

Public Awareness and Attitudes about Reproductive Genetic Technology

**The Genetics and Public Policy Center
with
Princeton Survey Research Associates**

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A. Introduction

The American public favors the use of reproductive genetic technology¹ but makes very clear distinctions between uses considered appropriate and those deemed inappropriate. Uses that improve the health of individuals are favored by a large majority of the public. Uses to select or modify non-health-related characteristics such as sex or intelligence are rejected by an even larger majority.

Americans are troubled by the possibility that, once made available, reproductive genetic technologies might be used for these or other inappropriate purposes. They also worry about the moral issues surrounding use of the genetic technology, and a sizable segment of the public evaluates these new technologies in religious and moral terms.

The public wants the government to regulate these technologies. Some members of the public want existing regulations tightened, while others believe the government does not currently regulate reproductive genetic technology but that it should do so.

These are among the results of a new survey about reproductive genetic technology conducted by telephone during the period October 15 through October 29, 2002. The survey was conducted among a nationwide representative sample of 1,211 respondents, 18 years of age or older. Based on the total sample, one can say with 95 percent confidence that the error attributable to sampling and other random effects is plus or minus three percentage points. In addition to sampling error, question wording and the

practical difficulties of conducting surveys can also introduce error or bias into the findings.

B. Awareness and Knowledge about Reproductive Genetic Technology

Most people are aware of developments in genetic technology, but few are truly knowledgeable. About nine in ten have heard about reproductive cloning (91 percent, including 38 percent who have heard or read a great deal about it) and in vitro fertilization (90 percent, including 39 percent who have heard or read a great deal about it), and about eight in ten have heard about genetic testing (83 percent, including 26 percent who have heard or read a great deal about it) and genetic engineering (80 percent, including 23 percent who have heard or read a great deal about it). Far fewer people, only 24 percent, have heard about pre-implantation genetic diagnosis, or PGD, whereby eggs fertilized through the process of in vitro fertilization (IVF) are tested and only those embryos with certain genetic characteristics are implanted in the womb (Figure 1).

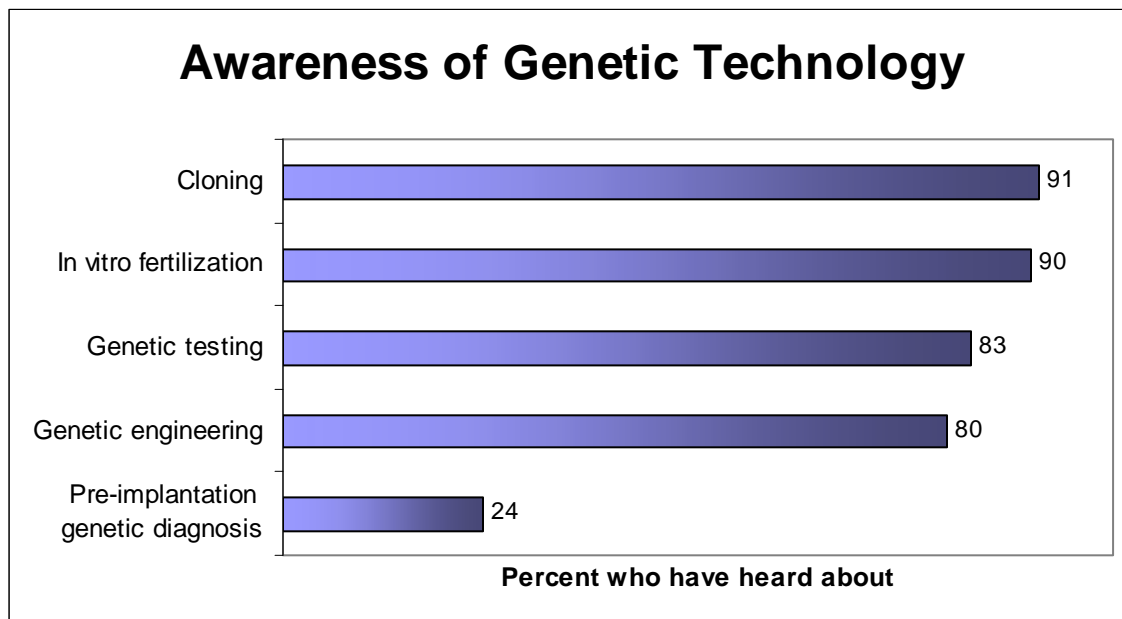


Figure 1

¹ For purposes of this report, reproductive genetic technologies include prenatal genetic testing, preimplantation genetic diagnosis, genetic modification, and reproductive cloning.

Awareness about genetic testing has increased over the past six years. In 1996, a survey conducted by the National Opinion Research Center found that only 16 percent of the public had heard or read a great deal about genetic testing, whereas now 26 percent say they have heard or read a great deal about it.

Knowledge of Genetic Testing

Most people know it is possible to use genetic testing to find out if a person has a greater than average chance of developing certain types of cancer (72 percent), and to use genetic testing during pregnancy to find out if the baby will develop a disease such as sickle cell disease or cystic fibrosis (70 percent). Somewhat fewer, but still a 52 percent majority, know it is not yet possible to use a genetic test during pregnancy to find out whether the baby will have high intelligence (Figure 2). Nineteen percent think a prenatal genetic test for IQ is available, while 29 percent are not sure.

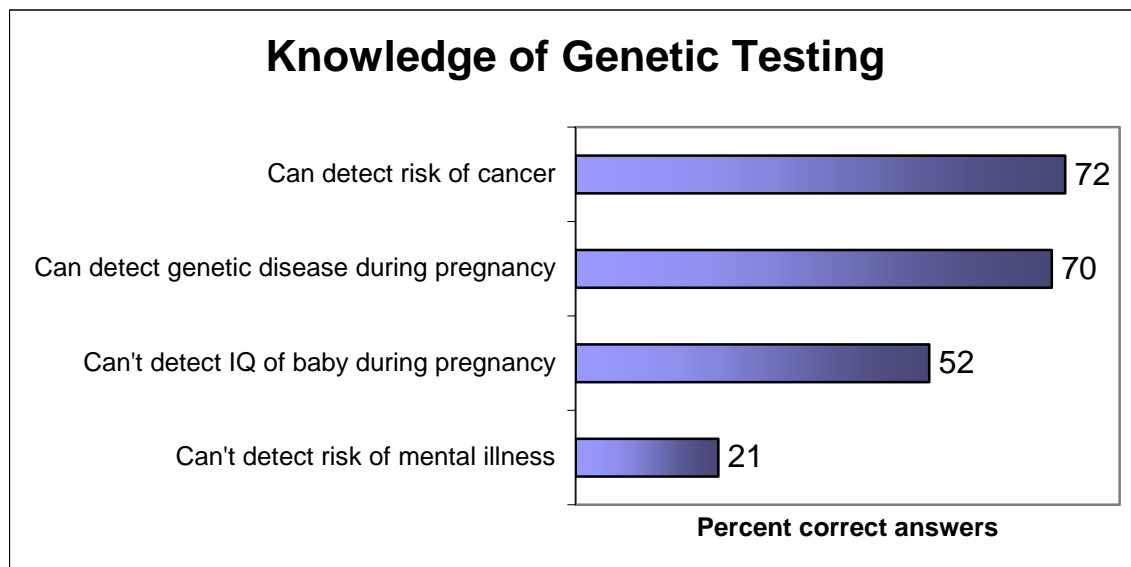


Figure 2

However, the majority of the public incorrectly believes that genetic testing can be used to determine whether a person has a greater than average chance of developing a mental illness such as depression (51 percent). Only 21 percent know it is not yet possible to apply genetic tests in this way (Figure 2).

