


Spring 4-2012

Living in an Age of Technology: College Students' Perception of the Role of Genetic Engineering and Reproductive Technology in Today's Society

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RHODE ISLAND COLLEGE

'Living in an age of technology'

college students' perceptions of the role of
genetic engineering and reproductive technology
in today's society

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**An Honors Project Submitted in Partial Fulfillment
Of the Requirements for Honors**

In

The Department of Sociology

**The School of Arts and Sciences
Spring 2012**

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‘Living in an age of technology’: college students’ perceptions of the role of genetic engineering and reproductive technology in today’s society

Abstract

This study examines attitudes about prevalent issues in genetics and reproduction among the college population. Eighteen interviews were conducted with students at Rhode Island College. Respondents were asked questions about their moral standpoints concerning utilizing genetic engineering for disease control and aesthetic purposes, employing assisted reproductive technologies (ARTs), regulation of such procedures, and also about media sources for which they have heard of these topics. Findings suggest that, generally, participants felt that genetic engineering for health issues is permissible, yet reprehensible for the purpose of aesthetically “designing” a baby, though four students (three of which were female) found the enhancement of physical traits enticing. There was overwhelming support, among all respondents, for the usage of ARTs for infertile couples, single women and gay couples. Also, utilizing ARTs to conceive was thought to be acceptable if an individual is a responsible caretaker, and the government should only go as far as to regulate for safety precautions. The most dominant sources of media responsible for the dissemination of information among this population were television and the internet. Results were interpreted in terms of Bourdieu’s theory of capital and Weber’s value-rational action theory.

Introduction

The 21st century is characterized by the proliferation and societal dependence on technology. It is an age of smartphones, Facebook, Google, and iPods; a culture of convenience and efficiency. A time that has reworked social norms and expectations and changed the way in which we interact with each other. It is a fast-paced world in which anything is possible. Embedded in high-tech culture, people are continually striving for “improvement” and “perfection,” even within a realm of biological procreation.

No longer does human reproduction necessarily require sexual intercourse. Technologies are being implemented into mainstream culture, subsequently giving individuals more choices. In the realm of baby-making, individuals can utilize methods such as in vitro fertilization (IVF), donor semen or eggs, frozen embryos, or surrogates (Peters 1996), in addition to new technologies for pre-implantation

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genetic diagnosis (PGD), making it possible to manipulate certain traits and produce "designer babies" (Michelle 2007). These technologies, among others, are leading to a new field of medicine, dubbed "reprogenetics" by some, that combines reproductive and genetic technology (Green 2007). Society is so enamored with the medical model and technology that it is increasingly equating enlightenment with scientific advancement (Lloyd 2001).

David Lloyd (2001), of *Vision* magazine, writes that "the accelerating pace of scientific advances is creating moral dilemmas where potentially immense and far-reaching ethical decisions are required to be made against the blur of warp-speed change." The prospect of regulating genes and finding cures for medical conditions is enticing, but when this leads to the manipulation of certain physical characteristics and the creation of the "designer baby," where do we draw the line? Who decides which genes are good or bad? Who decides which life is worth living? Ultimately, are we playing God? Furthermore, are citizens being equipped with the accurate information needed to make informed decisions and what role does the mass media play in influencing and bringing about awareness of assisted reproductive technology (ART)? These ethical questions pose new and complex quandaries, given that reproductive technologies are introducing third parties into what has, until recently, been a private matter between individuals (Merrick and Blank 2003). Maranto (1996) asserts that such technologies have "opened a new phase in the chronicles of human reproduction, one which may or may not be benign" (15).

Sociological Context

History of Eugenics

The term "eugenics," deriving from the Greek word for "wellborn," was first coined in 1883 by the British anthropologist Francis Galton (Tagliaferro 2010: 69). In his work "Eugenics: It's Definition, Scope, and Aims," Galton (1904) defines eugenics as the "science which deals with all influences that improve the inborn qualities of a race; also with those that develop them to the utmost advantage" (1).

The idea behind eugenics can be connected with the infamous policies of Nazi Germany, but a eugenics movement also swept through the United States in the first half of the twentieth century. In 1904 the Station for the Experimental Study of Evolution was established in Long Island, New York. The purpose of this organization was to train people who were to study poor individuals in New York and New Jersey in order to collect “data” on what was considered “hereditary” traits, including “shiftlessness” and “feeble-mindedness” (Tagliaferro 2010: 69-70). Eugenicians were hoping to improve the health, intelligence, and productivity of the human race, ultimately paving the way for “future generations of superior people” (Peters 1996: 85).

Though these notions may seem rational and even advantageous to some, they unfortunately led to forced sterilization laws targeting anyone who was deemed “feeble-minded” or unfit in some aspect (Tagliaferro 2010). These ideas took flight in America and by 1931 sterilization laws were in action in about thirty states, and around twenty thousand people had been involuntarily sterilized (Tagliaferro 2010). The implementation of eugenics in America was abandoned later on in that decade once it was established that it was based on faulty genetic theory (Peters 1996).

Now, some eighty years later, with the expansion and progress in reproductive technologies, there has been a renewed interest in choices in baby making and a shift towards concern for the betterment of individuals and society. Current technologies and genetic testing are more accurate at detecting various medical disorders than in the past. As more knowledge is becoming available concerning genetics and technologies, the motivation and quest for a healthier race is being resurrected. Our species has an insatiable obsession with improving current conditions, as if the present were never as good as it could be.

Background of ARTs

Among the recent technological advances are procedures such as artificial insemination (AI), in vitro fertilization (IVF), MicroSort, and pre-implantation genetic diagnosis (PGD). Artificial insemination is a process that involves injecting sperm derived from a male partner or donor into a woman. In this case, the fertilization of the egg takes place inside the woman. In vitro fertilization, on the other hand, is when a woman's eggs are mixed with sperm in a laboratory test tube or petri dish, causing the fertilization to occur outside of the body before it is injected into a woman (Gosden 1999). MicroSort is a new method of sex selection that involves sorting sperm based on the chromosomes that dictate sex, ultimately allowing for the selection of a particular sperm for fertilization, based on the desire for a female or male child (Bhatia 2010). Pre-implantation genetic diagnosis is a procedure that removes one or a few cells from an embryo in order to test whether it carries a harmful mutation or genetic disorder (Gosden 1999). This diagnostic technology, however, also has the capability to test for the characteristic of sex, thus allowing people to select a certain sex preference for their child (Cho 2010).

These technologies represent huge strides in the realm of science and biomedicine and illustrate the capacity and speed of change, for possibilities that were once unimaginable have quickly become adopted and routinized (Green 2007). Indeed, our society is witnessing the onset of a new era of human evolution. This evolution is markedly different from our past history, for as Green (2007) asserts, "we have been the passive subjects of change, [but] in this new era we will take the direction of our evolution into our own hands" (2). This increasing shift in control brings with it concerns for the potential ramifications and implications that such advanced technologies may have on future society. The new advances retain a level of uncertainty that lead to a myriad of possible consequences, subsequently creating a divide between those who believe these advances are creative and impressive

improvements on the human condition, and those who fear meddling with nature will have negative impacts in the long run.

