Introduction

The American public favors the use of reproductive genetic technology[1] 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.

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

GENETICS AND PUBLIC POLICY CENTER MISSION

The Genetics and Public Policy Center is an independent and objective source of information and analysis on genetic technologies and policies. The Center is a part of the Berman Bioethics Institute at Johns Hopkins University and is funded through a grant from The Pew Charitable Trusts. Its first initiative is reproductive genetics. The Center advocates neither for, nor against, reproductive genetic technologies or policies affecting their development and use, but instead is committed to providing objective information and analysis and facilitating dialogue so that all can make their own informed decisions on these issues.

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)**.

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.

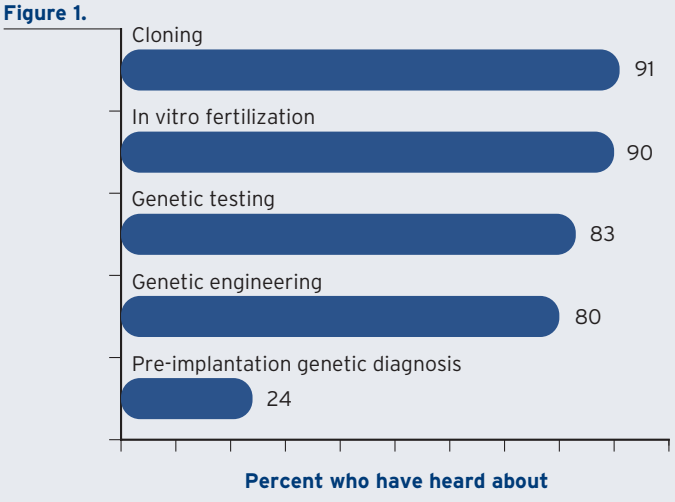
Knowledge of Genetic Testing

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.

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)**.

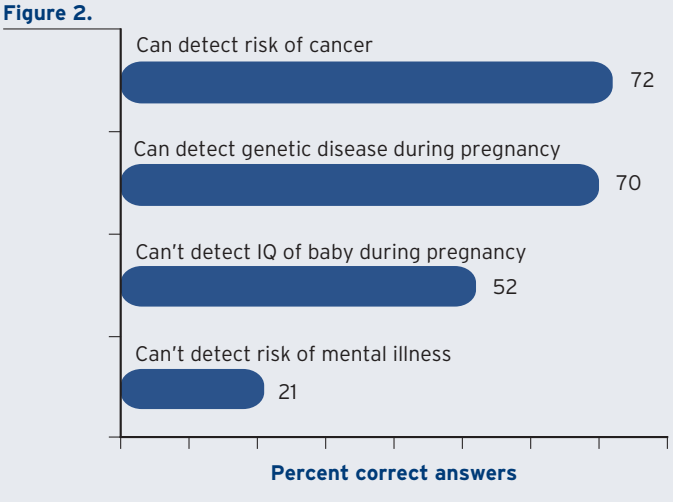
Awareness of Genetic Technology

Figure 1.



Knowledge of Genetic Testing

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)**.

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

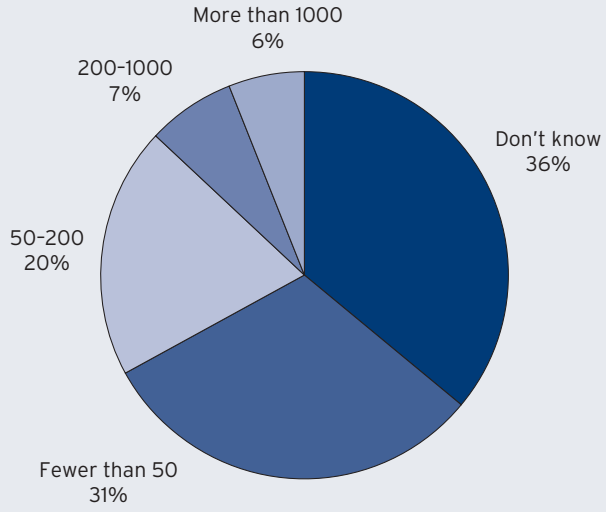
Ninety percent of the public knows it is scientifically possible to create a clone, or genetic copy, of an animal such as a cow or sheep **(FIGURE 4)**. About half (46 percent) also think it is possible to create a clone of a human, and about half of these people (22 percent of the public as a whole)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