The public underestimates the number of genetic tests that are available. Currently, there are 582 genetics tests available clinically to identify whether a person has or is likely to develop a certain disease or characteristic. However, about half the public (51 percent) thinks fewer than 200 tests are available and another 36 percent say they have no idea how many tests are available. Only 7 percent correctly puts the number between 200 and 1,000, while 6 percent think more than 1,000 tests are now available (Figure 3).

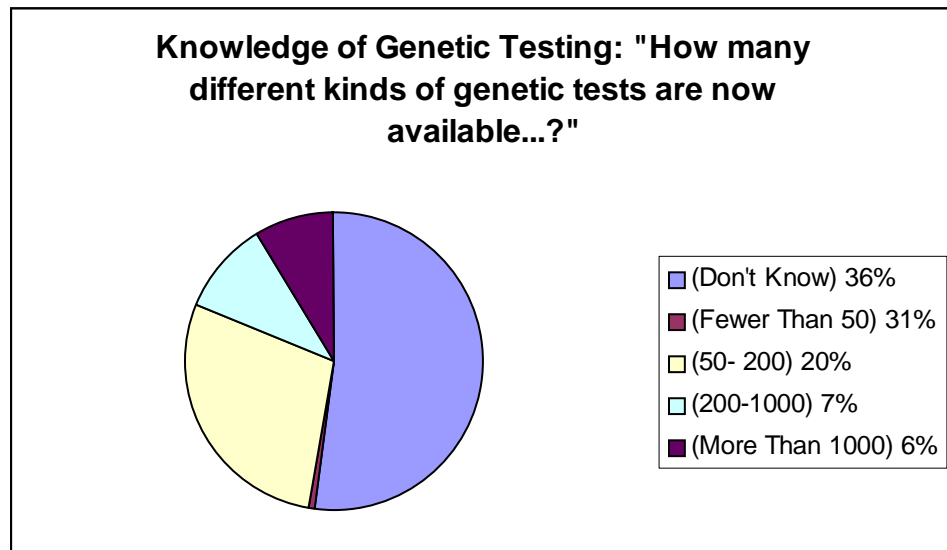


Figure 3

The public's knowledge about genetic testing seems to have remained steady over the past few years. In 2000 the University of Maryland's Survey Research Center conducted a survey that asked similar, though not identical, questions about the availability of tests for cancer, depression, sickle cell disease, and cystic fibrosis. The percentage of people giving the correct answer in the University of Maryland survey was within 2 to 5 points of the percentage giving the correct answer in the current survey.

Knowledge of Reproductive Cloning

Ninety percent of the public knows it is scientifically possible to create a clone, or genetic copy, of an animal such as a cow or sheep (Figure 4). About half (46 percent) also think it is possible to create a clone of a human, and about half of these people (22 percent of

the public as a whole) think a human clone has actually been created (Figure 5). While some scientists have announced their intentions to clone a human being, none have yet demonstrated success.

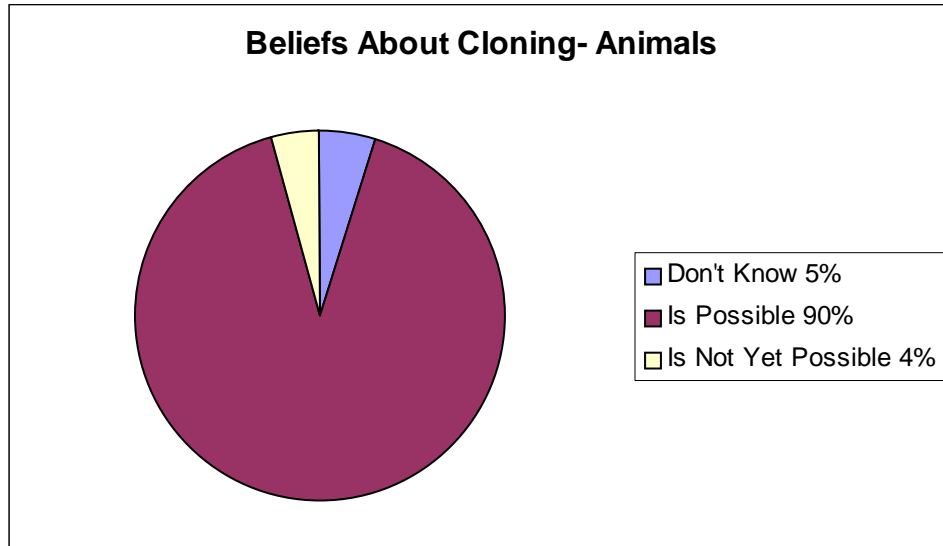


Figure 4

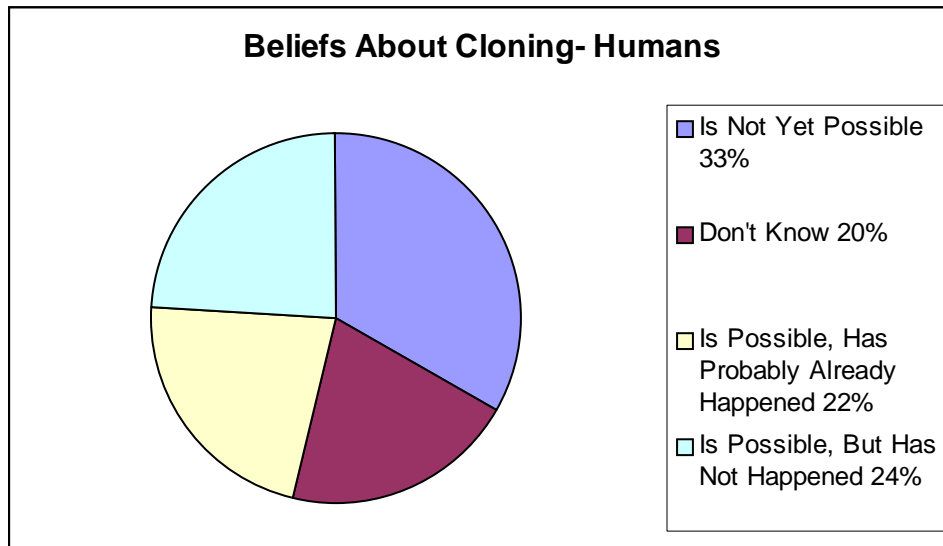


Figure 5

Knowledge of Genetic Engineering

The public's knowledge about genetic engineering is somewhat sketchier than its knowledge about genetic testing and reproductive cloning. Just half (52 percent) of those surveyed know it is not yet possible to change a baby's genetic make-up before it is born in order to make it smarter, stronger, or better looking. But only about a third (35 percent) are aware that techniques do not yet exist to change a baby's genetic make-up before it is born to prevent it from having a genetic disease (Figure 6). About a quarter (23 percent) of the public thinks it is possible to prevent a genetic disease using genetic engineering, and 16 percent think it is possible to use genetic engineering to ensure that a baby has other desirable characteristics.