These issues were further elucidated in the 2004 Report of The President’s Council on Bioethics that addressed the regulation of new biotechnologies. The report called attention to the ethical and social concerns that the President’s Council has recognized and felt could have a significant impact on society as a whole. The report clearly outlines the concerns in its introduction and incorporates the following issues:

(1) The daunting complexity of options confronting would-be ART patients, and the need for full and candid reporting of the successes and failures of different ART treatments and techniques...(3) The potential aggravation of existing social inequalities, should such technologies become available only to the wealthy or the privileged. (4) The possible emergence of new grounds for inequality and discrimination based on genetic characteristics. (5) The prospect of making entrance into human life contingent on passing certain genetic tests. (6) The concern that the state, insurance providers, or others may attempt to impose prenatal or preconception testing on prospective parents...(8) Questions about the boundary between disease-prevention and so-called “enhancement” uses of these technologies—how to define that boundary and what to do about it. (9) The effects of commercialization of aspects of human procreation...(10) The consequences of moving procreation more and more into the laboratory and possibly turning it in the direction of manufacture. (11) The changing expectations of parents regarding children born using—or not using—genetic screening and selection...(14) The fear that a growing emphasis on genetic determinants of human life will exaggerate the primacy of genetic causation over environment, free will, agency, and choice. (The President’s Council on Bioethics 2004: 6-7)

These concerns are not trivial and may greatly impact our society. Some may feel they are too risky and potentially degrade human life, and others believe the risk to individuals is minimal compared to the sizable gains for humankind.

Controversy Surrounding ‘Reprogenetics’

On the more conservative side of the debate lie the concerns that ART increases the likelihood of human procreation moving into the realm of manufacture, as it incorporates technical approaches into reproduction. Further along these lines, there is the fear that the commercialization of reproductive

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tissues will ultimately degrade the human body and diminish respect for the natural process of procreation. Others find these claims to be unjustified and as the President's Council explains, "they argue that commerce in human gametes is no different from commerce in other meaningful activities of life (like paying one's doctor) or commerce in other articles of special significance (like a religious text or a wedding ring)" (The President's Council on Bioethics 2004: 150).

Another area of concern is that the parents who are making the decisions may base them, subconsciously or not, on their own interests rather than those of the unborn child. Parents, then, may try to control their child, having high expectations, and placing undue pressure on the children to be the "perfect" child that lives up to what the parents already decided they should be (The President's Council on Bioethics 2004). This quest for a "perfect" or designer baby, coupled with the modification of traits and characteristics is likened to a new eugenics movement. Participants are searching for only the "best" offspring, and in doing so, are "binding the next generation to a genetic fate that suits the will of the present one" (110).

Eugenics implies that those who do not possess the desired characteristics are inferior, further stigmatizing those who fall short of perfection. The result may be a division between the genetic haves and have-nots, along class lines. The exorbitant price tag on ART procedures will further exacerbate the divide between the rich and the poor and only serve to perpetuate this system of class inequality (Cho 2010). Despite these numerous concerns and ethical issues, some remain advocates of advancements in ART to improve human life.

In his book "Babies by Design: The Ethics of Genetic Choice," Green argues that society is capable of bringing intelligent "design" into the world of human reproduction and that every new advancement is an illustration of the capacity of human creativity (2007). Others sharing Green's sentiments argue that it is justifiable and responsible of society to consider direct interventions into the future generation's genetic makeup in order to prevent disease and ultimately improve living conditions

for all. Also, bettering overall living conditions may further benefit society financially, for it is costly to care for chronically ill populations. Furthermore, Gosden (1999) maintains that today's citizens are better informed and ready to approach the issues of reproduction. He believes parents are justified in wanting to ensure that they produce a "perfect" child and that "focusing on a few precious children encourages a sense of responsibility and careful planning of the family to be" (232).

Putting aside the debate of whether or not such advances in ART are beneficial to society, the issue over government regulation of biotechnologies is a legitimate concern. Merrick and Blank (2003) mention three constitutional rights that limit the power of the government in intervening in a pregnant woman's reproductive decisions. These include "the right to bodily integrity, the right to make intimate family decisions, and the right of parents to make decisions about how to raise their child" (6). Even those who do not regard the concerns about biotechnologies as significant or justified, may find the notion of government regulation and intervention worrisome. Gosden, an advocate for the biomedical progress, admits that it would be quite alarming and discomforting "if the state, as guardian of the public purse, chose to make reproductive decisions for us by deciding the kind of people that there ought to be, and weighing the costs of raising a defective child" (Gosden 1999: 240). This type of state involvement harks back to the atrocities committed by the Nazi regime, but then once again raises the important questions: who decides which genes are good or bad and who decides which life is worth living?

Given the pace of scientific progress and the potential impact of the changes, it is imperative that individuals are obtaining accurate and unbiased information needed to make decisions. It may be argued that a main source of the propagation of certain views can be traced back to religion. What may lie at the center of the disagreements are the differing beliefs of God's sovereignty, the extent of human control and power, and what is deemed an appropriate response to technological advances (Green

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2007). In addition, the media may play a pivotal role in influencing individuals' beliefs by the type of information disseminated and the way in which it is presented.

The media has the power to either reinforce or discourage support for the movement and utilization of various reproductive technologies. It is a major source of information from which individuals gain insight and understandings of social and political issues concerning medical developments (Michelle 2007). Many journalists rely on scientists in the field when writing about ARTs, ultimately allowing these and other specialists the power to direct the agenda and debate on their own terms (Michelle 2007). Given the desire to continually improve society coupled with the power of the mass media in shaping attitudes towards reproductive technologies, "some may consider these developments creative solutions to human problems," yet others may view them as "tampering with nature" and having the potential for "unforeseen and irreversible calamities" (Fenwick 1998: 109).

Advances and changes in reproductive technologies impact us all. When the issue involves interfering with the inherent nature of humans and reproduction, then it could ultimately lead to either positive or negative consequences. It has the potential to cause discrimination in various manifestations or, conversely, can make further strides for the health and population of humanity. America is rapidly changing and growing with technological advances that are posing numerous moral dilemmas and quandaries. This issue of reproduction, in particular, is one that can ultimately affect everyone, given that it deals with the perpetuation of the human race.

Public Attitudes towards 'Reprogenetics'

These controversial issues are continually debated and existing literature provides insight into society's attitudes and positions. Committees such as the Human Fertilization and Embryology Authority (HFEA) and the Human Genetics Commission (HGC), have commissioned surveys of public attitudes concerning reproductive technology, choices, and sex selection. After reviewing various observational

studies, surveys, and debates, a recent report from the HGC elucidated the general consensus of the public: “attitudes to genetic information and sex selection for medical reasons have shown approval, whereas sex selection for nonmedical reasons was generally disapproved of” (van den Akker 2005: 117). This study had a more narrow focus and the results deal with only some of the numerous concerns brought up about reproductive technologies and genetic engineering.

Another study of public attitudes (Genuis, Chang, and Genuis 1993) focused not only on the public opinions towards various ARTs, but also the views concerning the regulation and government legislation of them, and what demographic factors potentially influence the respondents’ beliefs. The authors found that 72% of the participants believed that the government should regulate the research and availability of certain ARTs. In terms of gender, women were less supportive of using ARTs than men. Also, support was the highest among those who identified with the New Democratic Party. In general, participants thought that ARTs “interfered with or disturbed the natural course of reproduction” (160).

Much of the survey data conducted in the United States concerning public opinions of ARTS reveals that there is overwhelming support for the use of PGD to avoid disorders, such as Down syndrome and other serious health issues. However, little support was shown for the hypothetical use of ARTs in order to manipulate certain traits for obesity, intelligence, or homosexuality (Kalfoglou, Doksum, Bernhardt, et al. 2005). A study published in “Fertility and Sterility,” reiterates the public’s worries of these new technologies and the fear that that may be used for the “wrong” reasons. Other concerns included the potential for discrimination, partly due to the inequitable access to the expensive technologies and procedures (2005).