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

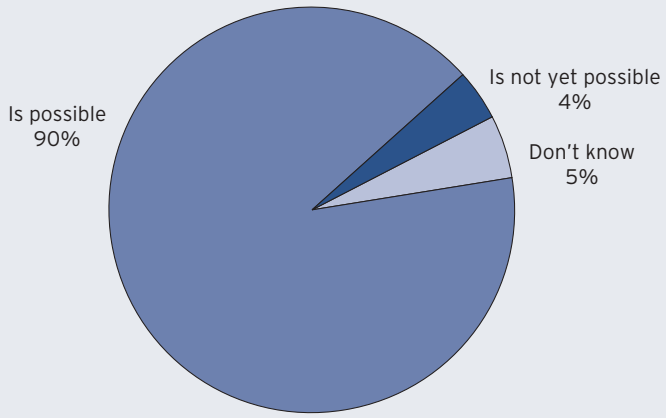
Knowledge of Genetic Testing:
"How many different kinds of genetic tests are now available...?"

Figure 3.



Beliefs About Cloning-Animals

Figure 4.



genetic engineering, and 16 percent think it is possible to use genetic engineering to ensure that a baby has other desirable characteristics.

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 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.

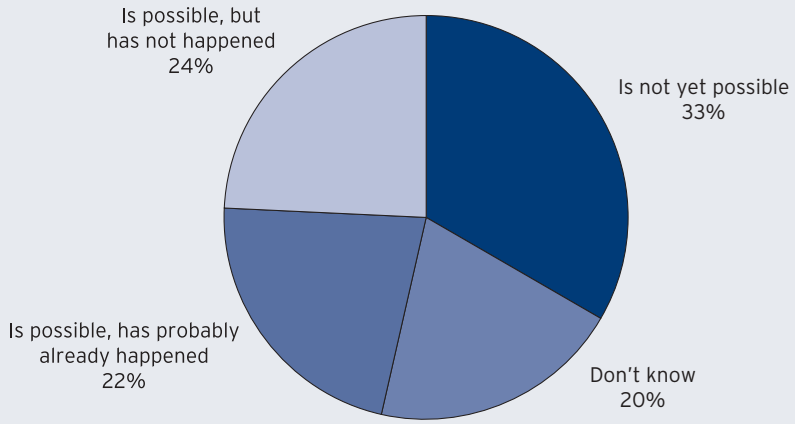
Acceptance of Genetic Technology

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)**.

2 Age differences in knowledge among men are not statistically significant

Beliefs About Cloning-Humans

Figure 5.



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.

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.

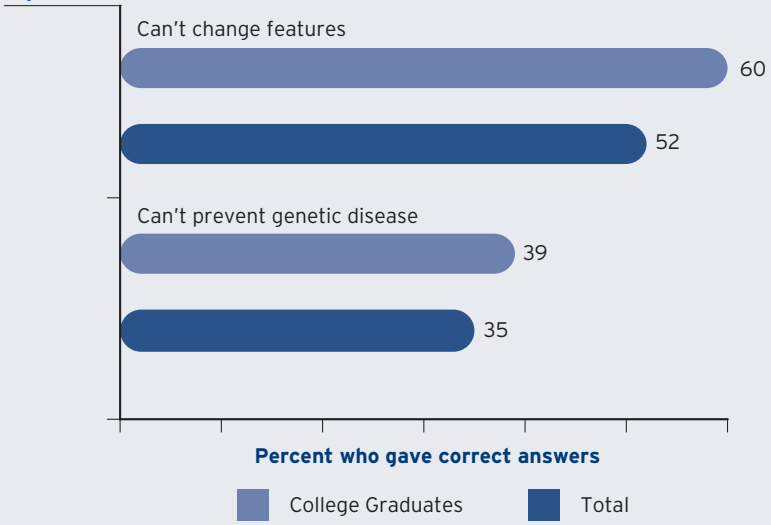
Opponents of the use of genetic technology hold their attitudes much more strongly than proponents do. Just over half (54 percent) of those who receive low scores for their support of genetic

Table 1: Approval of Different Applications of Genetic Technology

	Approve	Disapprove
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		

Knowledge of Genetic Engineering

Figure 6.