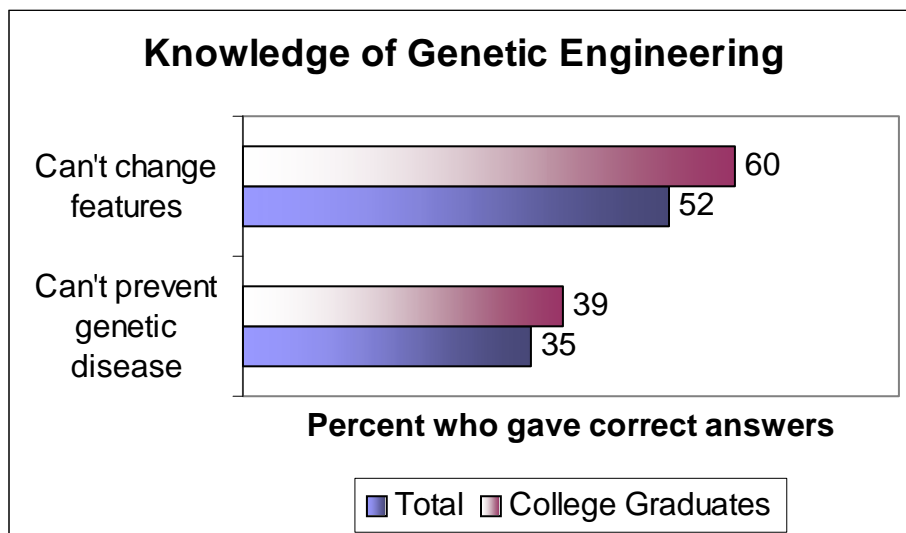


Figure 6

Knowledge Demographics

Young women and college graduates are the most knowledgeable about reproductive genetics. Twenty-eight percent of women age 18 to 29 answered at least six of the eight knowledge questions correctly, compared with 18 percent for women age 30 and older and 17 percent for men overall.² Thirty percent of college graduates also receive top

² Age differences in knowledge among men are not statistically significant.

scores on knowledge about genetic technology, compared with just 15 percent of those who did not go to college or did not graduate.

Similarly, college graduates are most likely to have heard or read a great deal about IVF, reproductive cloning, genetic testing and genetic engineering, and to have heard of PGD technology. Women are more likely than men to be aware of IVF and genetic testing, while men are more likely than women to have heard or read a great deal about reproductive cloning and genetic engineering.

There are no statistically significant differences among whites, blacks and Hispanics in knowledge about these topics, and few significant differences in awareness. Hispanics are more likely than whites or blacks to say they have heard or read a great deal about reproductive cloning (46 percent, compared with 38 percent for whites and 32 percent for blacks). Whites are more likely than blacks to say they have heard or read a great deal about genetic engineering (25 percent for whites and 15 percent for blacks). Twenty-two percent of Hispanics also say they have heard or read a great deal about genetic engineering, a number that is statistically equivalent to both the white and black percentages.

C. Acceptance of Genetic Technology

Most Americans approve of the use of genetic technology for health-related purposes, but they reject using it for sex selection or to enhance desirable traits such as strength, intelligence, and attractiveness. And, the public disapproves of research on both animal and human reproductive cloning (Table 1).

Very few people view these technologies as either all bad or all good. Only 5 percent of the public does not approve of ANY of the 12 uses of genetic technology investigated in this study, and even fewer, just 2 percent, approve of all of them.

Table 1: Approval of Different Applications of Genetic Technology

	<u>Approve</u>	<u>Disapprove</u>
PGD to avoid serious genetic disease	74 %	22 %
In vitro fertilization	72 %	20 %
PGD to ensure child is a good tissue/blood match	69 %	25 %
Prenatal Testing for disease	66 %	27 %
PGD to avoid a tendency to diseases like cancer	60 %	33 %
Genetic engineering to avoid disease	59 %	34 %
Animal Cloning	37 %	55 %
PGD to choose child's sex	28 %	68 %
PGD to ensure child has desirable characteristics	22 %	72 %
Genetic engineering to create desirable traits	20 %	76 %
Prenatal Testing for desirable traits	20 %	74 %
Human Cloning	18 %	76 %
Number of cases = 1,211		

Exposure to information about genetic technology does not have a consistent effect on attitudes. In a few cases, people who had heard or read a lot about a technology were slightly more likely than others to approve of the use of the technology (IVF, genetic engineering, reproductive cloning). However, in a few other cases involving the use of PGD technology, people who had heard of the technology before the interview were slightly less likely than others to approve of its use in specific cases. There was no relationship between awareness and attitudes for five of the genetic technology uses investigated.

Opponents of the use of genetic technology hold their attitudes much more strongly than proponents do. Just over half (54 percent) of those who receive low scores for their support of genetic technology (approving of three or fewer of the twelve uses investigated) say they feel very strongly about issues related to genetic technology. In sharp contrast, only 26 percent of those who are highly supportive of genetic technology (approve of 9 to 12 uses), and 32 percent of those who are mixed in their support (approve of 4 to 8 uses), say they feel very strongly about the issues.

Attitudes Towards Health-related Applications

A majority of those surveyed approves of using genetic technology to prevent genetic diseases, including 74 percent who approve of PGD to select embryos for implantation