Some participants of Kalfoglou, et al.’s (2005) study believed that choosing specific traits for a child is morally wrong and rooted in human vices such as vanity and selfishness. There was overarching concern that the creation and implantation of the technologies for some seemingly benign purpose will

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inevitably lead to the abuse of it for other purposes. Yet, others in the study argued that "technological intervention in reproduction can lead to efficient and vast improvements in human capabilities in any number of dimensions, and we have an obligation to pursue technological progress" (1617).

Still, some believe affliction to be a valuable part of life, contributing to the diversity present among humankind. Reducing the number of individuals with disabilities may deprive the world of their potential contributions and may also eventually lead to the reduction of society's understanding and acceptance of those who are different. Some respondents in the study (Kalfoglou et al. 2005) voiced the notion that this decline in understanding will result in a "loss of compassion [that] could ultimately lead to a loss of "what makes us human"" (1618). Some expressed the concern that the use of the ARTs to eliminate disabilities or disorders is only a 'quick fix' and an easy way out of a difficult situation. One man in the study illustrated this point, saying "I think the people who are creative geniuses have plenty of traits, which really are not easy to deal with. And it seems like a lot of what we're talking about is "let me get rid of things that are hard to deal with," like obesity or having a learning disability" (1618).

The purpose of my study is to gain an understanding of young adults' attitudes towards, and perceptions of, reproductive technologies and its implications. Given the rate of scientific advancements in medicine, these ethical and social concerns could be very real choices available to future prospective parents. For example, within ten years, most current college students will be at the age when they may be considering becoming a parent, and if biotechnologies continue to advance at their current pace, there is the potential that the unimaginable will become possible. This qualitative study will explore the attitudes of college respondents who have come of age within this new technologically driven world of Facebook, Google, and cell phones. My study will gain insight into the views of an age of individuals whose lives are dependent upon technology and who might soon have to deal with these dilemmas.

Data & Methods

In order to discern the attitudes and positions towards “reprogenetics” among young adults, individual interviews with eighteen male and female college students were conducted. Approval from the Institutional Review Board was granted prior to any recruitment efforts and interviews taking place. Given the time and scope of this project, I utilized a convenience sample and recruited participants with the use of fliers distributed among the Rhode Island College campus and word-of-mouth from professors inviting their students to participate (See Appendix A for recruitment flyer). Each respondent received a five dollar gift card to “Dunkin Donuts” at the beginning of the interview session as compensation for their participation.

The interview questions (Appendix B) approach the topics of genetic engineering and eugenics, reproduction and technologies, and the role of the media concerning these issues. During the interviews, a computer was utilized to transcribe the responses into a word processor. Interviews ranged from 25 to 45 minutes; on average they lasted 30 minutes. Each interview was coded for the background and demographic information, including the participant’s sex, age, race/ethnicity, religion, and political party affiliations (See Appendix C for demographics), as well as for themes that arose out of the narratives. The final project is a qualitative study, derived from the culmination of the analyses of narrative data and the development of analytic themes resulting from my interviews. In order to maintain the true sentiments of the respondents, all excerpts and quotations are reported verbatim and have not been edited for grammatical errors. Pseudonyms were used to ensure the anonymity of the participants.

The respondents included nine females and nine males and ranged in age from 19 years old to 40 years old, with a mean age of 24. The majority identified as Caucasian or “white” (78 percent, n=14), one classified herself as “Hispanic/Portuguese,” one individual was African American, and two were

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Asian. In terms of political party, the sample was mostly divided between those declaring themselves as democrats (28 percent, n=5), those were independent (22 percent, n=4), and those who did not have any political party affiliation (33 percent, n=6). The remaining individuals recognized themselves as republican (11 percent, n=2), and moderate (0.06 percent, n=1). The most common religious affiliation was "none" (44 percent, n=8). Four students (22 percent) classified themselves as Catholic, though one admitted to being an "un-practicing Catholic." There was one student who was Jewish and one who was Buddhist. Two individuals (11 percent) described themselves simply as Christian, while two others more specifically supplied that they were Baptist.

Findings

Genetic Engineering: Redesigning the World

Understanding the Terms

Before examining respondents' attitudes toward genetic engineering, it is helpful to assess whether they are familiar with the terms and their meanings. Seven out of nine females were familiar with the phrase 'genetic engineering', while six out of nine males were familiar with it. Though not many individuals could describe any details or procedures of genetic engineering, the majority of students comprehended the basic concepts and usages. Some descriptions include:

"Genetic engineering is when they take certain parts of the person that they want—like the DNA or whatnot—and they kind of put it together and make what they want" (Marina, 30 years old).

"It is the genetic testing before birth to get the kind of child that you desire" (Maureen, 40 years old).

"From what I understand, it's manipulating the embryo's DNA to change the outcome" (Andrew, 21 years old).

"Something related to designing genetics in a favorable manner" (Brittany, 19 years old).

"I know you can sort of streamline certain traits for some people as far as reproductive technology is concerned" (Kim, 20 years old).

“Modifying the DNA of an ovum to get rid of bad genes and put preference on others” (Eric, 21 years old).

“Like the designer babies and test tubes” (Mark, 22 years old).

A few students also attributed genetic engineering to the concept involved in stem cell research.

Interestingly, despite the history of race and gene purification in early 20th century America and during Hitler’s reign, few participants recognized the term ‘eugenics’. Only two of the eighteen respondents were familiar with the term: Kim, a 20 year old, and Mark, a 22 year old. Mark related eugenics to “an ethnic cleansing-type thing. Where people will try to produce only one type of superior being.” Kim explained, “I’ve heard it in relation to Nazis before. But other than that. It still happens. People experiment with reproductive science.”

Conception and Abortion

Only two females believed that they would conceive children if there was a chance of passing on a genetic defect or disorder, while five males stated that they would still choose to conceive with their partner. The two women were Marina (30 years old) and Amanda (20 years old), and identified as Buddhist and Christian, respectively. They represented both the democratic and the republican parties. Amanda did not mention any particular morals persuading her to still conceive, but rather, just stated, “No. I would still have children...because you never know what could happen or what medicines might come out.” Marina, on the other hand, appeared to wrestle with the decision a bit more. When asked about her decision, she begins:

Oh god...that’s such a tough question. Uhm...I think depending on how much I want the child—if I really really want the child—even if I know there is going to be a genetic disease, I would. Just because, back then, when people didn’t know, they would conceive anyway and then find out later. And in a way I kind of know what my family carries based on past history. So, I think I would still conceive.

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The five men who would choose to conceive identified as "Christian," "Baptist," "Catholic," and not religious. In terms of political parties, they affiliated themselves with "moderate," "independent," and no affiliation. John, who identified as Catholic, reported his feelings saying, "No, I wouldn't choose not to [conceive]. I think that would be the wrong reason not to have children." Yet, others still argued that conceiving a child in that circumstance would be the wrong decision.

Of the two men who would choose not to conceive if there was a congenital problem, one stated he was "liberal," and the other did not affiliate with a political party. They both stated that they were not religious. Four women asserted that they would not conceive if there was a chance of passing on a genetic defect or disease, while only two men said that they would not conceive. The women that would not conceive encompassed the democrat, republican, and independent parties. One identified as Baptist, while the other three did not identify with any religion. Lana believed that she would not conceive, for under that circumstance she claims that "it's hard for you and it's hard for that child." She went on to explain, "I just can't conceive giving birth to a child like that...constantly at a handicap. It's stressful for the child." Eric also felt that the stress and difficulty it would place on the child makes conceiving a selfish decision. He expanded on that notion suggesting:

I feel like adoption is a wonderful option for people with severe genetic diseases. There are plenty of children in need of homes, including infants. It's greedy to want your own child if they have a very high chance of being born with a debilitating disease.

