

Is it ethical to  
genetically engineer  
babies for designer  
purposes'



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Is it ethical to Genetically engineer babies for designer purposes? Content

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Discussion8-14 Conclusion15 Abstract Introduction Genetic Engineering is a notorious and complex subject, burdened with ethical and moral debates, packed with fascinating science. Everything begins with DNA, (Deoxyribonucleic acid). We are all made up of DNA. Without understanding DNA, genetic engineering or any sort of alteration within engineering of DNA is unfeasible. If you do ask someone, (what is a designer baby? , who does not know the science behind designer babies or genetic engineering, they may say it is a creation against the nature as we are dismantling nature's characteristics and deciding to adjust the faults. What if, by modestly taking a tablet containing new hormones, you could have unconventional athletic powers and run like an Olympic athlete? What if, by injecting yourself with stem cells and changing your genetic makeup, you could have the baby you wanted? Would you do it? If you and others did, what would our society become?

You might think if this is this science fiction? But think again, during the last few decades, research in genetic engineering has been advancing at lightning speeds. Recent innovations have presented us with unanticipated promises, and at the same time with complex dilemmas. ' Designer babies' is an advantage reproductive technology that allows the parents and doctors to screen embryos for genetic disorders and select healthy embryos . The fear is that in the future we may be able to use genetic technologies to modify embryos and choose desirable or cosmetic characteristics. Designer babies' is a term used by journalists to describe this frightening scenario. It is

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not a term used by scientists. These techniques allow doctors and parents to reduce the chance that a child will be born with a genetic disorder. At the moment it is only legally possible to carry out two types of advanced reproductive technologies on humans. The first involves choosing the type of sperm that will fertilise an egg: this is used to determine the sex and the genes of the baby. The second technique screens embryos for a genetic disease: only selected embryos are implanted back into the mother's womb.

This is known as Pre-implantation Genetic Diagnosis (PGD). Recently scientists have made rapid advances in our knowledge of the human genome and in our ability to modify and change genes. In the future we may be able to "cure" genetically inherited diseases in embryos by replacing faulty sections of DNA with healthy DNA. This is called germ line therapy and is carried out on an egg, sperm or a tiny fertilised embryo. Such therapy has successfully been done on animal embryos but at present it is illegal to do this in humans.

However, it is legal to modify the faulty genes in the cells of a grown child or an adult to cure diseases like cystic fibrosis - this is called body gene therapy. Today it is possible to choose the sex of the embryo using advanced reproductive techniques during IVF. Doctors can do this using one of two methods. The first method is to sort out a sample of the father's sperm and only fertilise the egg with either 'male' sperm or 'female' sperm. The second method is Pre-implantation Genetic Diagnosis (PGD), which is used to screen-out embryos likely to have a genetic disease.

PGD takes place during IVF where the sperm fertilises the egg in a 'test-tube' in a laboratory. The fertilised egg grows for a few days before a single cell is removed and tested to find out either the sex of the embryo or if abnormal genes are present. Surprisingly, removing one cell does not seem to affect the embryo's development. Genetic screening of embryos using the techniques of sperm selection and PGD are sophisticated ways to avoid a growing number of genetic diseases but they have provoked many ethical arguments.

Scientists are learning more and more about how genes work and interact with each other. Using PGD it will soon be possible to screen and select for many more diseases. In the future it may be possible to really create 'designer babies' and to move from testing for medical conditions to the selection of designer features such as height, eye colour, facial appearance and perhaps even intelligence and personality. The aptitudes of genetically amending humans to improve their well-being and to treat incapacitating illnesses are turning into a reality.

Nevertheless, the recent understanding in genetics may correspondingly enable us to contrive our own genetic blueprints to enhance our muscles, height, and intelligence, to select the sex, hair colour, and even personality of our children, and to create super humans that appear flawless. The ethical dilemmas adjacent to genetic engineering are immense, and intense. Due to the moral appearance of this research, some people state the remarkable human safety risks, and debate that one cannot avoid the misapplication of the technology for non-medical purposes, for instance enhancing one's athletic performance.

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Some people argue that changing a baby's genetic personalities destabilizes our humanity. Ethicists resist that genetic engineering cheapens the meaning of parenthood, where children become only consumer goods and possessions of their parents. While others argue that progresses in genetics are not powered by defensible social needs. People who can pay for the new technology will make themselves look better than the others; which brings the class gap between rich and the poor. Should we allow humans the choice of being genetically modified? Should parents have the right to design and change their children at determination?