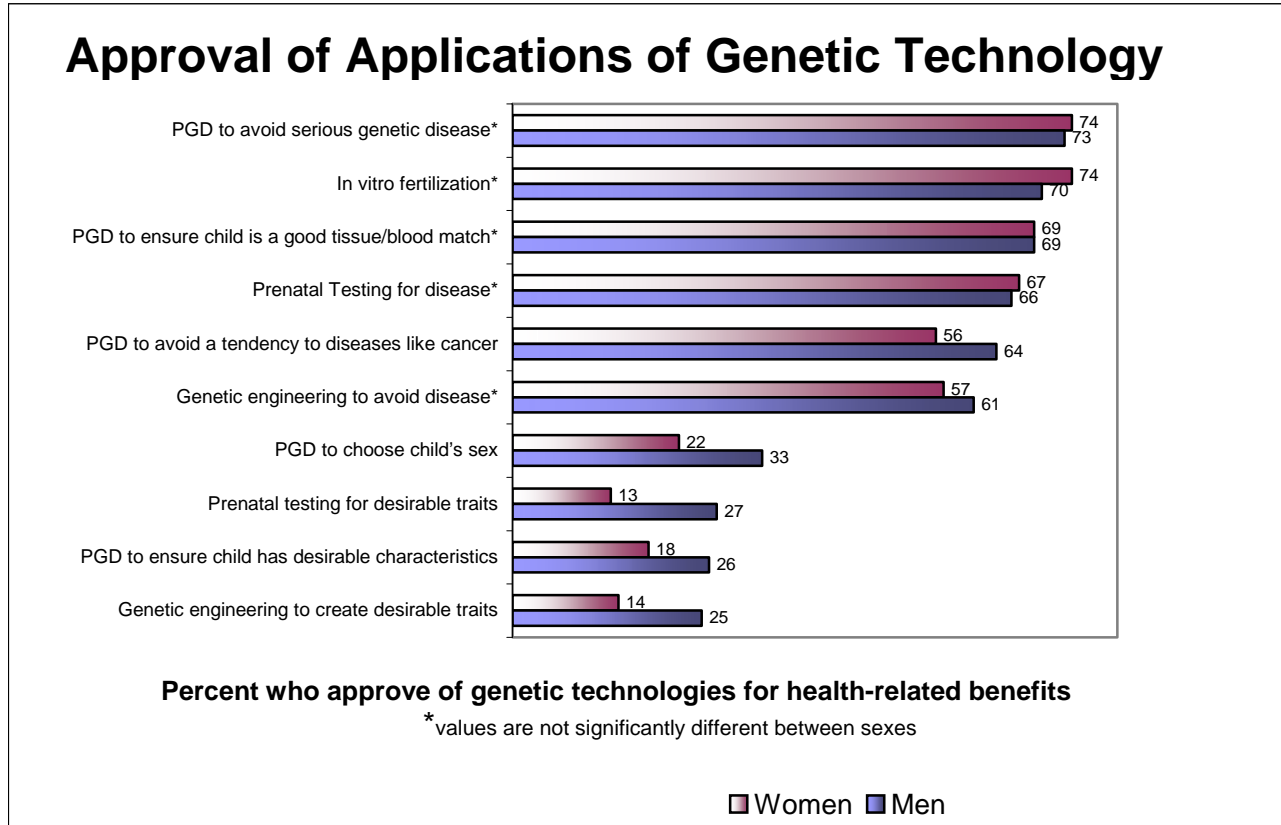


Figure 7

that do not have a serious genetic disease, 66 percent who approve of pre-natal genetic testing to find out whether the baby will develop a serious genetic disease, 60 percent who approve of PGD to select embryos that do not indicate a tendency for developing certain types of cancer, and 59 percent who would approve of genetic engineering to prevent a parent from passing on a genetic disease to his or her children (Table 1, Figure 7).

A large majority (72 percent) also favors the use of IVF to help people have children. And 69 percent approve of using PGD to select embryos for implantation that would

result in a child who would be a good match to donate blood or tissue to a sibling who is sick and needs a transplant (Table 1, Figure 7).

But many people, from a fifth to a third of the public, reject even these health-related uses of genetic technology. Disapproval of these uses of genetic technology is more commonly found among older people and among Evangelical Christians. However, even within these sub-groups of the population, a majority approves of each of the six health-related uses of reproductive genetic technology.³

Attitudes Towards Non Health-Related Uses

The public clearly rejects using genetic technology for non-health-related purposes. Just 28 percent approve of using PGD to select only embryos of a certain sex for implantation and only 22 percent would approve of using PGD to implant embryos that would result in a child with desirable characteristics such as strength or high intelligence. Only 20 percent approve of using prenatal genetic testing to find out whether a baby will have such desirable characteristics, and the same number, 20 percent, would approve of using genetic engineering so parents could alter their own genes to ensure their children will be smart, strong or attractive (Table 1, Figure 7).

Men are more likely than women to approve of non-health-related uses of reproductive genetic technology (Figure 7). Young people age 18 to 29 of both sexes, blacks, and Hispanics are all more likely than their counterparts to approve of non-health-related uses of genetic technology.⁴ However, even among these demographic sub-groups of the population, a majority remains opposed to these uses. There are no statistically significant differences in approval of these four technologies by religious identification.

³ There are statistically significant differences in approval by age for all six health-related technologies. However, the key distinction is between those over and under the age of 30 for three technologies, while the key distinction is between those over and under age 50 for the other three health-related technologies. There are statistically significant differences in approval by religious identification for only four of the six health-related technologies.

⁴ Age differences in approval are significant for three of the four non-health-related technologies. Racial differences in approval are also significant in three out of four instances.

Attitudes Towards Reproductive Cloning

Most people disapprove of animal and human reproductive cloning. Only 37 percent say they approve of scientists working on animal cloning, and about half as many, 18 percent, say they approve of scientists working on ways to clone humans.⁵ Men are much more likely than woman to approve of animal and human reproductive cloning (Figure 8).

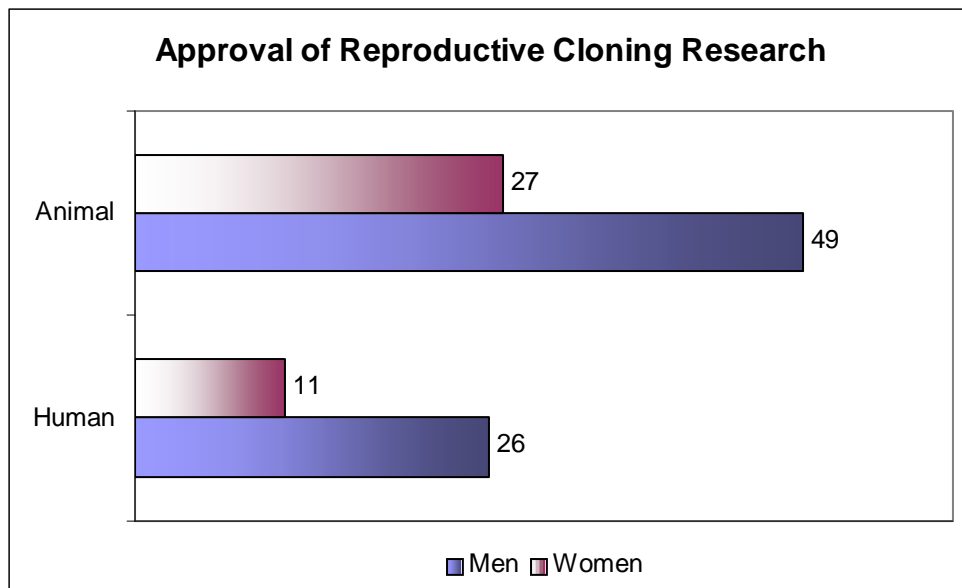


Figure 8

Attitude Demographics

Evangelical Christians are less supportive of genetic technology than are people who identify with another religion, or who do not have a religious affiliation. We considered people to be highly supportive of genetic technology if they approved of at least nine of the twelve uses investigated in the survey. Using this measure, only 13 percent of Evangelical Christians are highly supportive of the use of genetic technology, compared

⁵ The questions used to measure attitudes toward cloning did not mention any possible benefits to individuals or society before asking respondents to express approval or disapproval. In measuring attitudes toward all of the other genetic technologies, a specific benefit was either explicitly mentioned in the question or was implied by the content of previous questions.

with 20 percent of those who report a different religious affiliation and 27 percent of those who report no religious affiliation.