Will, however, appeared to base his decision more on the impact conceiving would have on *him*, rather than the potential child. He declared that he would not choose to conceive "because [he doesn't] want to have mentally handicapped children." He further explains, "they'd be very difficult to raise. I feel I would become overwhelmed...I would not have children because it wouldn't be worth it to me."

A total of five participants, including three females and two males, were unsure of whether or not they would conceive, or believed that it was conditional upon the severity of the defect or disorder.

This is illustrated in Andrew's response:

I think depending on the disease or health issue. Certain things are more damaging to life than others. Certain things are worse than others. If it's real bad, I'd say that I'd probably choose not to...or the opposite.

The suggestion of adoption as an alternative was a theme that appeared throughout many of the interviews. As Jim's comment illustrated:

It would depend on the severity of the disease, and the treatments out there for it. If it was something like it would be born without an arm, or something...there are treatments out there. Well, there's always adoption.

Despite any feelings and values that the students held concerning bringing a child into the world with a genetic or health defect, an important distinction arose between choosing to conceive and choosing to continue a birth once a child is already conceived. When prompted, only seven individuals were sure that they would conceive, yet under these new circumstances, eleven students attested that they would give birth to their child if already pregnant. Only four out of the eighteen respondents stated that they would abort their child if it might be born with a genetic defect or health issue. Gender did not appear to be an important factor; two were women and two were men. The women were young (under 23 years old), both identified as not religious and belonged to the democratic and independent parties. When asked, Lana (22 years old) did not have any reservations about her decision, and quickly answered, "Mhm. If the abortion can still be done safely."

Similarly, the men were not religious nor did they affiliate with any political party. One respondent, Will, who was adamant about not wanting a mentally handicapped child, simply stated, "I would choose to abort it. I don't have any beliefs that would prevent me from making that decision."

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Mark, who did not agree with aborting the fetus, introduced an intriguing explanation that was not iterated in any other interview. He justified his beliefs saying:

I don't think it's necessarily okay in that case to take something's life that's just starting. If it was absolutely certain, I would say no, still. Again, because at that point, I would be killing the child. The whole argument for aborting the child is that they may not have a chance to live a completely normal life, but if I abort them, I'm not even giving them the chance to find out.

In addition to those who agreed and those who disapproved completely, a total of three respondents (two female and one male) felt that choosing to abort would be depend on the type and degree of the defect.

Disease Control vs. Aesthetics

The concept of a designer baby has become more widely known in today's society with the new advancements in reproductive procedures and technologies. While it still involves manipulating genes, there exists a profound difference between modifying genetics to control diseases and defects, and modifying them to choose physical characteristics of unborn children. Only four out of the eighteen respondents claimed that they would choose physical traits of their future children, such as sex and eye color, if the technologies were available. Three women stated they would, while only one younger man mentioned that he would. All four of these individuals did not identify with any religion. The man also did not belong to any political party, while the three women represented the democratic and independent parties. Kim (20 years old) found the concept to be intriguing and when asked whether she would choose any physical traits, mused, "Maybe eye color, just 'cause I've always had a thing for blue eyes." Though she admitted this, she did continue to contemplate over the decision and added, "I probably wouldn't get too serious and try to make a designer baby."

None of the respondents found this decision to be conditional, thus fourteen individuals simply stated that they would not choose any physical traits for their future children. A few students were

particularly passionate about the issue and felt it would be reprehensible for the parents to try to determine any physical traits of their unborn children. Eric, a 21 year old liberal with no religious affiliation, proclaimed, “I would not like to choose any of that because I feel like that’s loving your children on a purely superficial level and breeding them like pedigree show animals.” Marina, the 30 year old democrat identifying with Buddhism, imparted her opinion saying:

I am totally against that. I think that you get what you have and—I don’t know—when you get to pick and choose...when you get into cloning and all those things...it’s like you’re playing with science in a way that you shouldn’t. What does it benefit? It benefits to what you feel is beautiful and what you want—not necessarily for health issues.

This ethical dilemma was elevated to another level when participants were asked to debate the benefits and consequences of ensuring the births of only healthy humans.

The majority of students did not believe that the world would benefit from ensuring only the births of healthy and disease-free humans. Only three of the respondents did assert that this scenario would be advantageous to society: Lana (22 years old), Will (19 years old), and Jim (26 years old). Of these three people, two were not religious and one was the “un-practicing Catholic.” Also, two did not associate with any political party, while the other was part of the independent party. Lana believed that a disease-free world would be a positive scenario and asserted that society is already attempting this through the development of various vaccines. Will believed that disease-ridden humans placed a burden on the world and postulated that “if they could be humanely removed from society, humanity would be better as a whole.”

Aside from these few deviant cases, most felt that utilizing genetic engineering for these purposes would be taking it too far. Some individuals deemed a disease-free world as not only a frightening proposition, but a complex and contentious one to bring to fruition. Mark (22 years old) claimed that “it could cause a lot of controversy over what is considered healthy, and human beings are

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prone to developing abnormalities throughout their lives, anyway. So if that's the case, should we be killing them off too?" Marina (30 years old) mirrored the anxiety developing from such ambiguity in ensuring only healthy births when she said:

I think that's scary to me. I wouldn't condone that at all. I guess I would say, in general, to screen it, uh, I would say in the end it might turn bad. Again, I feel like it's subjective. Like someone who might not be able to walk, but they're healthy, it's okay. And then a child who has all their limbs and functions, but then they're morbidly obese and have diabetes—again, that's another form of unhealthiness. So where would you stop? It's very shady.

Advantages of Genetic Engineering

When asked to think about any potential advantages to genetic engineering, including modifying genes to prevent health defects and for choosing specific physical traits, the respondents supplied a variety of answers. Carla (30 years old) believed that manipulating the genes to prevent diseases would also reduce the amount of orphans in society. She further explained, "I believe that most of the people up for adoption have some kind of disease. I think [genetic engineering] would...not eliminate, but lessen the amount of kids that are up for adoption."

Another advantage mentioned was that parents would have the ability to produce a more socially acceptable child. This is particularly interesting given that what is "socially acceptable" is a fluid notion, being socially constructed and thus subject to change. Only two respondents, both male, spoke of this as an advantage. Will (19 years old) confidently advocated this view stating:

I believe if there was a way to determine genetic traits before birth and it was shown to have no negative effects on the child, I wouldn't see any reason not to go for it. Advantages I see include a more socially acceptable child in certain circumstances. Give them the best chance possible. Make it congruent to the society you live in.

John (28 years old) thought that the ability to choose the gender of one's future child could be a great advantage in today's society. He further explained, "I would say an advantage could be like...coming

from being able to choose the sex of the baby. Obviously, males and females have different opportunities because of their gender, so you could open or close more doors in their life.”

A few individuals discussed the financial benefits of genetic modification. Two were females, 40 years old and 22 years old, who represented the republican and independent parties, respectively, and one was a 19 year old male with no party affiliation. The republican woman was Baptist and the other two individuals were not religious. Will felt that “unhealthy and disease-ridden humans pose an unnecessary burden on society as a whole.” Lana briefly mentioned that “they spend a lot of money on handicaps.” Maureen explained:

The population of the world could benefit in the ways that money isn’t being spent in keeping people alive. It takes a lot of money to take care of someone with multiple, multiple disabilities. Private healthcare generally isn’t paying for that. It’s generally the government paying for that. I feel bad about thinking that.