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 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).**

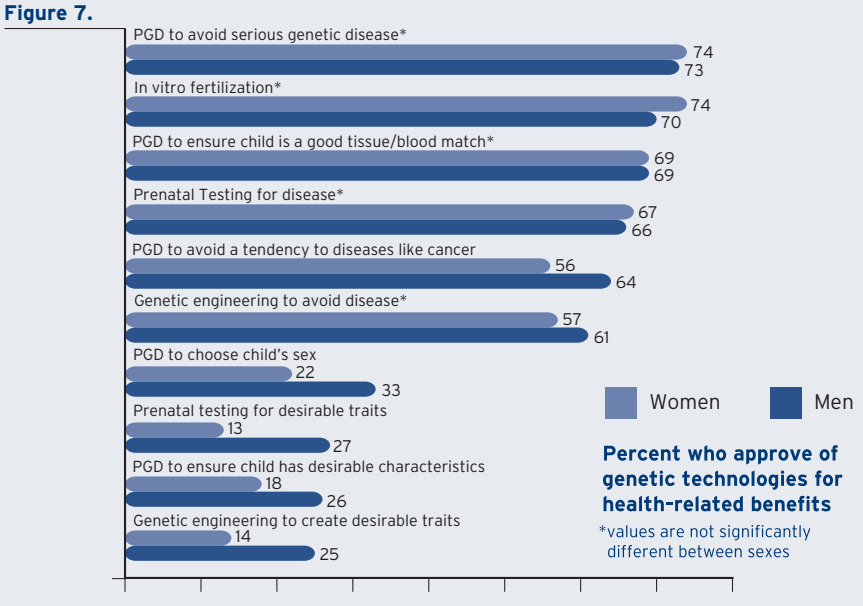
A large majority (72 percent) also favors the use of IVF to help people have children. And 69 percent approve of using PGD to select embryos for implantation that would result in a child who would be a good match to donate blood or tissue to a sibling who is sick and needs a transplant **(TABLE 1, FIGURE 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]

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.

Approval of Applications of Genetic Technology

Figure 7.



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.

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 women to approve of animal and human reproductive cloning **(FIGURE 8)**.

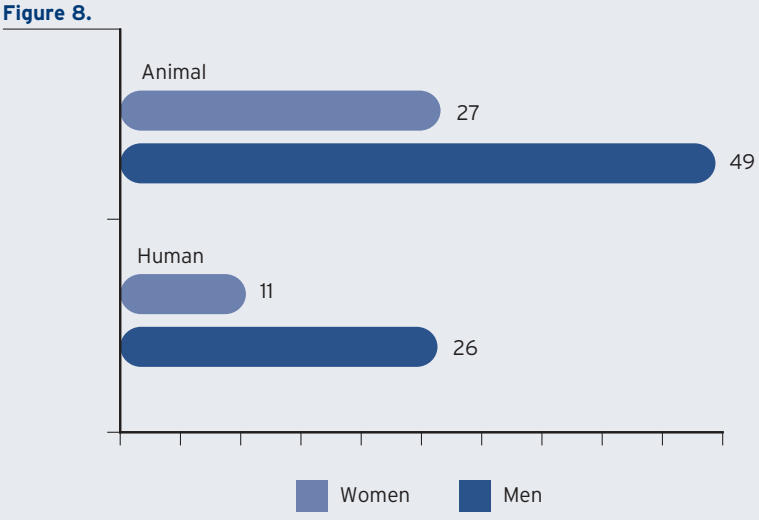
Evangelical Christians are less supportive of genetic technology than are people who identify with another religion, or who do not have a religious affiliation. We considered people to be highly supportive of genetic technology if they approved of at least nine of the twelve uses investigated in the

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.

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.

Approval of Reproductive Cloning Research

Figure 8.



survey. Using this measure, only 13 percent of Evangelical Christians are highly supportive of the use of genetic technology, compared 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]

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.