Should present research in human genomics be banned forever? What other options are available? Eventually, who finally decides on these topics? Not a single person knows the consequences of transmuting God's creation.

Research Review Biological entities are comprised of millions of cells. Each cell has a nucleus, and inside every nucleus are series of DeoxyriboNucleic Acid (DNA). DNA carries complete information regarding the function and structure of organisms ranging from plants and animals to bacterium. Genes, which are sequences of DNA, determine an organism's growth, size, and other characteristics.

Genes are the vehicle by which species transfer inheritable characteristics to successive generations. Genetic engineering is the process of artificially manipulating these heritable characteristics. Genetic engineering in its wide-ranging sense has been around for thousands of years, since people first recognized that they could mate animals with specific characteristics to produce offspring with desirable traits, and use agricultural seed selectively.

In 1863, Mendel (An Austrian Scientist) discovered that traits were conveyed  
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from parents to offspring by distinct and independent things, they are known as genes.

Mendel's observations formed the basis for the area of genetics, which has led to the selecting genes known as 'Artificial Selection'. True Genetic Engineering is the procedure of directly deploying DNA within a cell. A red-letter date for true Human Genetic Engineering came in 1988 when Congress sponsored the Human Genome Project, a massive determination to plot and structure the human genetic code in addition to the genomes of other species. There are commonly three methods that are used to introduce a foreign gene into a plant or animal: Plasmid, Vector, and Biolistic. The plasmid method is often used to alter the genome of a bacterium.

It is accomplished through treating equally the bacteria and the chosen gene with the same constraint enzyme by doing so it generates sticky ends on both the bacterial DNA and the gene's DNA. These sticky ends will connect with each other. Scientist's choose the bacteria that have captivated the new gene and can the use these bacteria to contrivance the gene into plants or mammals. The vector method is accomplished using viral vectors that will convey the DNA to the host. It starts in a similar way to that of the plasmid method, but is more consistent to use to contrivance the desired features into the host cells.

After the trait from the viral vector is inside the host cell, the cell will then go on to replicate the trait itself with its own genetic information. The biolistic method is a technique that is mostly used in engineering plants for instance, when trying to enhance pesticide resistance to a crop. The run through of

human genetic engineering is considered by some to have had its starts with In Vitro Fertilization (IVF) in 1978. IVF concreted the way for preimplantation genetic diagnosis (PGD), which is the process by which an embryo is microscopically inspected for emblems of genetic disorders.

Quite a lot of genetic based diseases can be recognized by PGD and the embryo is then destroyed due to the fact it carries that particular allele containing the disease. The ethical, moral, and religious allegations are recognizable. Feasibly, yet more contentious is the fact that PGD enables for the identification of gender, and enables parents to decide whether or not to permit an embryo to progress based on the sex of the child. This aptitude has the possible to influence society's male and female stability and increases the matter of guideline and quota-based births.

The first greatest probable tactic for straight deploying human genes is germline gene therapy. Rather than screening embryos for disorders as with the current PGD process, germline therapy would essentially present new genes into the cells. Any traits thought desirable can be made original to the embryo as if they were inherited naturally. Cloning is the process of producing a genetically identical replica of an organism. A clone is said to be all offspring derivative asexually from a single individual.

Scientists plotted to custom somatic cell nuclear transfer for the first human clone, which is the same technique that was used to create Dolly the sheep. Somatic cell nuclear transfer is accomplished when: Eugenics is the knowledge of refining human inheritance characteristics. The movement began in the 19th century, founded by Sir Francis Galton. While he focused

primarily on positive Eugenics, the 20th century saw the more aggressive promotion and application of negative Eugenics (such as sterilization of the unfit), finally ensuing in the movement being tied to Hitler and the Nazi party.

This marked the ultimate decrease of Eugenics as a popular or even socially adequate movement. Discussion There are really numerous dissimilar methods that can be used to try to ensure the sex of the baby and they're not all new or scientifically proven; Sperm Sorting - taking the sperm of the father and separating them into male and female chromosome carriers and then artificially inseminating the mother with the 'right' sperm. IVF can also be used to fertilize the egg and get great pregnancy results, by using the latest technology at the Las Vegas fertility group.