The most commonly mentioned advantage of being able to choose the genes and traits of unborn children was that it would provide the parent(s) with the child that they desire. Five respondents (three females and two males) saw this as the advantage to genetic engineering. They encompassed less conservative political parties or had no affiliation. One male was Baptist, while another male more generally identified as Christian. The other three individuals were not religious. Samuel stated that “you get a baby that’s perfect for you in your eye.” Lana related this belief to a personal experience saying, “Yeah, that’d be awesome. I mean, who wouldn’t. Yes, because my aunt in particular, she really wanted a baby girl and she kept trying and trying, and if you can have your first choice—it’s a great advantage because that’s what the parent wants.”

Disadvantages of Genetic Engineering

Along with the advantages, respondents cited various potential disadvantages of genetically engineering unborn children. Among them, some believed that it would subsequently lead to job loss for

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certain individuals, and some believed that it could result in an overpopulation of the world. The only two people who correlated it with job loss were Samuel (20 years old) and Andrew (21 years old), both with no political party affiliation. Samuel classified himself as Baptist, while Andrew claimed no religious affiliation. Andrew posited that "yes, then you won't have all the diseases, but then you're going to lose jobs for doctors and whatnot." He went on to say, "the other problem, too, is we'd have lots of overpopulation. If you don't have sick people dying, then at some point we're going to run out of space on earth."

Other participants felt that a possible implication of manipulating genes and ridding future humans of diseases would be a diminished tolerance and ability to cope with any other sicknesses, thereby heightening the stigma associated with certain illnesses. Marina felt passionately about the potential for such adverse impacts on the human race. She expressed her feelings saying:

Again, like, you're playing with it. I mean, maybe we're supposed to have certain diseases. It's kind of, like, something as simple as washing your hands, and now you're using sanitizers, and then people are overusing it, and now there's kids that will get sick over the smallest things that we didn't get sick from because we used to play with dirt and go outside. So it's kind of like...how extreme do you want to take it?

Towards the end of the interview, she continued on to explain:

To me...I am skeptical. I always feel like when you choose one way, there's always a consequence. It's kind of, like, the diet in this country. All of the sudden, chicken was cheap—chicken breast and spinach and everything was cheap. And then we find out, oh, at what expense? They pump all these chemicals in the animals and they put all these fertilizers. So we're eating all these things, and now we have all these issues. So now people are going organic. So, I feel like this topic, it's all good right now. But what's going to be the consequence 10, 20, 50 years from now? And we're going to find out. I always feel like there might be something negative. Maybe I'm a pessimist with that stuff, but that's how I feel.

Ian (19 years old) mentioned, "People develop resistance to things. If there were this ideal, people wouldn't know how to respond to diseases that develop."

Five respondents considered another disadvantage of genetic engineering to be that it was “playing god,” stripping reproduction and humanity of its natural and unique elements. Samuel stated that an advantage would be to get your perfect baby, but he went on to say, “but then again, I wouldn’t want that. I’d want the child that God gave me, you know what I mean? I wouldn’t want to fix my baby a certain way.” Brittany asserted that it would be “taking away natural childbirth,” and continued on to say that “part of life is mistakes. I think we’re playing...it’s almost like we’re trying to play god or something.” Another young woman felt that to choose certain traits for an unborn child would be to limit their rights before they are even born and out in the world. John also agreed with this notion saying, “the baby or the person would have like—their life would be set up for them, you know?” He believed that health issues are a part of what make individuals unique. Jim argued that “no one should be able to perfectly make their baby, because every girl that would come out would probably look like a ‘Barbie’.” Kim related back to her personal experience and when asked about any consequences said, “I don’t know. There are certain things I wouldn’t necessarily say have to be screened out. I know plenty of people who are artists who are a little mentally different, and that would change who they are.”

Interestingly, only two students, both male, brought up the issue of societal conflict and further prejudice that could result from the genetic engineering of humans. When inquired about any potential benefits or consequences, Mark, the 22 year old Catholic belonging to the independent party, asserted:

I don’t think I see any advantages. For disadvantages, I mean, potentially, if more people have access to that kind of opportunity, it may spark trends in the way people design their children, which could only further serve to marginalize the already marginalized.

Eric, identifying as a 21 year old liberal who is not religious, stated, “I feel like it can help eliminate diseases, but I also feel like a mutt vs. pedigree standard will emerge.”

Throughout this study, a significant distinction began to emerge between utilizing genetic engineering for health reasons and using it to create somewhat of a designer baby. A recurring theme

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was that genetic engineering is acceptable for the purpose of improving health conditions and diseases, however, it is not okay to use *only* for the purpose of preselecting certain physical traits for a child. Eight of the eighteen respondents, five of whom were male and three of whom were female, shared this outlook concerning bioengineering. These individuals were diverse in terms of religious affiliation and political orientation (they represented Baptist, Catholic, Buddhist, and Christian religions, as well as no religion, and also encompassed democratic, republican, independent, moderate, and no political party affiliations). Eric, the aforementioned man who feared the emergence of a mutt vs. pedigree standard, continued on to describe his feelings about this issue:

I think being able to screen for disease is very helpful for the livelihood of the child. I also think that evolution has come to a standstill in the human race because of medicine. I think that it's very dangerous to start modifying children on aesthetics, though. Especially since third world countries won't have these options. This will most likely lead to more racism, more separation between Western cultures and the rest of the world, and a different type of caste system based on looks.

Jim also explained his qualms with bioengineering for aesthetic purposes:

I appreciate diversification. If we all look the same, what fun would that be? Hitler tried that once. I understand, if I could remove a gene that gives my child autism, then, yeah, I'd want to remove it to give my child a better quality of life. But purifying skin color, race—no one will ever be happy. People with curly hair want straight hair.

Other individuals who felt that modifying genetics was only acceptable for health issues did not necessarily recognize the aggravation of any societal or racial inequalities as a repercussion. Instead, they attributed it to their own personality and notions of humanity. When asked if she would choose the physical traits of her future child, Jess (20 years old) responded, "No. I couldn't do that. It's just...I feel like that's just something as humans we deserve to have our own. People aren't like clothes." She went on to say, "of course we'd benefit if we screen it. If we only had the healthiest of the population. But, morally, I don't think it's right." Marina described her views, admitting:

For me...I'm old-fashioned. I don't think you really should play with it too much. But if the point is to see, like, the health of the kid and whatnot, and see the diseases, then it's okay. But it shouldn't go any further than that. And then picking and choosing who can be born and who shouldn't be...I don't agree with that.

Assisted Reproductive Technologies

Understanding the Terms

Though procedures such as in vitro fertilization have practically become household names, they are concepts that are much more complex and consequential than citizens may realize. All participants were familiar with the concept of surrogacy. The majority of the respondents either could not differentiate between artificial insemination and in vitro fertilization, or were not familiar enough with the procedures to describe the basic concepts behind them. Only four individuals were familiar with in vitro fertilization: Jess and Maureen, ages 20 and 40; and Evan and Eric, both 21 years old. Three of these respondents were also the only individuals who could explain the procedure of artificial insemination. Maureen most accurately summarized all three procedures informing that “in vitro is the father and a mother’s sperm and egg united and then an embryo is implanted. Artificial insemination is having the sperm introduced by means other than intercourse. Surrogacy is having someone else carry the child.” Jess was less articulate in her description that “vitro is the Petri dish. Artificial insemination is where people pretend it’s a turkey baster.” Despite not being able to delineate between these different technologies and procedures, Diane (37 years old), when prompted, optimistically defined such assisted reproductive technologies as “the wonderful opportunity to create a new life.”

Ethics behind ARTs

Though only four respondents were familiar with in vitro fertilization and only three could distinguish artificial insemination from it, ten individuals still asserted that they would try these

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procedures, despite not fully understanding them. These ten individuals, out of the eighteen participants, agreed that they would utilize such reproductive technologies in the case that they could not become pregnant after over a year of trying. Five of these individuals were female and five were male. Many viewed these ARTs as viable options and had no trepidation about utilizing them. Lana (22 years old) insisted that "we're living in an age of technology. There's no reason we shouldn't use it."