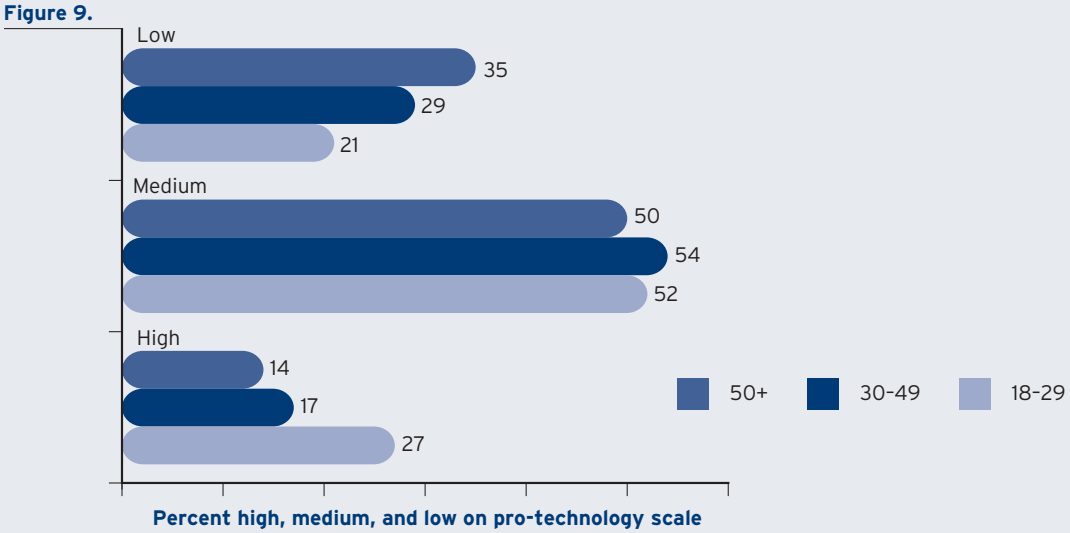
Attitude Trends

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),

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.

Support for Genetic Technology by Age

Figure 9.



and only slightly higher than the 30 percent approval measured by PSRA in 1991 **(FIGURE 10)**.

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)**.

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).

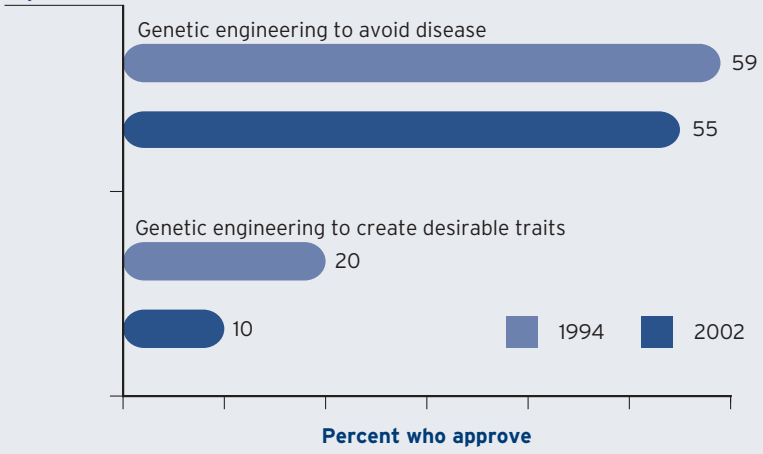
Political identification also shapes how people classify their orientation to issues of genetic technology. Republicans are divided between the two orientations, while Democrats and Independents clearly favor the health and safety orientation. Among Republicans, 41 percent think about genetic technology 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

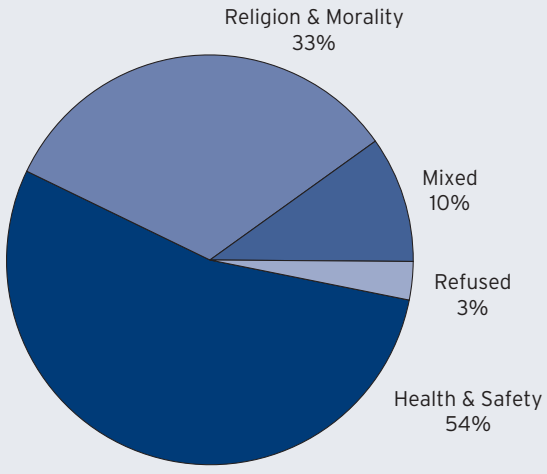
Trend in Attitudes Toward Genetic Engineering

Figure 10.



Basic Orientation to Issues Surrounding the Use of Genetic Technology

Figure 11.



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 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)**.

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).

