Designer Babies: Ethical Considerations

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articlehighlights

Advances in genetics may make it possible to "select" our children's genes and characteristics. We need to consider

- what are the moral and ethical limits of this choice?
- should we **distinguish**, or choose, between selecting for therapy and enhancement?
- are human genetic modification technologies safe?
- what effect will human genetic modification have on society?

In 2004 the term "designer baby" made the transition from sci-fi movies and weblogs into the Oxford English Dictionary, where it is defined as "a baby whose genetic makeup has been artificially selected by genetic engineering combined with in vitro fertilization to ensure the presence or absence of particular genes or characteristics."[1] This coinage was prompted by recent advances in genetics that may make such babies possible. We need to pause and ask what moral or ethical limits, if any, should apply to the selection of our children's genes or characteristics. Before we can answer this we must address other questions:

What issues should we consider before modifying humans?

- How would designer babies be made?
- Is there a moral or ethical difference between using genetic technologies to prevent disease and to enhance human capacities?
- Should we be striving to protect our humanity from genetic enhancement?
- What effect will human genetic modification have on society?

Designer babies: Not today, but perhaps tomorrow

There are two types of moral or ethical questions one can ask about designer babies. The first addresses the specific technologies that might be used to **modify** or select a baby's genetic makeup. The second question looks away from technological details to focus on the very idea of a designer baby.[2]

Is GM technology safe and ethical?

- Are the technologies of genetic modification and selection safe enough to be used on humans?

- Even if the technologies are safe, can they be morally defended?

The Oxford English Dictionary definition describes the way of making designer babies that at the same time is the most conceptually straightforward and raises the biggest concerns about safety. One way to make a designer baby begins with an embryo created by in vitro fertilization (IVF). Genetic engineers modify the embryo's DNA and then introduce it into a womb.

Geneticists have enhanced learning in mice.

Farmers in many parts of the world now plant crops with genomes altered to make them resistant to pests or herbicides.[3] Recent discoveries about the influence of genes on human traits such as **susceptibility** to disease, shyness, and athletic ability open the possibility of transferring these techniques to human beings. An experiment on mice performed at Princeton University suggests one way this might be done.

Geneticists introduced into mouse genomes an additional copy of a gene. . . .[4] The resulting "doogie" mice, named for the teen genius central character of the early 1990s TV show "Doogie Howser, MD," seem to learn faster than other mice and **retain**, keep, information longer. The NR2B gene exists in humans, prompting speculation about performing the same trick on one of us. Before this is done, we need to examine pressing safety concerns.

There are several safety concerns about the technology.

- Current techniques of genetic modification introduce genes at random places in the genome. We should be concerned about the possibility that an inserted copy of NR2B may arrive in the target genome in a way that disrupts the function of another gene **crucial**, or important, for survival.
- Many genes have more than one effect. The effect we intend may be accompanied by others of which we become aware only later. There is evidence for such effects on doogie mice, which seem not only to have improved powers of learning and memory, but also to have a greater sensitivity to pain, an enhancement of more **dubious**, or unreliable, desirability.[5]
- Many of the traits that we may want to select are influenced by multiple genes. A gene affects intelligence only in combination with other genes. We are unlikely to find single genes whose modification would reliably produce a 20-point boost in IQ, for example.[6]

We should expand on the dictionary definition to consider other ways of selecting our children's characteristics. These ways of making designer babies will avoid some of the risks inherent in the genetic modification of human embryos while introducing others. One technology is preimplantation genetic diagnosis (PGD), currently used by some people at risk of passing serious genetic disorders on to their children.

Preimplantation genetic diagnosis is already used to screen for genetic defects.

- People who use preimplantation genetic diagnosis to avoid passing on a disease to their child have a collection of embryos created for them by IVF.
- These embryos are grown to the eight-cell stage, at which point one or two cells are removed and checked for genetic variants associated with the disease.
- Only embryos lacking these variants are introduced into the womb.

PGD is an expensive procedure currently offered only to couples at risk of having a child suffering from a serious genetic disease. But there is nothing inherent in the technology that limits it to such uses.

One scientist argues you can also screen for personality traits.