Prenatal Diagnosis - An ultrasound examination or an amniocentesis test can be used to determine the sex of the foetus. Obviously, the only way to avoid giving birth to a baby of the 'wrong' sex under these methods is to abort the baby. Pre-Implantation Diagnosis, using existing scientific methods unavoidably means that if a person wants to have a child of the sex of their choice then they will need to endure In Vitro Fertilization (IVF) treatment.

Unfertilized eggs will be removed from the women, fertilized in a petri dish and then brought to a zygote (eight cells) stage at which point cells are detached and verified using a technique known as Preimplantation Genetic Diagnosis (PGD). The same technique is more commonly used for testing for genetic disorders. Only specific disorders can be tested for, there is no broad examination offered. Hence, it is necessary for a disorder to be pre-identified



i. e. it is know that the parents are likely to pass on the disorder or disease to the child.

I have already outlined what is presently scientifically potential and as we can see it is possible to identify certain genetic abnormalities that specify the presence of a disorder and to identify a male or female embryo. Within the territories of present scientific competences producing a designed baby is simply not possible, some information occurs as theories and some investigation with animals has taken place, but so far to the finest of our familiarity no-one has risked endeavouring to genetically design a human.

Nevertheless, current scientist will eventually prove that they can create a human with all the desired traits and characteristics'. Thus what requests to be discovered to enable the parents of the future to sit down with their catalogue and tick the hair, eyes, nose, and IQ boxes? The answer is that Scientist will need to do a lot more work on recognizing and dividing the specific genes that control the growth and growth of each individual.

Afterwards, they will need to put more effort into how to modify the DNA so that the child matches desired characteristics'.

Now, we know that the formation of the human is a highly complex process of interaction and interweaving and not simply a case of take this gene, change it and hey presto the baby that was going to have green eyes will now have brown eyes. The Law A lot of the countries permit sperm sorting, and prenatal diagnosis is mutual even predictable practice once used as a medical tool and therefore not subject to the similar rigorous inspection under law. Traditional methods are not generally affected by law either.

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Laws leading the use of PGD for specifically for non-medical sex assortment differ around the world. In particular countries such as the USA and Australia it's 'not illegal'. In the USA the American Society for Reproductive Medicine (ASRM), who role as an optional service on topics as ethical in lieu of statutes governing procreative technologies, determined that physicians ought to be allowed to proposition pre-conceptive methods of sex selection, if initiate to be harmless and effective, to couples desiring "gender variety" beneath definite circumstances (ASRM Ethics Committee 2001).

In other countries PGD and sex selection is subject to state laws and is permitted where the gender of the offspring is associated to a genetic disorder. Nevertheless, the exact nature of the law differs significantly between countries, and is consistently focus to unceasing debate and apprise. For example in Germany the law allows for prenatal diagnosis testing of an embryo for a genetic disease (note that an embryo i. e. fertilized egg and not an unfertilized egg can be tested) and if the embryo is found to have a disorder or disease then the pregnancy can be terminated without time limit.

In the United Kingdom the law says that PGD can be used to determine if an embryo has a genetic disorder or disease, or is a match for a sibling that has a genetic disorder or disease and further that if there is a high risk of a gender specific genetic disorder or disease then the sex can be tested for. People have been seeking to create designer babies for centuries. A few of the methods for sex selection have been outlined above and there are more options available, ask around and you will find plenty of people willing to share their particular method.

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Character and feature selection hasn't always been done using scientifically proven methods but it has been around for as long as the human race has been procreating. In many respects human nature seeks to choose those characteristics which we find most attractive, we choose the partner we wish to breed with, someone who has the features we like, someone we approve of, has traits or characteristics we desire in our children. This process does not necessarily takes place on a wholly conscious level but let's not fool ourselves into thinking it all pure chance.

Undoubtedly in wealthy societies we have few uncertainties about modify ourselves to suit fashion, desires and happiness; if you want to be a surgeon and get rich choose plastic surgery, if you are feeling slightly ill you go to the chemist and pick up a bottle of pills to alter your mood or increase your sex drive or keep you young and vigorous. Why is it so odd that we should desire to permeate our offspring with beautiful characteristics? Why is it that once we bring scientific approaches into the picture that hackles get raised?

First, let's not forget that most of the methods require that some embryos be discarded and that is a debate that rages across many areas and is discussed fully elsewhere on this site. Alongside the right to life issue are a couple of other debates, these include; global and local gender imbalance, fear of a new eugenics movement, PGD and disease/disorder identification - is it all good?. Global and Local Gender Imbalance We live in a sexist society, most cultures value women above men.

