

Reflections on Genes and Eating Disorders

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There is renewed interest and research into genetic influences on the development of eating disorders. This article looks at some of the assumptions underpinning this research.

Classical views on genes

Most of us are captured by the classical idea of genes as hereditary factors that control the characteristics of living things. With this view, to say that the gene or genes for a characteristic have been found, implies both that certain genes determine or control the characteristic and that they have been identified. Today's molecular biology brings us an understanding of genes that undermines this view. A gene is now understood to be a sequence of DNA containing the code to make a protein. Very few characteristics or diseases are the direct result of a single or even several such proteins. In spite of this, the classical view continues to affect the way that genetic influences are seen and discussed.

New understanding of genes

While every analogy has its limits, here is one that might help explain this new understanding. A gene or set of genes might be compared to an idea or set of ideas for a novel. If the author never writes the novel, the ideas influence nothing. If the author proceeds to write the novel, the ideas have a very strong influence at the beginning of the writing process, but quite early in the process, the characters, setting, and plot may interact and develop according to principles not restricted by the original novel ideas, each influencing the other. J.K. Rowling, for example, recently described the death of a character in *Harry Potter and the Order of the Phoenix* as deeply upsetting to her, perhaps not something that had been part of her original idea, and yet consistent with the logic of the characters and events of the novel.

Suppose that our author's novel is published and eventually is to become a Hollywood movie. The screenwriter chosen to adapt the novel for the screen brings his or her own ideas to influence the story. The American studio system brings many other influences to bear as well: economics, ideology, censorship, star-promotion, and marketing to name a few. Each new level of operations brings new rules and principles to influence the end result. We may or may not recognize the original author's ideas in the movie version of the novel, however those ideas were involved in the development of the movie. We might say that they made the movie possible, but they definitely did not determine its content.

Similarly with genetic influences, the more complex a level of the organism's functioning we are concerned with, the less direct an influence any proteins coded by genes are likely to have. Eating disorders are complex conditions that involve physiological functioning; thinking processes; behaviours that have individual beneficial effects, like self-comforting; behavioural choices which have cultural value, like the benefits derived from being thin; and individual meanings, like demonstrating one's strength through self-denial, or communicating distress. There are extremely few diseases which are the result of a mutation to a single gene, as Huntington's disease is. In fact, this is one of the reasons that the classical view of genes was overthrown. While genes will be *involved* in eating disorders, like the author's initial ideas for a novel are involved in the movie based on it, we will not find a gene or mutation that *causes* eating disorders.

Susceptibility and genes

Some researchers have suggested instead that we look for "susceptibility genes" for eating disorders. When an individual has susceptibility genes for a particular disease, he or she is at risk for the disease because it will manifest in a certain environment. Examples given by eating disorders researchers often include the risk of diabetes in people of Asian and Native American ancestry, which becomes manifest in an environment when food is abundant. With some such diseases, we know how to lower or eliminate the risk through environmental changes. For example, phenylketonuria is an hereditary disease caused by the lack of a liver enzyme required to digest phenylalanine, an amino acid most commonly found in protein-containing foods such as meat, cows' milk, and breast milk. This condition can cause brain damage in affected babies, which can be prevented by early detection and manipulation of the feeding environment, that is, eliminating phenylalanine from the child's diet. What these examples have in common is that the illness or disease can be completely defined in physical terms, that bio-chemical processes specific to the illness are candidates for locating genetic contributions, and that the manifesting environment is physical or bio-chemical, rather than interpersonal or socio-cultural. Suggesting that these conditions are models for what we might find with eating disorders still plays on the classical idea of genes and fails to take into account their significant and qualitative differences from eating disorders.

Environment and genes

The effects of genes that may be involved with eating disorders have not been established. Some possibilities researchers are investigating include genes that code for proteins involved in neurotransmitter variations (related to serotonin and dopamine, for instance) which differently affect mood, anxiety, and novelty-seeking; or genes that code for proteins involved in information processing tendencies; or those involved in "traits" like perfectionism or perseverance. No environment or set of environments in which genetic susceptibility would necessarily manifest has yet been specified. There is no

reason to believe that either separately or together, the current candidate genetic influences would be specific to eating disorders, as we know them to be involved in other conditions, and we know that eating disorders often occur along with other conditions. We should be skeptical of the susceptibility model until genetics researchers show us, either directly or in relation to more relevant diseases or disorders, how that model would work with the level of physical, behavioural, interpersonal, and socio-cultural complexity at which eating disorders exist.