Hamer's proposal is controversial, but suppose he is right.

Preimplantation genetic diagnosis is not risk free.

PGD does not involve the genetic modification of human embryos and hence avoids some of the risks described above. But it is not entirely risk-free. Some commentators fear that the removal of one or two cells from eight-cell embryos might have implications for the well-being of people created by PGD. Defenders of PGD respond that the cells of eight-cell embryos are totipotent, meaning that they are undifferentiated and equally capable of forming all the cells of the human body. As the technology has been in use for under a decade, it is too early to say with certainty who is right in this dispute.[8]

Another biotechnology—cloning—may enable the selection of children's characteristics.

Cloning is an alternative method.

- Cloning by somatic cell nuclear transfer uses a somatic, or body, cell from the person to be cloned.
- The nucleus of this cell is introduced into an egg cell whose own nucleus has been removed.
- The resulting reconstructed embryo is introduced into a womb.

Although some people may view cloning as a last-ditch response to infertility, others may see it as a way of selecting the characteristics of their child. This choice would be exercised through the choice of the person to be cloned. For example, you might pursue physical attractiveness on your child's behalf by using a somatic cell from Angelina Jolie or Brad Pitt, who may, in the future, have to be more careful about where they leave their saliva and hair follicles.

Cloning could lead to parental preference for an enhanced child.

Those who hope to clone designer babies should be wary of genetic determinist misrepresentations of the technology.[9] **Genetic determinism** is the view that an organism's significant characteristics result mainly from the action of its genes, with

environmental influences playing a **negligible**, or small, role. This view, now widely recognized as false, has been supplanted by the view that organisms emerge from a complex interaction of genes and environment. Roger Federer's clone would be subjected to a different collection of environmental influences from the original, meaning that the clone might easily lack any interest in or **aptitude**, or ability, for tennis. Prospective parents who accept that cloning comes with no guarantee might reassure themselves that a clone of Federer would be more likely to be a tennis champion than a child they produced naturally.

This way of making a designer baby will not be attractive to prospective parents who place value on a genetic connection with their child. The woman who gave birth to a clone of Roger Federer would be no more genetically related to the clone than she is to the original. She might establish a rather limited genetic connection by contributing the egg into which the nucleus of the Federer somatic cell is inserted. But the significance of this connection is vastly outweighed by that with the donor of the nucleus.

Animal cloning has proven to be risky.

Even if we understand how cell nuclear transfer might enable us to make designer babies, we are not yet ready to create children by cloning. There are major concerns about the health of clones. Animal clones suffer from a variety of problems that some scientists connect with incomplete reprogramming of somatic cell DNA or damage inflicted by the process of nuclear transfer. Human clones may also suffer from these problems.[10]

Preventing disease or enhancing attributes?

Suppose we move away from discussion of risks to focus on the reasons for having a designer baby. We can identify two different kinds of motivation:

Is there an ethical divide between therapy and enhancement?

- Replacing the version of the gene linked with heart disease, for example, aims to ensure that the resulting person's cardiac functioning does not fall below a level considered normal for humans. We call it "therapy" because we recognize that it aims to prevent a disease state.
- Adding an extra copy of the NR2B gene to a human embryo, on the other hand, has the quite distinct aim of producing someone who, in some area, functions beyond a level considered normal for human beings and as such qualifies as an "enhancement."[11]

This prompts a question: Is there a moral distinction between treating or preventing disease and enhancing traits? Some think that we should pass different moral judgments on enhancement from those we pass on therapy. They say that while therapy is justifiable, enhancement is not.

How do you distinguish between therapy and enhancement?

The problem is that it is difficult to make the therapy–enhancement distinction principled. It is hard to find definitions of disease suitable to serve as a moral guideline for genetic technologies. Social constructivists consider diseases to be states to which society takes a negative attitude. Cancer seems to satisfy the requirements of this definition, but so might homosexuality and practicing a religion different from the norm in your society. Objectivist accounts avoid these difficulties by making the definition of disease independent of our attitudes. According to the most widely advocated version of this view, I suffer from disease when some part of me fails to perform its biological function. For example, cholesterol deposits on the arteries constitute or conduce to disease because they impede the heart in the performance of its function, which is to pump blood. The problem with this way of defining disease is that it may sometimes set goals irrelevant to human flourishing. Suppose we were to discover that homosexuality was a consequence of malfunction in the part of the brain responsible for sexual attraction. Should this rather obscure fact about biological functioning count more than the fact that many homosexual people seem to be living excellent lives?[12]

Some technical options destroy the embryo to avoid genetic defects.