Men and women were pretty equally unsure of whether or not they would utilize the technologies. Only three respondents (two women and one man) believed that they would not choose to utilize them. The women who would not use them were 30 years old and 40 years old, and identified as democratic and republican, respectively. Marina (30 years old) identified as Buddhist, while Maureen (40 years old) stated she was Baptist. The one male who mentioned that he would not utilize IVF or AI was Mark (22 years old) who identified as Catholic and of the independent party. Some students felt that using ARTs would detract from the natural aspect of childbirth, while others felt adoption to be a better option. When asked if she would personally undertake such procedures, Maureen purported, "Probably not. I guess I would just think that God had a better plan for me. I would consider adopting before I would consider those. There's lots of kids out there that need homes."

There was agreement among all participants that it is morally acceptable for infertile couples, single women, and homosexual couples to utilize reproductive technologies and procedures in order to conceive children. This likely reflects the relatively more progressive attitudes of students at a liberal arts college. Many respondents agreed with the sentiment that "everyone should have that chance to have a child and raise kids" (Samuel, 20 years old). No one appeared to have any reservations about an infertile couple using any reproductive technologies to conceive, however, various students voiced some concerns of single women and homosexual couples utilizing them.

A number of respondents stipulated that it would be morally permissible for single women to use reproductive technologies if they are financially stable and have the ability to care for the child. Andrew, though he condoned it, elucidated his worry reporting, "From what I've read, I believe that there are studies that show that single parents have a more difficult time." Marina, who endorsed single women employing such reproductive technology, further reinforced her justification saying, "And even when there's women who are dating somebody or married to someone, have kids and they divorce, they're still single, anyway."

In terms of homosexual couples using any ARTs to conceive, several participants believed that "sexual preference does not determine parenting skills" (Carla, 30 years old). Another student, Mark, further endorsed this notion and thought that homosexual couples have a right to the technologies considering "there's a 100% chance that they can't conceive because they don't have the necessary organs, so for people that don't want to consider adoption, that option is there." Marina shared that she is a lesbian and divulged her personal worries of having a child saying:

It's really not the conceiving part that would be the issue. It's more, like, how people accept the baby. That's my issue that I have. I'm afraid that I can't raise a child in the way where people see them as "normal" and would treat them the same as every kid. So that's my fear.

Advantages of Reproductive Technologies

Overall, the participants only illuminated three advantages of reproductive technologies and procedures, such as in vitro fertilization, artificial insemination, and surrogacy. The majority of respondents (fifteen out of eighteen) recognized one basic benefit as the ability for people to have a child and a family, despite being unable to prior to the technologies. One of these individuals also believed that the existence and usage of these reproductive technologies would open up more jobs in that field. Only two males did not mention these same benefits, but rather, focused on the notion that the technologies offer a chance for healthier humans. Will felt strongly that the "advantages are

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clear...when they pose the possibility of producing healthy, more properly developed children." One 20 year old female, identifying as not religious and democratic, did not mention any potential advantages.

Disadvantages of Reproductive Technologies

A number of drawbacks to the reproductive technologies were discussed by the participants, including the recurring issue of overpopulation, the notion that it takes away from the natural process of procreation, and feeling that it may diminish the number of individuals contemplating adoption as an alternative to childbirth. A very relevant issue, brought up only by Jim and John, was the concern of the costs of such technologies and procedures. Jim explained that "you can do in vitro and artificial insemination multiple times and I'm sure multiple rounds is expensive," and as John posited, there will "always [be] people who can't pay for it." Another worry expressed by a few men is, once again, the notion that these specific technologies may create societal conflict or perpetuate racial and class divides. Will conjectured that because "some members of society advocate against these procedures because of religious beliefs or moral standards, [it] may lead to societal conflict." Another male theorized that access to these technologies would allow for it to be abused in numerous ways, subsequently instigating further societal problems.

An additional disadvantage that was brought up by three different females, ages 20, 30, and 40 years old, is the possibility that women may become pregnant with multiple embryos at once when utilizing in vitro fertilization and may choose to give birth to more babies than she can support. Carla (30 years old) summarized this concern saying that "the disadvantages is that you're unable to see...how many of the children you will have." Maureen (40 years old) went further to say, "You've heard about people keeping the babies," and Amanda (20 years old) explained this to be a negative situation in which women or parents are "biting off more than [they] can handle, like 'octomom'."

The two most common themes concerning possible shortcomings include the idea that these procedures and biotechnologies are still relatively new, and thus, may actually have various unknown consequences. The other troublesome issue that was elucidated in the interviews, is the view that because these technological advances are enabling more individuals to become parents, they may also be allowing “unfit” individuals to have children. Three females and one male illuminated the fear of the unknown with respect to the reproductive technologies. Marina, though she disclosed that she is a lesbian and clearly could not procreate with her partner via sexual intercourse, asserted that she still rather get pregnant “the natural way.” When asked about the reproductive technologies, she explains her discomfort with them saying, “that’s why I’m kind of, like, I really would want to do it myself, because it’s still fairly new, and, uhm, we don’t know how it’s going to be. It’s kind of playing with science, you know?” Andrew upheld this same belief stating that “it is a medical technology. It’s science. Science is certainly not perfect. So there could be defects that were created through scientific methods, rather than the actual process.”

Regulating Genetic Engineering and the ARTs

The amount of control the government and parents should retain over genetic engineering and reproduction is a very contentious and multifaceted issue. Throughout the interviews, the complexity surrounding the question of interference was quite evident. The majority of respondents were somewhat conflicted and had difficulty determining the level of control parents should maintain and/or the extent of regulation that the government should impose. Participants were asked their beliefs on such interference both with the manipulation of genes for disease control and physical traits, and also with the regulation of assisted reproductive technologies.

Not one individual agreed that the government should have complete control in these areas. Only three students, two males and one female, felt strongly that they should not have any say, and the

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remaining fifteen participants found governmental control to be conditional. The three individuals who believed that the government should not interfere at all, advocated that these decisions fall only under the parents' jurisdiction and should be their choice entirely. The other respondents were somewhat wary about leaving total control up to the parents who may or may not be fully responsible and capable of making such influential choices. Thus, many people felt that the government should only go as far as to regulate the procedures and technologies to ensure the safety of everyone involved or prevent unfit individuals from becoming parents. Some suggestions and justification for governmental intervention include:

I think the government should regulate depending on what method you use, how healthy you are—maybe to come up with a plan to make sure that the parent is getting counseling to make sure they do want this. (Carla, 30 years old)

[The government] should be setting up systems to be teaching people how to make better decisions and to prevent them from being in compromising situations. (Mark, 22 years old)

Some students were bothered by the idea that individuals were becoming parents when they cannot fully take care of their children and suggested that the government should “stop someone on welfare who has six kids from having any more” (Maureen, 40 years old). Jim (26 year old) echoed this belief when he stated that the government should control procreation:

If you're collecting welfare and unemployment and you get knocked up. If you're an unfit parent, if you're a druggie, if you're on welfare, if the state would take away your children...then you shouldn't be allowed to have children in the first place.

He went on to say, “You can be as good as you try to be, but if there's no money, no food on the table, no clothes on your back. If you can't take care of yourself, then how can you have a child?”