In 1990 a Nobel prize winning economist, Amartya Sen <http://ucatlans.ucsc.edu/gender/Sen100M.html>, published a paper claiming that approximately

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100 million women were 'missing', she concluded that the majority of these women were missing from Asia and North Africa and further that this was predominantly due to a lack of fundamental health and social care given to girls. Others added to Sen's conclusions by suggesting that the imbalance could also be due to infanticide and sex-specific abortion.

Since then an economics graduate student, Emily Oster, has presented findings that suggest that the cause of approximately half of the 'missing women' could be a correlation between rates of hepatitis B; there is evidence to suggest that pregnant women with Hepatitis B are more likely to give birth to boys, nobody is quite sure why. Oster suggests that where Hepatitis B is more prevalent a gender imbalance occurs. The areas where Hepatitis B is more prevalent and Sen's 'missing women' seem to coincide. Oster concluded that this anomaly could account for as much as half of Sen's 'missing women'.

But this still leaves an astounding 50 million women unaccounted for. In relation to the debate about the use of PGD for sex selection this number becomes very important. If we can misplace 50 million women without the use of PGD what might happen if its use for sex selection becomes commonplace? On the other hand, don't we believe in individual freedoms and the right to choose? Isn't it more important to educate society out of its current misogynistic mind set? Perhaps even, if the technology were made widely available then eventually a new balance would be found.

Possibly the most important thing to remember within this debate is that sex selection is not an over the counter option. It requires fairly arduous and

expensive procedures and a real desire to achieve your ends. A great many of the articles that you read about genetic engineering and related areas start by pointing out that the main goal is disease elimination and that of course is good. PGD is most commonly used to identify those embryos that are carrying a genetic disease or disorder and then to discard those embryos deemed 'unsuitable' for implantation.

Alongside this is the practice of prenatal testing and termination of foetus with certain conditions. Scientists have discovered a good few genetic disorders that can be identified using these processes and it is now quite common practice for parents who suspect they may pass on a genetic disease or disorder to seek PGD or prenatal treatment. But is it always good and is everyone really so enthusiastic about the use of the technology? Many disability rights groups and bioethicists have taken up the debate arguing that people with disabilities should not be seen as a group who should be eliminated from society.

They argue that to decide that people with disabilities are not 'normal' is to attempt to alter the diversity of human life and to take away from society a sense of caring and consideration. They see the use of prenatal and PGD testing as a form of discrimination. Further many people argue that a number of the genetic conditions that are being tested for are conditions that do not produce symptoms until later in life and that with proper medical treatment people with some conditions can live full lives.

Now of course some of the genetic disorders that are tested for are indeed horrific and can reasonably easily be justified as candidates for PGD but if we

see these diseases at one end of a continuum and then diseases of later life at the other end, who should be in the position to decide the cut off point and how will societal pressures affect those making such choices? There are other issues such as the way we view our offspring. Will children become a mere commodity designed by us to fit into our world as an accessory and not as an individual in their own right?

Taken to the extreme will the use of PGD create a race of perfect unblemished stereotyped people variety only coming out of changes in fashion? Who will ultimately make the decisions about what is acceptable what is not and how can we ensure that the technology will be used responsibly? There appear to be approximately three billion bases, or chemical letters, making up the nucleotide sequences that form 20, 000 to 25, 000 genes which code directly for proteins. Just how genes and the proteins they produce interact is still poorly understood. <sup>2</sup> But protein-coding genes comprise only 2% of the human genome. The functions of other DNA sequences are still largely a mystery. We do know that some of them contain switches that turn genes on and off, and we have learned that at the ends of the chromosomes there are telomeres, whose shortening appears to be related to the aging process, and non-functional genomic parasites, whose only function in our bodies seems to be to replicate themselves. An estimated 40- 48% consists of repeat sequences. Even after sequencing the genome, we will still have to determine how these data relate to expression.

The sequences are only the parts list to a grand machine, the outlines of which we are only beginning to trace. Scholarly opinion is rapidly growing more cognizant of the role of genes in human society. In 1998, University of <https://assignbuster.com/is-it-ethical-to-genetically-engineer-babies-for-designer-purposes/>

Massachusetts political scientist Diane Paul wrote that just fourteen years earlier, in 1984, she had labeled as “hereditarian” or “biological determinist” the view that differences in mentality and temperament were substantially influenced by genes – employing these terms as though their meanings were unproblematic.