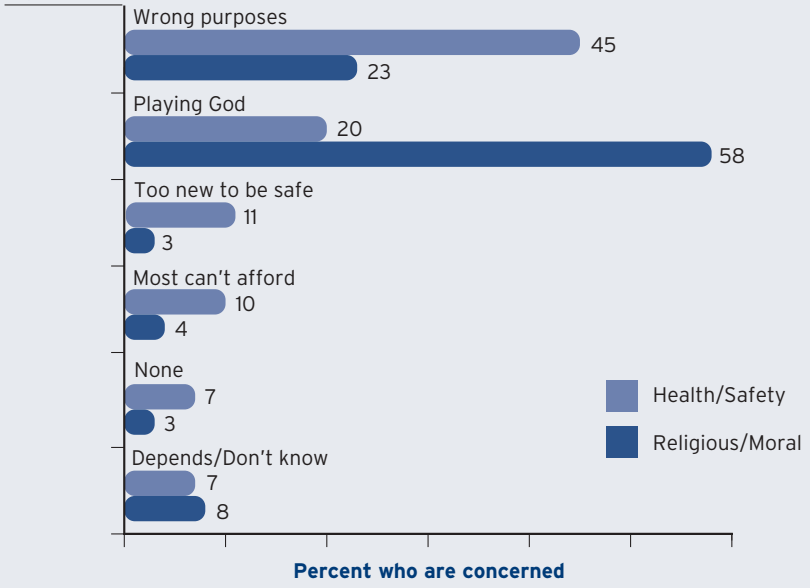
People with a health and safety orientation are attracted to these technologies by the possibility that certain genetic diseases can be wiped out forever (44 percent) and that individual parents can

Table 2: Concerns about Genetic Technology by Basic Orientation to Issues

	Total	Health Safety	Religious Moral
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

Concerns About Genetic Technology by Basic Orientation to Issues

Figure 12.



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.

Table 3: Perceived Benefits of Genetic Technology by Basic Orientation to Issues

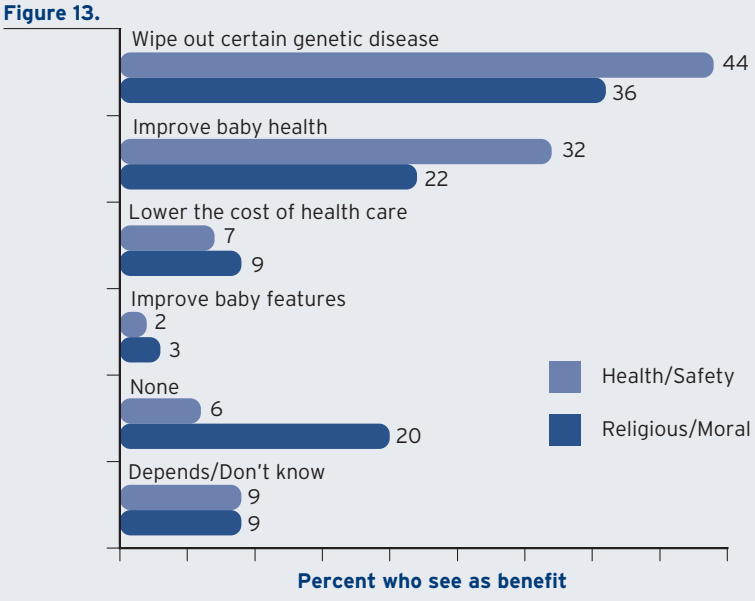
	Total	Health Safety	Religious Moral
Certain genetic diseases can be wiped out forever	41 %	44 %	36 %
Parents can improve their chances that their baby will be healthy	27 %	32 %	22 %
The overall cost of health care in America will be less	8 %	7 %	9 %
Parents can improve their chances that their baby will 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

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.

Perceived Benefits of Genetic Technology by Basic Orientation

Figure 13.



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 approval 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.

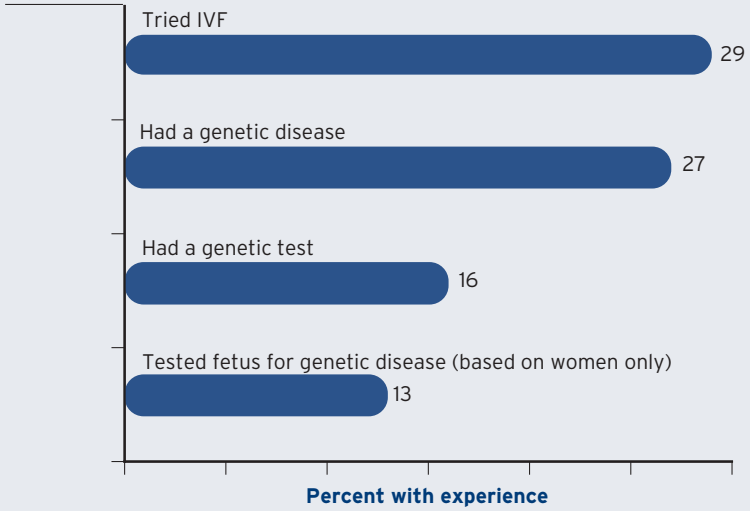
People who regret not having children themselves are no more favorable toward the use of IVF than people who have had children, or than those who did not have children but do not regret it. Fifty-seven percent of those who regret not having children, 71 percent of those with children, and 68 percent 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).