Other individuals were particularly worried about the possible repercussions of parents manipulating the genetics of their children without any regulations. They explained their fears in the following excerpts:

If people could choose their future baby...some people might take it to their head and go over the extreme. And maybe the baby would come out weird or different just because they're trying to do all these experiments on their child, you know what I mean? (Samuel, 20 years old)

If people were altering traits, you don't want—I mean, I can see there being problems. Someone doing this illegally for personal gain or something. It's something you wouldn't want getting in the wrong hands. (Andrew, 21 years old)

I think the government should have their fingers in it because you can't just have mad scientists cooking up babies and stuff. I think there has to be some regulations to it. (John, 28 years old)

Furthermore, though many respondents felt that people should have the freedom of choice relating to reproductive decisions, four students did believe that parents should not have much control over these issues. John advocated governmental interference because he thought “the parents would do it for the wrong reason, because they feel men get more opportunities, or are better athletes, so to speak.”

Only one individual held a more extreme view that government regulations should be imposed not necessarily for the protection of the future child, but to help eradicate disease and health defects in the human race. Will (19 years old), who advocated strongly in favor of a disease-free world, believed that the government should take steps to obtaining that scenario. He advised that there should be a “statistical analysis that screens down for Down syndrome and other mental retardation—if it is a roughly 65 percentile chance for mental retardation, government involvement in the termination of the child should be considered.”

Role of the Media: Dissemination and Framing of Information

Most citizens do not have an extensive knowledge or expertise in genetic engineering and reproduction, and thus may rely on sources of popular media to supply them with information. Subsequently, the mass media can have an immense impact on the public's attitudes and the extent to which they understand the reproductive issues and technologies at the center of debate. Interview data revealed that the most common source of media through which respondents became familiar with or

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gained some insight into these topics was television. This finding is not particularly surprising, given companies' interest in advertising their products to potential customers through commercials, and given that the average American watches about 158 hours of television a month (Nielsen 2010). Nearly all (17 of 18) people mentioned certain television shows or commercials they had viewed that illustrated these concepts, including the news, movies, sitcoms, reality shows, and documentaries.

Other popular sources of information included the internet, newspapers, a college course, and friends or family members (these examples include those other than media). A high proportion (78%) listed the internet as a source, explaining that they have seen pop-up advertisements, conversations in blogs, articles, and videos online. About 60% mentioned that they heard of the topics through newspapers, including advertisements and articles about new technologies and stories of celebrities who are employing them. Half of the respondents recalled having heard of some of the concepts through an academic course in college, though they could not remember many specific details or notions that they learned. Seven individuals claimed that they heard about reproduction and/or genetic engineering topics through conversations with friends and family.

The respondents were also asked to evaluate the information they received through various sources of media to ascertain what general messages they were conveying. Nine students acknowledged that the media representations they experienced were mostly positive, portraying genetic engineering or reproductive technology as a beneficial advancement. As Mark claimed, "A lot of them kind of glorified the idea that we have the ability to do these kinds of things now." No one believed the messages were negative towards these topics, though Amanda admitted that though she has heard mostly positive messages, there have been "the horror stories in the news," but she does maintain that "those are few and far between." Four students stated that the messages they heard were biased towards either side, in general. Lana recognized that the "internet can be very subjective [because] you

go on and look for information that's on your side." Despite this, five respondents believed that the information they received was neutral and simply provided information and facts. Will actually proposed that the internet is good method for gaining insight into the issues and others' attitudes saying, "It is the best form of communication concerning controversial issues such as these, because people tend to be the most free in expressing their opinion."

Discussion and Conclusion

Many of the findings from this qualitative study mirror those uncovered in the existing literature concerning moral and ethical quandaries in "reprogenetics." A common theme that reappeared throughout the interviews is the notion that advances in genetic engineering and reproduction are detracting from the nature in conceiving children and in human life. Furthermore, there was a fear that gradually stripping procreation and humanity of its natural elements would also diminish the creativity and individuality in society. The literature touched upon the idea that many people who are considered creative geniuses may also have certain traits or disorders that would, in the disease-free world, be removed. One particular female in the study echoed this very similar fear about ultimately eradicating the creativity in artists and changing their core personality.

One particular study in the literature suggested that women were generally less supportive of utilizing the ARTs than men. Throughout these interviews, however, there was overwhelming support for the usage of ARTs by infertile couples, gay couples, and single women. All respondents shared these sentiments, regardless of gender or other demographics. This absolute support conveyed by all individuals is a surprising finding, though it may be the result of a more homogeneous sample of less conservative students who all attend a liberal arts college. Gender did seem to be a factor in the issue of conceiving a child knowing that there is a chance for a genetic disorder. Interestingly, more men (n=5) than women (n=2) claimed that they would conceive under these circumstances. This is perhaps

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because women, being the child bearers, are more aware and concerned with not only the impact of the disorder on the child, but also its impact on their own health and wellness throughout the pregnancy.

Another intriguing finding relating to gender was that of the two individuals who acknowledged the potential for the aggravation of social inequalities and racism as a disadvantage of genetic engineering, both were males. Furthermore, of the four respondents who asserted that they would choose the physical traits of their unborn child, three were females. These two findings point to the possibility that women are more concerned or tempted with the possibility of physical enhancement, while men are less preoccupied with it and more aware of its greater implications. This thought harks back to Bourdieu's concept of capital and the idea that women have often been forced to rely solely on physical capital, in contrast to men who, because of their gender, are open to more opportunities and forms of capital, such as economic and social. Perhaps the female respondents found the idea of physical enhancement more enticing because they have been influenced by societal constructs that teach them that aesthetics are painfully important.

The concerns brought up by the President's Council on Bioethics were also expressed or demonstrated to some extent by the respondents in the study. In order to make appropriate and responsible decisions, individuals must be well-informed and aware of the benefits as well as the potential adverse consequences. Furthermore, the Council's fear of a lack of "full and candid reporting" about the technologies and procedures is quite legitimate. After surveying the participants about their understanding of the technologies and terms involved, such as genetic engineering and in vitro fertilization, it became apparent that not many individuals in the sample retained any significant knowledge needed to make truly informed decisions. As mentioned earlier, though only three students could define and differentiate between in vitro fertilization and artificial insemination, the majority of the respondents (56 percent, n=10) asserted that they would seek out and employ the procedures if

they were unable of becoming pregnant after over a year. The thought that many citizens are making important and influential decisions concerning the human race and are not actually comprehending the issues involved, is a frightening possibility that could ultimately lead to unforeseen and harmful repercussions. This finding could, however, be a result of this particular sample of individuals who are relatively young (mean age being 24 years old) and have not yet encountered any need to employ these reproductive technologies. There exists the possibility that if and when the need for the ARTs arises, individuals will educate themselves and become knowledgeable enough to make prudent choices. Regardless, it is still imperative that, when the time approaches, accurate and candid information is accessible in order for citizens to make the important choices.

The powerful role that the mass media retains in disseminating information and framing the messages conveyed to the public about the medical advancements was also illustrated through the study. The study demonstrated that the most popular sources of information derived from television and the internet. Many students who discussed these two mediums discussed differing categories within each for which they heard of the topics of genetic engineering and reproduction. They ranged from scholarly sources and documentaries to more subjective sitcoms, reality shows, and blogs. Some respondents felt that the messages portrayed were positive towards the technologies, whereas others believed the messages they viewed to be negative or neutral. These findings--that the mediums through which the media can disseminate knowledge and ideas are vast, as well as the number of interpretations and perceptions the public may derive—are indicative of the powerful position the mass media quietly retains in swaying the public opinions concerning new controversies in society.