That usage today would surely be contested. For the view implicitly disparaged by these labels is once again widely accepted by scientists and the public alike. The bottom line is that with every day we gain greater knowledge and that in the not all that distant future we will be able to predict, with a high degree of certainty, the genetic load that we are passing on to future generations. Disease, by its very nature, has a genetic component. A disease is either inherited or the result of the body’s response to environmental elements such as a virus.

At present human genetic engineering is primarily carried out through a process known as Preimplantation Genetic Diagnosis or Selection either PGD or PGS. No real engineering takes place, what happens is single cells are removed from embryos using the same process as used in In Vitro Fertilisation (IVF). These cells are then examined to identify which are carrying the genetic disorder, which are not. The embryos that have the genetic disorder are discarded, those that don’t are returned to the uterus in the hope that a baby will be born, without the genetic disorder.

Only previously identified genetic disorders can be tested for, there is no ‘catch all’ testing. What this means is that if the parents fear their unborn child might inherit a disease or disorder they can choose to have their

embryos tested for that specific disease or disorder. Some examples of disorders that can be tested for are: • Downs Syndrome • Tay-Sach Disease • Sickle Cell Anaemia • Cystic Fibrosis • Huntington's disease There are of course many others than can be tested for and medical and scientific institutes are constantly searching for and developing new tests.

This procedure is fairly uncontroversial, it does however have it's critics who argue that human life starts at conception and therefore the embryo is sacrosanct and should not be tampered with or that we simply should not be messing around with our genetic make up and the results are unstable and unpredictable. Another use for this technique is gender selection, which is where the issue becomes slightly more controversial. Some disorders or diseases are gender specific, so instead of testing for the disease or disorder the gender of the embryo is tested for and whichever gender is 'undesirable' is discarded.

This brings up huge issues about the ethics of gender selection and the consequences for the gender balance of humankind. A more recent development is the testing of the embryos for tissue matching. The embryos are tested for a tissue match for a sibling that has already developed or is in danger of developing, a genetic disease or disorder. The purpose is to produce a baby who can be a tissue donor. This is known as Sibling Savers.

Again this technique has caused much controversy as the purpose of the testing was seen as being not for the purpose of disease elimination directly. This technique is one step forward in the search for ways to treat and cure, rather than eliminate, genetic disease and disorder and for finding ways to



use these techniques in the use of genes as curers i. e. the introduction of a modified gene that could perhaps suppress a tumorous growth. This is known as Gene Therapy. The next step in disease elimination is to attempt to refine a process known as Human Germline Engineering.

Whereas PGD affects only the immediate offspring germline engineering seeks to affect the genes that are carried in the ova and sperm and thus eliminate the disease or disorder from all future generations making it no longer inheritable. The possibilities for germline engineering and gene therapy go beyond the elimination of disease and move us into the other spheres of influence we identified earlier; longevity, capacity, adaptability and fashion. In 1976, the first successful genetic manipulation took place on mice, in efforts to produce more accurate disease models and test subjects.

These mice were modified at the germline stage: that is, permanent genetic changes were induced by transplanting new genes into the mouse's embryo. The real breakthrough happened twenty five years later—on January 11, 2001, when scientists in Oregon unveiled ANDi, a baby rhesus monkey carrying a new jellyfish gene in his genome. <sup>1</sup> The birth of a genetically modified primate, one of the closest relatives to mankind, heralded the arrival of a new era in human genetic research. One month later, scientists announced in *Nature* the completion of sequencing, or mapping, of over 97% of the entire human genome, roughly five years ahead of schedule. This represented a crucial step in our march toward fully understanding human disease. Equipped with the new “ dictionary” of the human genome, all we have to do is to learn how to use and modify it at our will. In early 2003, New Jersey fertility doctor Jacques Cohen reported the first modification in the <https://assignbuster.com/is-it-ethical-to-genetically-engineer-babies-for-designer-purposes/>

human genome. According to Cohen, his pioneering infertility treatments produced two babies with DNA from two different mothers, which “ represented the first case of human germline genetic modification resulting in normally healthy children. <sup>3</sup> Although such changes in the genetic makeup were miniscule, their implications were symbolically profound. Arthur Caplan, director of the Centre for Bioethics at the University of Pennsylvania, called it “ an ethically momentous shift. ” <sup>4</sup> As the face of science is being permanently altered by such changes, so is our moral understanding and awareness. When the words “ gene therapy” first entered our daily vocabulary, most Americans applauded its novelty, ingenuity, and potential for medical research. However, as one realizes the deep social and ethical consequences, the concept of “ super humans” scare them.