Young people age 18 to 29 are more favorable toward the use of these technologies than people age 30 and older. Twenty-seven percent of young adults, but only 16 percent of people age 30 and older, are highly supportive of genetic technology (Figure 9). At every age, men are more accepting of these technologies than women (25 percent of men overall, but only 12 percent of women, are highly supportive of genetic technology).⁶

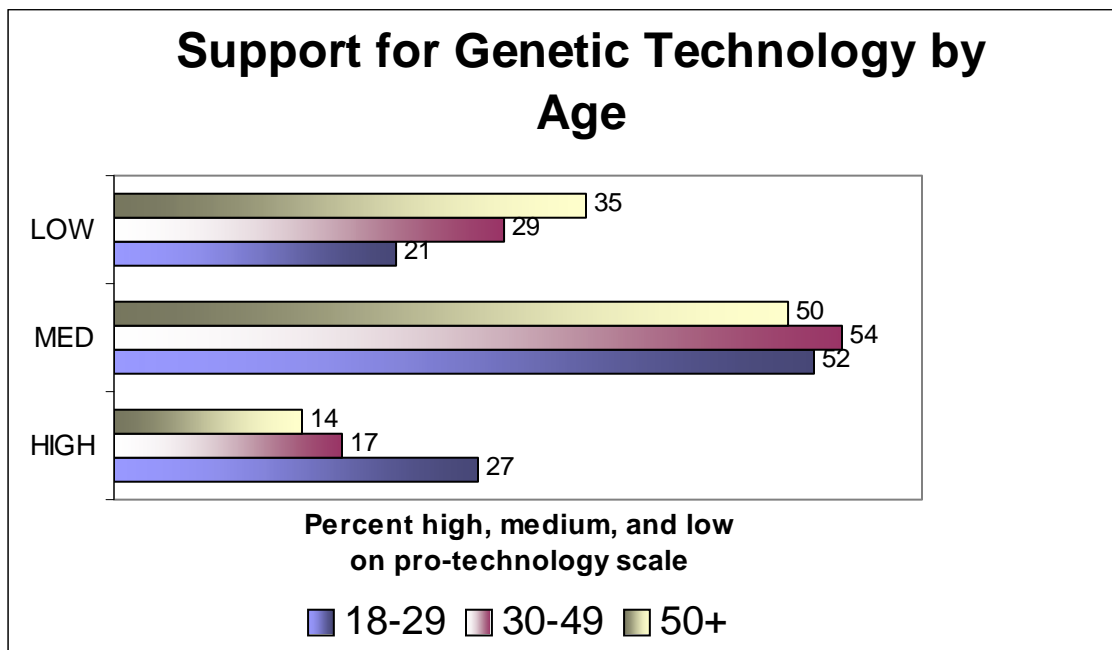


Figure 9

There are no statistically significant differences by race or ethnicity in overall support of the use of genetic technology. Twenty-five percent of Hispanics, 22 percent of blacks, and 16 percent of whites all score as highly supportive of genetic technology.

⁶ The gender differences in approval of genetic technology are apparent at every age. Among those age 18 to 29, 34 percent of men, but only 20 percent of women are scored as highly supportive of genetic technology. Among those age 30 to 49, 23 percent of men and 12 percent of women are considered to be highly supportive. Among those age 50 and older, 22 percent of men, but only 7 percent of women, are scored as highly supportive. Part of the gender difference in approval among people 50 and older may reflect the fact that older women are more likely than older men to be Evangelical Christian. However, differences in religious identification cannot account for gender differences among people under the age of 50.

Attitude Trends

Attitudes toward many of these uses of genetic technology are being assessed for the first time in this survey. However, a few have been investigated in other surveys conducted over the past ten years, and the trends have been relatively stable. Princeton Survey Research Associates (PSRA) asked about approval of genetic engineering in a 1994 survey conducted for Family Circle magazine. As in the current survey, a majority approved of using genetic engineering so a parent could prevent a child from inheriting a genetic disease (55 percent in 1994 and 59 percent now), but an even larger majority disapproved of using it to ensure that a child would have desirable characteristics such as strength or high intelligence (85 percent in 1994 and 76 percent now). Approval of research on animal cloning, at 37 percent now, is unchanged from the level recorded in a 1997 survey by ABC News (39 percent), and only slightly higher than the 30 percent approval measured by PSRA in 1991 (Figure 10).

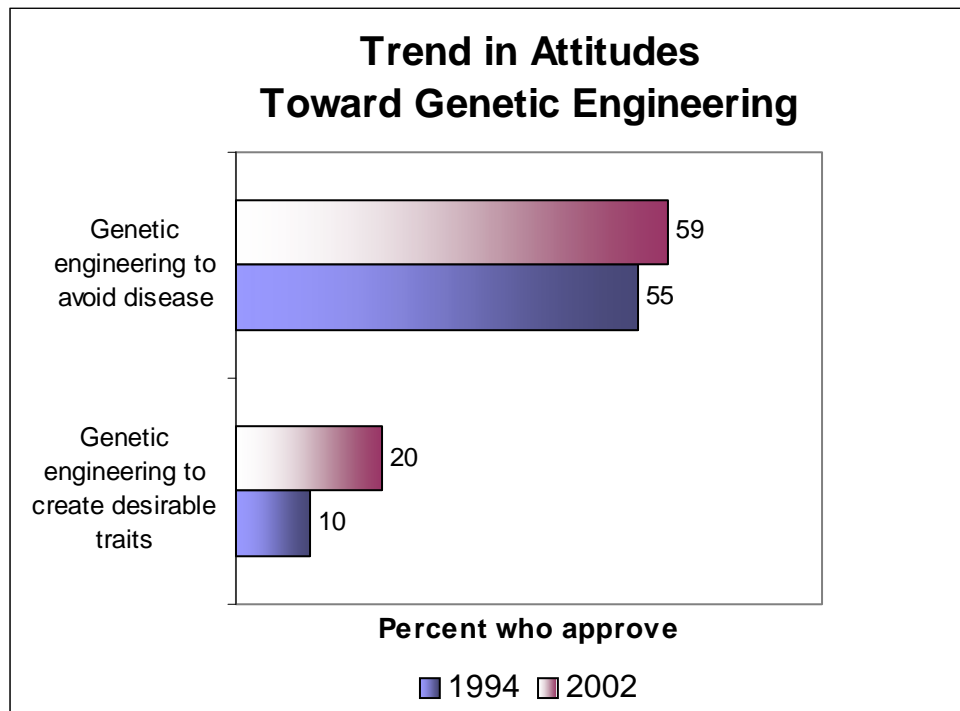


Figure 10

Perspective Matters

The perspective one brings to thinking about these issues shapes views about the acceptability of genetic technology. We asked respondents in this study to classify themselves into one of two groups, depending on how they think about the issues surrounding the use of genetic technology. Fifty-four percent of those surveyed, which represents a slight majority, say they think about these issues mainly in terms of their implications for health and safety. A smaller group, representing a third of the population (33 percent), says they think about these issues mainly in terms of religion and morality. The remaining 13 percent could not classify themselves into one of these two groups (Figure 11).