Another significant implication of the new advances in genetic engineering and reproduction is the potential for exacerbating the social inequalities that are already prevalent in society, for not all individuals will have access to such opportunities because of financial reasons and the division of

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classes. Though there are worries about the long-term and unknown consequences, this aggravation of social conflict and racism may be a more immediate repercussion if the advancements in genetic engineering continue to gain prominence and spark trends among the wealthy and fortunate in "designing" the human race. As mentioned earlier, only two respondents made mention of this social conflict as a disadvantage. Weber's theory of value-rational action as the motivation behind certain choices could provide one explanation for this finding. In his work, "Economy and Society," Weber asserts that:

Examples of pure value-rational orientation would be the actions of persons who, regardless of possible cost to themselves, act to put into practice their convictions of what seems to them to be required by duty, honor, the pursuit of beauty, a religious call, personal loyalty, or the importance of some "cause" no matter in what it consists. ([1925] 1978: 24-5)

Applying this theoretical framework, it could be suggested that only two individuals acknowledged the greater societal implications of genetic engineering because the majority were instead motivated by other personal ideals, pursuits of beauty, or cultural norms.

As with any exploratory analysis, there are limitations of this study. The nature and scope of the project only allowed for a convenience sample. Subsequently, a major limitation is the homogeneity of the sample. Unfortunately, because there was not enough time to gather a significantly larger sample and because there was not enough diversification in factors such as race and political party, limits were placed on the ability to test for and generalize certain correlates that may have influenced the respondents' perceptions and feelings. Additionally, the sample, consisting only of college students, represented a particular group who has theoretically been exposed to this topic through intellectual conversations in courses such as Sociology, Philosophy, and Nursing. Furthermore, because the purpose of the study was to focus on the students' moral and ethical standings, there is the chance that participants may have lied, restricted their responses, or hid behind ambiguity in order to avoid feeling judged or accused. Recognizing this as a limitation, however, it was emphasized at the beginning of each

interview that the purpose was to obtain the candid opinions and beliefs held by the individuals for the sake of knowledge rather than to evaluate and place judgment. With qualitative research and interviewing, a certain level of interpretation exists between the researcher and the participants. Such interpretation may also be a limitation, for according to Max Weber, all researchers have biases.

Future research should include a more extensive study of various populations' attitudes, ensuring better representations from numerous demographics in order to further illuminate what societal factors may impact respondents' attitudes and opinions. Also, a study concentrating on conception and abortion could provide further insight by providing various scenarios and seeking to understand under what exact circumstances or health disorders would an individual choose not to conceive or choose to abort. Further research focused on this aspect could help elucidate the uncertainty encountered in some participants' responses and the ambiguity of the line drawn between what is permissible and what is considered unacceptable.

Appendix A: Recruitment Flyer

Volunteers Needed!



WHAT: Volunteers are needed to participate in interviews for an Honors thesis study concerning people's *attitudes and opinions* towards reproductive choices and the role of technology.

WHEN: Meeting time will be worked around *your schedule*.

WHERE: An agreed upon *on-campus* location.

COMMITMENT: Interviews should take no longer than *approx. 30 min-1 hr.*



Participants will be compensated with a *Dunkin Donuts* gift card!!

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Appendix B: Interview Guide

Following each of the questions, prompts will be asked in order to elicit further clarification or elaboration of the respondent's answers.

Genetic Engineering and Eugenics

1. Have you heard the phrase "genetic engineering" before? How would you describe it?
2. Have you heard the term "eugenics" before? What comes to mind when you hear that term?
3. If you could test yourself for genetic diseases you may carry which might be transmitted to your future child, would you take the test?
4. If this test showed that you and your partner had a chance of conceiving a child with a genetic disease or health issue/defect, would you choose not to conceive children? What if it was certain? Do you think the government should prohibit you from conceiving? Are there any situations in which you feel it may be appropriate or acceptable to choose otherwise?
5. If you or your partner were already pregnant and knew there was a chance of your child being born with a genetic disease or health issue/defect, would you choose to abort the child? Should the government prohibit you from having the child? Are there any situations in which you feel it may be appropriate or acceptable to choose otherwise?
6. If given the chance, would you and your partner choose your future baby's sex, eye color, or any other physical trait? What advantages do you see in doing so? What disadvantages do you see? Do you think the government should regulate or prohibit any of these actions? Can you explain further?
7. Do you see any benefit in the ability to screen for genetic diseases or health issues/defects in unborn children? Can you tell me more? Do you believe the population/world could benefit from ensuring only the births of healthy and disease-free humans? In what way? If so, how do you think the government should determine which children are healthy enough to be born?
8. In general, how much of a role do you think the government and parents should play in controlling the traits and genes of their future children? Can you explain further?

Reproduction

1. Are you familiar with the procedure of in vitro fertilization? How about the procedure of artificial insemination? Are you familiar with surrogacy? How would you explain these procedures?
2. If you or your partner were unable to become pregnant after over a year of trying, would you try any of these methods in order to conceive?
3. Regardless of whether you would personally utilize any of the previous methods with your partner, should such procedures be regulated or prohibited by the government?
4. Do you think in vitro fertilization procedures should be covered by health insurance? How about artificial insemination, or surrogacy using these methods?
5. What advantages and potential benefits do you see in utilizing these reproductive technologies? What disadvantages or potential consequences do you see? Can you tell me more?

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6. Do you think that it is morally acceptable for infertile couples to utilize these reproductive technologies and methods to conceive? Do you see any issues with them doing so? Can you explain further?
7. Do you think that it is morally acceptable for single women to utilize these reproductive technologies and methods to conceive? Do you see any issues with them doing so? Can you explain further?
8. Do you think that it is morally acceptable for homosexual couples to utilize these reproductive technologies and methods to conceive? Do you see any issues with them doing so? Can you explain further?
9. In general, how much of a role do you think the government should play in regulating procreation, including who can procreate and in what ways? In what way?

Media

1. How have you become aware of any of these aspects of reproduction or genetic engineering discussed? Have you been exposed to any of these topics in the media? I am going to list various sources of media and I would like for you to tell me through which source(s) you've become aware of reproductive technology and engineering. Please elaborate:
 - a. Television: _____
 - b. Radio: _____
 - c. Newspapers: _____
 - d. Magazines: _____
 - e. Billboards: _____
 - f. Fliers: _____
 - g. Pamphlets: _____
 - h. Internet: _____
 - i. Academic course: _____
 - j. Other: _____
2. If you have heard of these topics from any media sources, what message(s) did you receive from each source?

Demographics

1. Sex: _____
2. Date of birth: _____
3. Race/Ethnicity: _____
4. Religion: _____
5. Political party affiliation: _____

Appendix C: Respondents' Demographics

Pseudonym	Sex	D.O.B.	Race/Ethnicity	Religion	Political Party
Marina	Female	2/9/82	Asian	Buddhist	Democrat
Carla	Female	1/4/82	Hispanic/Portuguese	None	Democrat
Maureen	Female	3/11/72	Caucasian	Baptist	Republican
Ian	Male	10/19/92	Caucasian	None	Moderate
Samuel	Male	10/22/91	African American	Baptist	None
Evan	Male	10/4/90	Caucasian	Christian	None
Andrew	Male	3/25/91	Caucasian	None	None
Diane	Female	2/9/75	Caucasian	None	Democrat
Brittany	Female	7/22/92	Caucasian	Catholic	None
Kim	Female	5/18/91	Caucasian	None	Democrat
Jess	Female	3/11/92	Caucasian	Jewish	Independent
Lana	Female	8/24/89	Asian	None	Independent
Will	Male	1/10/93	Caucasian	None	None
Jim	Male	4/3/86	Caucasian	Un-practicing Catholic	None
John	Male	5/24/83	Caucasian	Catholic	Independent
Amanda	Female	4/10/92	Caucasian	Christian	Republican
Eric	Male	5/19/90	Caucasian	None	Liberal
Mark	Male	9/29/89	Caucasian	Catholic	Independent

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