A further moral complication emerges from the different approaches to treating disease and those who suffer from them. Genetically modifying an embryo so as to remove a gene linked with a higher than average risk of asthma may prevent asthma, but it need not prevent the existence of the person who might have suffered from it. Compare this with the use of PGD to avoid having a child at a high risk of asthma. This seems to prevent the disease only by preventing the patient's existence.[13]

Should parents be permitted to enhance their children?

The Nazis tried to design babies by practicing eugenics.

Finding a difference between treatment and enhancement does not in itself show that enhancement is impermissible. Some think we should reject genetic enhancement because of its connection with the eugenics programs promoted by the Nazis. The scientific minions of Adolph Hitler sought to shape the German population by murdering those judged inferior and encouraging those they saw as their betters to reproduce. Advocates of what has come to be called "liberal eugenics" would take responsibility for human enhancement from the state and pass it to individuals who would be guided by their own distinctive values in their selection of genetic advantages.[14]

Is the way parents rear a child also a way of designing a child?

Parents in liberal democracies already make choices about which schools to send their children to, how to feed them, who counts as a suitable after-school companion, whether children are to be given religious instruction, and if so of what type. In effect, they manipulate their children's environments to improve or enhance them.14–16 The moral parallel between upbringing and genetic enhancement draws support from modern understanding of the contributions that genes and environment make to human

development. As we saw above, the genetic view of development has been replaced by the view that organisms emerge from a complex interaction of genes and environment. The comparison of genetic enhancement with upbringing suggests that we were all designer children.

Are designer babies "posthumans"?

Some think we will lose our humanity if we modify human genes.

Opponents of the liberal argument for enhancement argue that there are morally significant differences between upbringing and genetic enhancement. Francis Fukuyama thinks that genetic enhancements may change our descendents to such an extent that they lose their humanity.17 According to Fukuyama, environmental influences operate only within limits set by genes, meaning that even ambitious education programs leave their subjects' humanity intact. A genetically enhanced child is more fittingly described as a "posthuman." The price for her super intelligence will be the experiences that give human lives meaning.

Are geniuses accidental posthumans because they're above the norm?

We might ask whether there are already posthumans among us. Albert Einstein and Ray Charles achieved well beyond the norm in their areas of endeavour. Some of the explanations for this achievement may be traced to their genomes. Would a parent who modified her child's genome so that it contained some of the genetic advantages of Einstein or Charles be taking the first step toward posthumanity? If we answer this question in the affirmative, should Einstein and Charles be considered accidental posthumans?

Transhumanists see designer babies as a goal rather than an issue.

The most forthright response to the concern that genetic enhancement might deprive our descendents of their humanity comes from a group of thinkers who call themselves "transhumanists."[18]

- Transhumanists propose posthumanity as a goal rather than something to avoid.
- They allow that we may have difficulty relating to the inhabitants of the biotechnological future but claim that if they are free of disease, super-intelligent, and routinely compose symphonies whose brilliance surpasses that of Beethoven's Ninth, this failure of identification is our problem, not the posthumans'.

Will genetic enhancement lead to a discriminatory society?

The end of liberal democracy?

Some of the most challenging moral and ethical questions about a licence to design babies concern the societies it might lead to. The movie Gattaca depicts a future in which genetically enhanced people take the lead, viewing unenhanced people as fit only to clean up after them. Liberal democracy is a cooperative venture in which all are seen as having something to offer.[17] Will genetic enhancement bring this social arrangement to an end, creating societies in which unenhanced people are viewed by their genetic superiors in much the same way that we currently view chimpanzees, suitable for drug testing and zoo exhibits but little else?