In some ways, all genes are susceptibility genes for damage, disease, or death given the “right” environmental condition or other. The most extreme example would be the genes that contribute to our needing to breathe oxygen to stay alive. Given an oxygen-deprived environment, the vast majority of us will sustain brain damage or die. The idea of “susceptibility genes” in this case becomes meaningless. It would probably be more accurate just to call the oxygen-deprived environment a poor or poisonous one for human beings. To meaningfully label some set of genes as susceptibility genes for a condition or illness, it should be possible to show that they are specifically connected to the illness or condition and that the environment in which the illness manifests is one that does not harm most people.

Socio-cultural environment

Over the past 30 to 35 years, our socio-cultural environment has idealized a body shape for women that minimizes body fat to pre-pubertal levels. This is opposite to the most common genetically-influenced direction of development for women’s bodies, which is increasing body fat at puberty and later. Thus, girls see their bodies developing in ways that they have been socialized to find offensive. It is no wonder that the vast majority of females in our culture react to finding themselves becoming offensive by trying to change themselves to be more acceptable. Although not all develop diagnosable eating disorders, the vast majority are dissatisfied with their bodies, and persistently act on this dissatisfaction through a range of body and appetite controlling efforts. A culture that sets females at odds with their own development and which supports industries that exploit the insecurities arising from this (e.g. the diet industry), is arguably a poor or poisonous environment for females to live in.

A socio-cultural environment does not exist at an abstract external level; rather, it permeates individuals’ relationships with one another in institutions like schools and workplaces, in families, in peer groups, and in other interpersonal interactions. When an individual girl is harassed about her body shape, this is not just an individual experience: it is a socio-culturally mediated one. Schoolboys can hurt a girl by telling her that she is fat, not because she is actually fat, but because they know it will bother her, giving them the upper hand. Boys doing so are playing on the culture’s negative associations with fat, the fact that girls are conditioned to see their personal value as appearance-related, and the power males have in evaluating female bodies. The economic interests satisfied

through this culture (and perhaps expanding it currently by creating intense insecurities in boys about their appearances) act as a conservative force against changing it. Socio-cultural environments are not neutral; they privilege some people's interests while disadvantaging others and therefore have political implications.

Think about this in relation to a different issue: suppose there are high rates of a criminal behaviour like stealing among males living in poverty conditions. We may try to prevent the development of stealing among boys living in poverty by educating them that theft is wrong, teaching them techniques to help them resist impulses to steal, providing them with medications to reduce their impulsive behaviours, and so on. At the same time, let's say we know that a small percentage of them are said to have genetic loading for impulsive behaviour and novelty-seeking, and are therefore likely to steal, especially when their culture bombards them with images of consumables that others purchase with ease, and that their culture values men who have big purchasing power. Let's say we also know that in cultures that don't hold these values and in which families are protected from poverty, stealing among males is radically reduced. What would we think about providing millions of dollars for genetics research, while paying lip service to the cultural and poverty issues?

Potential contributions of genetic research

Researchers in the field of genes and eating disorders suggest a number of potentially helpful contributions from their research. While these are currently appropriately vague, they may become more precise if it becomes possible to specify the involvement of particular genes and particular environments in these disorders. So far, the focus seems to be on refining practices that we already have, or could have, for example developing medications that could more specifically target individuals' neurotransmitter differences; teaching parents how to recognize early signs of perfectionism or obsessiveness, and how to help themselves and their children to use these to their own advantage, rather than be dominated by them; and guiding children to choose activities that do not exacerbate the effects of traits like perfectionism. These efforts might increase someone's ability to resist an eating disorder, but they will not provide a genetic prevention or cure in the classical sense.

It is true that if we could specify the genetic influences, we could also learn about protective factors by finding people who have the genes but don't develop eating disorders. While some boys and men do develop eating disorders, being male remains a major protective factor. It is tempting to suggest that the most effective gene therapy for eating disorders would consist of adding a Y chromosome to all "susceptible" females. A modest proposal!

Further reading

For an accessible introduction to the human genome: www.ornl.gov/hgmis.

For a collection of published papers on the genetics of anorexia nervosa and bulimia nervosa: www.wpic.pitt.edu/research/pfanbn/. See also www.eatingresearch.com; NEDIC Bulletin Vol. 18. No. 2. “Genes and Eating Disorders: Unraveling the Mystery”; and “A genetic link to anorexia” by Tori DeAngelis in *Monitor on Psychology*, Vol. 33, No. 3, March 2002, online at: www.apa.org/monitor.

The Misunderstood Gene, by Michel Morange, Cambridge Massachusetts: Harvard University Press, 2001.

Appetites: Why Women Want, by Caroline Knapp, New York: Counterpoint, 2003.

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