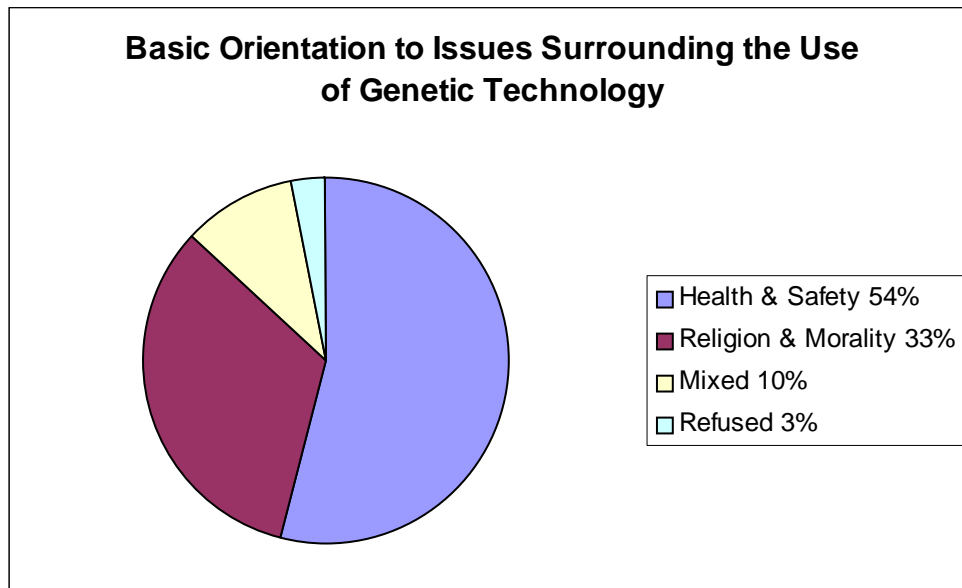


Figure 11

Evangelical Christians are more likely than those with a different religious affiliation or no religious affiliation to identify with the religion and morality orientation (48 percent, 28 percent and 12 percent, respectively). However, many Evangelical Christians classify themselves into the health and safety group (38 percent, compared with 59 percent for

those with another religious affiliation and 80 percent for those with no religious affiliation).

Political identification also shapes how people classify their orientation to issues of genetic technology. Republicans are divided between the two orientations, while Democrats and Independents clearly favor the health and safety orientation. Among Republicans, 41 percent think about genetic technology in terms of religion and morality, compared with 31 percent for Democrats and 29 percent for Independents. Forty-five percent of Republicans think about genetic technology in terms of health and safety issues, compared with 57 percent of Democrats and 58 percent of Independents.

People who think about genetic technology in terms of its religious or moral implications are much more likely to say they feel very strongly about these issues than those in the group oriented to health and safety (49 percent, compared with 30 percent). Members of both are equally likely to say they had already given a lot of thought to the issues surrounding the use of genetic technology before the interviewer called to conduct the survey (14 percent for those in the health and safety group and 16 percent for those in the religion and morality group).

People who say they think about these issues mostly in the context of health and safety are more favorable toward the use of genetic technology than people who mainly think about them in a religious or moral context. Those with a health and safety perspective are more than four times as likely as those with a religion or moral perspective to be highly supportive of the use of genetic technology (26 percent of those whose basic orientation is to health and safety considerations and 8 percent of those whose basic orientation is to religious and moral considerations approve of at least nine of the twelve uses investigated).

Most of the people in the group with a religious or moral orientation say the thing that worries them about genetic technology is that it is too much like playing God (58 percent chose this concern from among four possibilities offered, while only 20 percent of those

Table 2: Concerns about Genetic Technology by Basic Orientation to Issues			
	<u>Total</u>	<u>Health / Safety</u>	<u>Religious / Moral</u>
The technologies can easily be used for the wrong purposes	35 %	45 %	23 %
Using these technologies is too much like playing God	34 %	20 %	58 %
The technologies are too new to be used safely	7 %	11 %	3 %
Most people will not be able to afford these technologies	7 %	10 %	4 %
None of these are concerns	6 %	7 %	3 %
Depends	7 %	5 %	6 %
Don't know	2 %	2 %	2 %
Number of cases	1,211	652	399

with a health and safety orientation expressed this same concern). People with a health and safety orientation worry more about the technologies being used for the wrong purposes (45 percent chose this concern, as did 23 percent in the group oriented to religious or moral concerns) (Table 2, Figure 12).

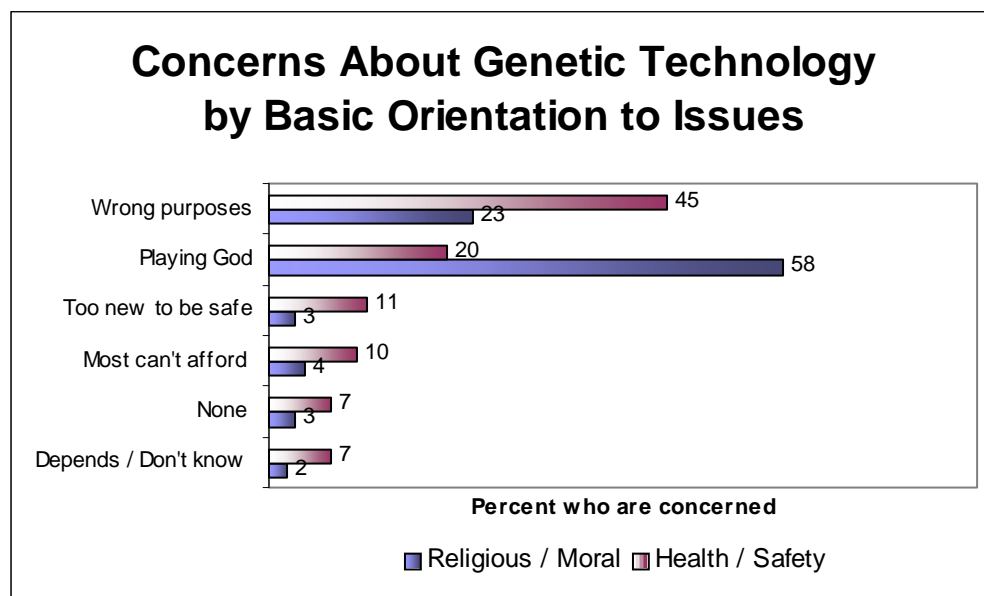


Figure 12

The health and safety group also worries that the technologies are too new to be used safely (11 percent) and that most people will not be able to afford them (10 percent). Very few people in the group with a religious orientation worry about either of these potential problems with genetic technology (7 percent for the two concerns combined).

People with a health and safety orientation are attracted to these technologies by the possibility that certain genetic diseases can be wiped out forever (44 percent) and that individual parents can improve the chances that their baby will be healthy (32 percent). People with a religious orientation also see the value of these potential benefits, but to a lesser degree, with 36 percent and 22 percent, respectively saying that these are the greatest benefit of genetic technology (Table 3, Figure 13). However, 20 percent of those with a religious orientation say they do not see ANY potential benefit of using genetic technology from among four possible benefits investigated. Only 6 percent of people with a health and safety orientation are similarly pessimistic about the value of genetic technology.