The possibility of creating a new breed of humans with “ better genes” is not something that the public has prepared for. Hundreds of citizens rallied across the country, hailing for a halt in human cloning research. A Time/CNN poll found that over ninety percentages of Americans were against creating “ genetically superior human beings. ” patients with muscular dystrophy due to malfunctions in the immune system, muscle cells deteriorate as a result of old age, lack of daily physical activities, or chronic illnesses that limit one’s movements. Traditional methods, such as rigorous physical therapy, are not feasible for people of all ages.

Most current drugs contain large doses of steroids to stimulate cell growth, but these drugs are not specific to muscle cells and excess hormone levels can lead to undesired side effects such as heart disease. A gene therapy to alleviate muscular dystrophy, or even reverse the inevitable and debilitating

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muscle loss due to old age, would be welcomed. Professor H. Lee Sweeney of the University of Pennsylvania developed a synthetic gene that, when injected into the muscles of mice, prevents and reverses the natural deterioration of muscle cells. More recently in August 2004, scientists in California announced the birth of " Marathon Mice," a new breed of genetically-modified mice that gained muscles and endurance without any exercise, and never became obese. Although the therapy is not yet approved for human use, the vision of curing muscular dystrophy is not too far away. However, such therapy does not come without ethical implications. Based on scientific reports on the current status of genetic enhancement of muscles, there are tremendous human safety risks. The track record for mammalian experiments showed that the medical risks are formidable and even dire in some cases.

Most test subjects did not survive due to immune responses to the injected foreign gene. The therapy fails to meet the rigors of human safety, efficacy, and protection. Suppose, for the sake of argument, that these health risks can be eliminated after improving the procedure. But what if we use the medical technology for non-medical ends, such as to improve athletic performance? The widespread use of steroids in the doping scandals during the Olympics suggests that many athletes are eager to try out genetic muscle enhancement.

Imagine runners sprinting through a mile in less than three minutes without breaking a sweat. What is really disturbing here? It is one thing to achieve athletic perfection Conclusion It is tremendously difficult to decide on which

is right and wrong when you do come across such an ethical subject and but <https://assignbuster.com/is-it-ethical-to-genetically-engineer-babies-for-designer-purposes/>

on the other hand it is a great climb in the science technology. It is a miracle to the scientist and whoever those believe in this theory, or more of a scientific theory but people who are totally against this will say it is a total terrorism, " you are terrorising what God has given to you".

According to the interviews with my families and friends I would definitely agree that they do think it is totally ethical to genetically engineer babies for designer purposes. Everyone is unique, and that is what special about the individuals. Being beautiful and being intelligent is not important to survive in this world. Logical skills are needed to survive in this typical world, nothing else is really needed. Genetical engineering itself is ethical, as you are still altering with God's creation but it is a great advantage as it does not cause any harm to the body.

I would definitely opt out for doing genetic engineering babies' for designer babies because religiously and human rightly it is illegal. Why would you modify what has God presented you. You would not know if the babies will come as a total disaster. Finally, I think it is blatantly ethical to genetically engineer babies' for designer purposes, due to fact it is illegal in many ways. Considering to all the interviews and evidences, Bibliography 1. <http://web.mit.edu/murj/www/v12/v12-Features/v12-f4.pdf> 2. [http://en.wikipedia.org/wiki/Genetic\\_engineering](http://en.wikipedia.org/wiki/Genetic_engineering) 3. <http://www.actionbioscience.org/biotech/agar.html> 4. <http://www.youtube.com/watch?v=i1-DpvPW-Ec> 5. <http://jp.senescence.info/thoughts/genetics.html> 6. [http://en.wikipedia.org/wiki/Gregor\\_Mendel](http://en.wikipedia.org/wiki/Gregor_Mendel) 7. OCR AS Biology Text Book 8. Designer Babies: Where Should We Draw the Line? (Debating Matters) by Ellie Lee 9. <http://www.geneticsandsociety.org/article.php?id=3157> 10. <https://assignbuster.com/is-it-ethical-to-genetically-engineer-babies-for-designer-purposes/>

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