conclusion, I believe that the genetic evidence for homosexuality is just not there. It's the values and politics of homosexuals and their supporters that is driving the gay gene agenda, not good science.

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