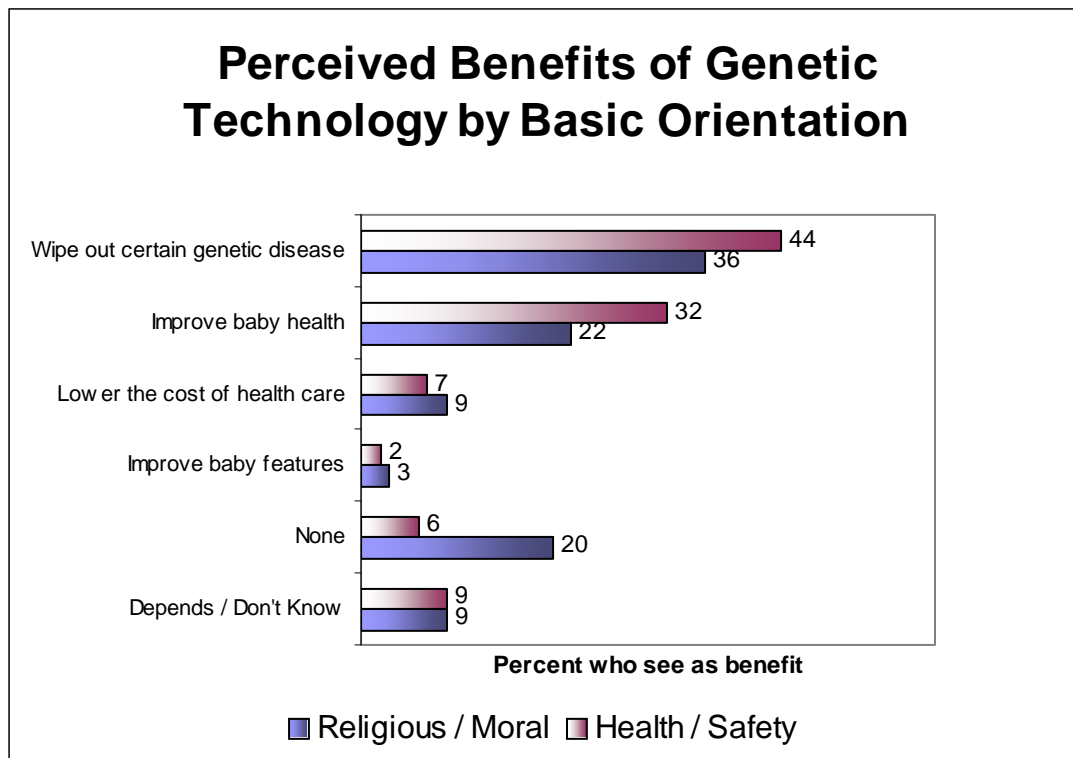


Figure 13

	<u>Total</u>	<u>Health / Safety</u>	<u>Religious / Moral</u>
Certain genetic diseases can be wiped out forever	41 percent	44 percent	36 percent
Parents can improve their chances that their baby will be healthy	27	32	22
The overall cost of health care in America will be less	8	7	9
Parents can improve their chances that their baby will have the features they want	2	2	3
Don't think any of these are benefits	12	6	20
Depends	5	5	4
Don't know / Refused	5	4	5
Number of cases	1,211	652	399

D. Experience with Genetic Technology

Many Americans already have personal knowledge about some of the genetic technologies investigated in the survey. Twenty-seven percent say they or an immediate family member has a genetic disease. Sixteen percent say they or an immediate family member has had a genetic test, and 13 percent of women say they had a prenatal genetic test during their pregnancy. Twenty-nine percent say they, or someone they know well, has tried to become pregnant using IVF.

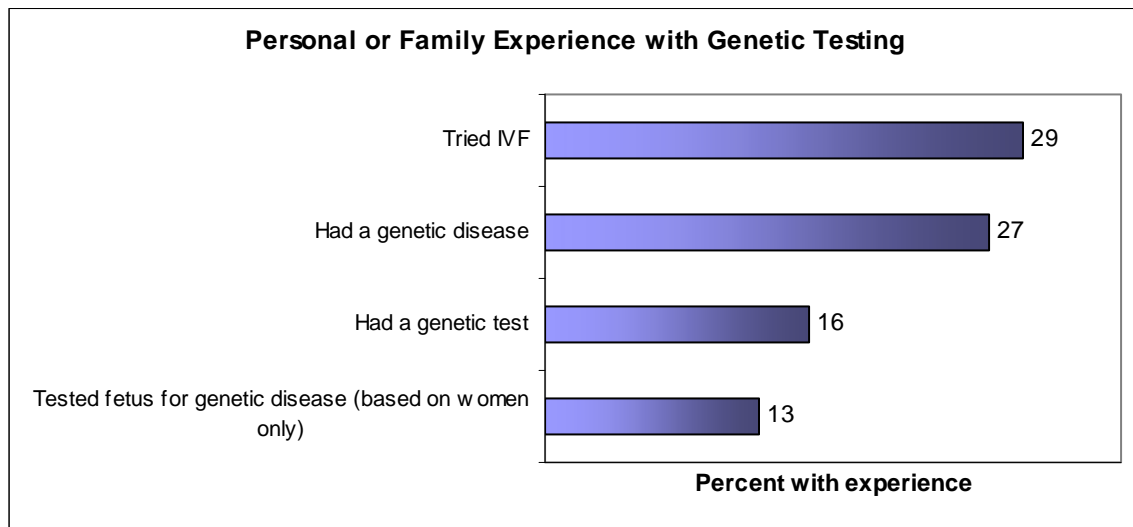


Figure 14

Having this kind of personal knowledge does not increase one's knowledge about the current capabilities of genetic testing and genetic engineering. Nor does having personal knowledge of genetic technology bear a consistent relationship to attitudes about the use of genetic technology.

Women who have actually had a prenatal test themselves while pregnant are more likely than other women to know that prenatal tests exist for diseases like sickle cell anemia and cystic fibrosis. Eighty-seven percent of women who have had a prenatal test answered this question correctly, compared with 73 percent for other women. There were no other statistically significant differences in knowledge about genetic technology by experience with genetic technology.

Women who have had a prenatal test are much more favorable toward the use of prenatal testing to find out if the baby will develop a serious genetic disease (84 percent approve, compared with 64 percent approve among other women). People who either have themselves used IVF, or who know someone who has, are much more likely than others to approve of the use of IVF (90 percent vs. 64 percent). But, experience with IVF is not consistently related to attitudes about the use of PGD. And, people who have experience with genetic tests and genetic diseases in their families have the same attitudes about the use of genetic technologies as others who have not had this experience.

People who regret not having children themselves are no more favorable toward the use of IVF than people who have had children, or than those who did not have children but do not regret it. Fifty-seven percent of those who regret not having children, 71 percent of those with children, and 68 percent of those who did not want to have children approve of the use of IVF. IVF is most accepted by people, mostly young adults, who are childless, but plan to have children in the future (80 percent approve).

E. Privacy

A potential concern regarding genetic testing, whether in the reproductive context or not, is that the results of genetic tests might be used to discriminate against individuals in the insurance or employment markets. Most people think employers and insurance companies should not have access to information that someone has a gene that increases the risk of disease (85 percent and 68 percent, respectively) (Figure 15). In contrast, most think spouses or partners and, to a lesser extent, other members of the immediate family do have the right to know the results of genetic tests. A two-thirds majority (68 percent) thinks a husband, wife or partner should be allowed to know that a person has a gene that increases the risk of disease. A much smaller majority, just 53 percent, thinks other immediate family members have the right to this information.

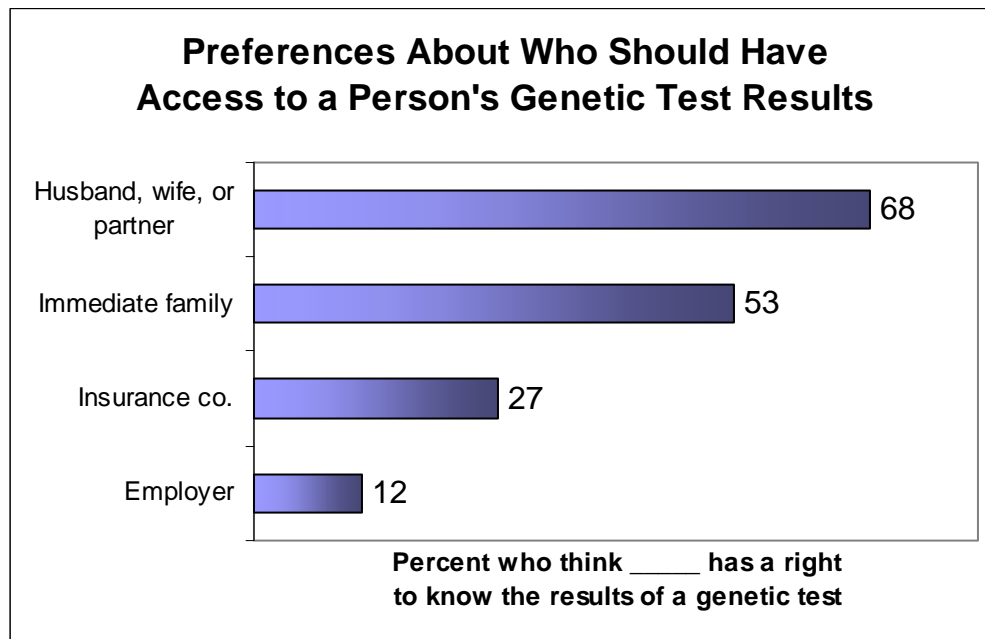


Figure 15

College graduates, people who have heard or read a great deal about genetic technology, people who had thought a lot about these topics before the interview, and people who receive high scores for their knowledge about genetic technology, are less inclined than others to want the results of genetic tests made available, even to spouses and family members (Table 4).

Table 4: Preferences about Who Should Have Access to a Person’s Genetic Test Results by Awareness, Knowledge and Education

		<u>Employer</u>	<u>Insurance co.</u>	<u>Husband, wife, or partner</u>	<u>Immediate family</u>	<u>Number of cases</u>
Awareness	Total	12 %	27 %	68 %	53 %	1,211
	Heard a great deal	8 %	20 %	60 %	46 %	348
	Heard little or nothing	13 %	29 %	72 %	56 %	863
	Thought a lot	11 %	22 %	56 %	44 %	196
	Thought some or little	10 %	25 %	69 %	52 %	886
	No previous thought	22 %	40 %	80 %	73 %	124
Knowledge	High	5 %	20 %	56 %	41 %	244
	Medium	12 %	27 %	70 %	55 %	518
	Low	14 %	30 %	72 %	58 %	449
Education	College Graduate	5 %	13 %	51 %	38 %	424
	Some College	7 %	18 %	63 %	48 %	326
	No College	18 %	39 %	65 %	81 %	457

F. Support for Regulation

Large majorities believe the quality and safety of genetic testing (75 percent), genetic engineering (71 percent), IVF (65 percent), and PGD (62 percent) should be regulated by the government. An even larger majority, 84 percent, believes the government should have regulations to limit human reproductive cloning.

Public support for government regulation cuts across partisan lines. Close to half of Republicans (47 percent), Democrats (42 percent), and Independents (45 percent) alike say they think the government should regulate *all five* of the genetic technologies investigated in this study. There are no statistically significant differences by party identification in support for government regulation for any of the individual technologies.

Similarly, people who base their thinking about genetic technology on a health and safety orientation are equally in favor of government regulation as people who think about genetic technology from a religious or moral perspective. Forty-four percent of those

with a health and safety orientation, and 46 percent of those with a religious or moral orientation, say they think the government should regulate all five genetic technologies. The only statistically significant difference between these two groups is in support for government regulation of human reproductive cloning. Large majorities in both groups favor government limits on human reproductive cloning, but there is somewhat more support among those with a religious or moral orientation (89 percent) than there is among those with a health and safety orientation (82 percent).

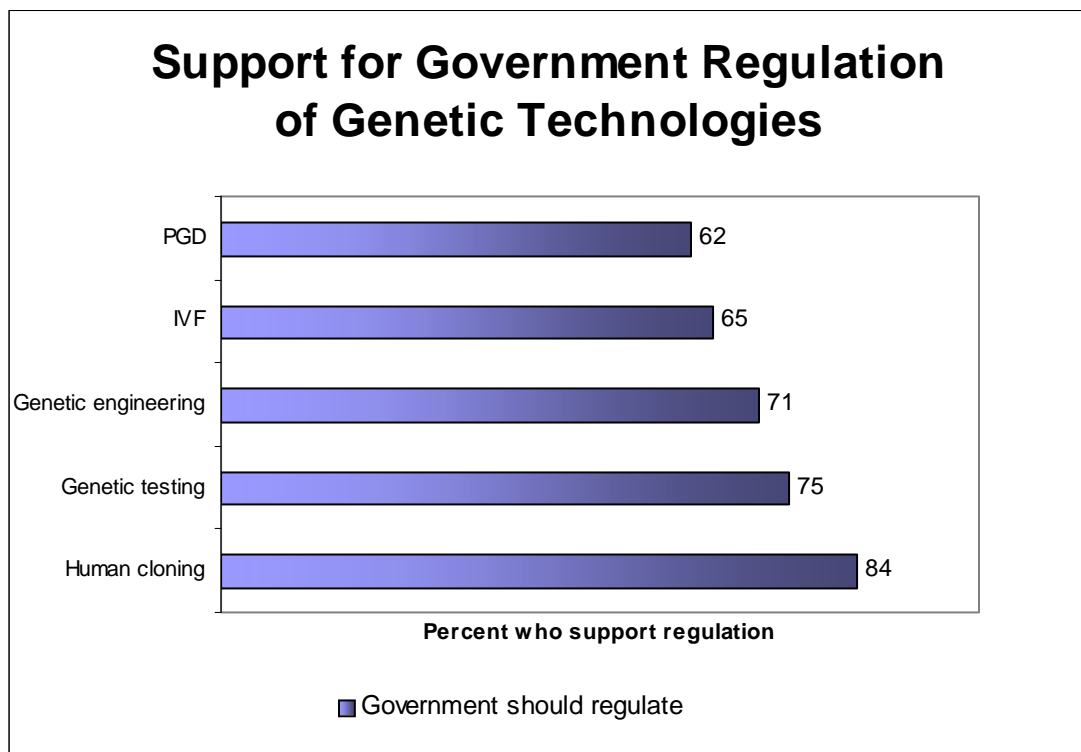


Figure 16

Many people think the government already does have regulations to cover the use of genetic technologies, although large numbers are also unsure whether such regulations exist (Table 5).

Table 5: Perceptions about Government Regulation of Different Genetic Technologies

	<u>Government does regulate</u>	<u>Government does not regulate</u>	<u>Not sure about regulations</u>	<u>Number of cases</u>
Human cloning	53 percent	25	23	1,211
Genetic testing	40 percent	30	30	1,211
Genetic engineering	30 percent	34	36	1,211
In vitro fertilization	26 percent	30	45	1,211
Pre-implantation genetic diagnosis	4 percent	8	87	1,211

Some of those who think the government already regulates genetic technologies would like to see those regulations made stricter.