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,

Personal or Family Experience with Genetic Testing

Figure 14.



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.

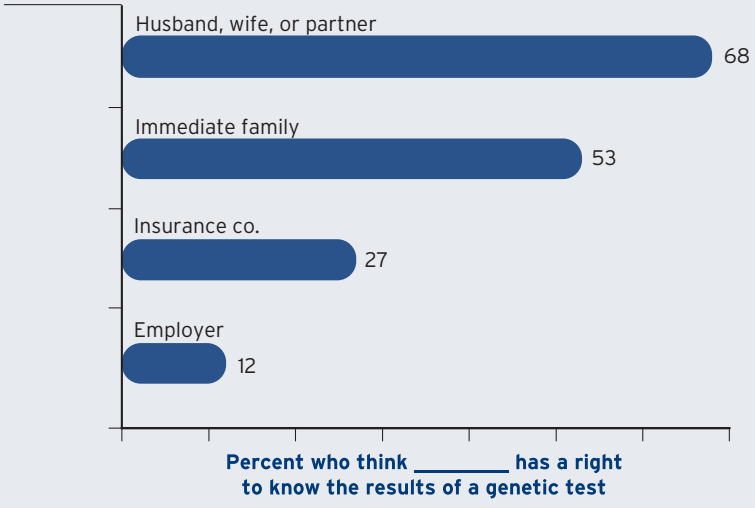
College graduates, people who have heard or read a great deal about genetic technology, people who had thought a lot about these topics before the interview, and people who receive high scores for their knowledge about genetic technology, are less inclined than others to want the results of genetic tests 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

		Employer	Insurance Co.	Husband, wife, or partner	Immediate family	Number of cases
	Total	12 %	27 %	68 %	53 %	1,211
Awareness	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

Preferences About Who Should Have Access to a Person's Genetic Test Results

Figure 15.



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).

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)**.

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

Support for Government Regulation of Genetic Technologies

Figure 16.

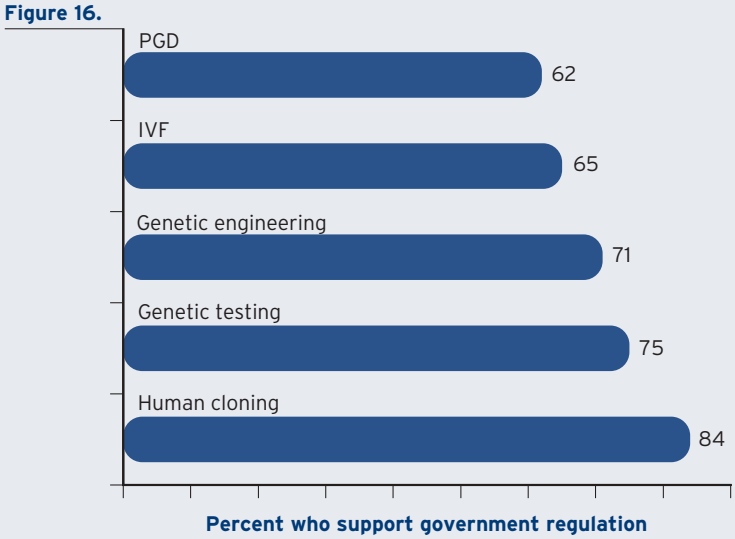


Table 5: Perceptions about Government Regulation of Different Genetic Technologies

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

Methodology Summary

Public Awareness and Attitudes About Genetic Technology

Prepared by Princeton Survey Research Associates
for the Genetics and Public Policy Center
October 2002

The Public Awareness and Attitudes About Genetic Technology Survey, sponsored by the Genetics and Public Policy Center, included telephone interviews with a nationally representative sample of 1,211 adults living in continental United States telephone households. The interviews were conducted in English by Princeton Survey Research Associates, Inc, from October 15 to October 29, 2002. Statistical results are weighted to correct known demographic discrepancies. The margin of sampling error for the complete set of weighted data is ±3%.

Details on the design, execution and analysis of the survey are available on the Center's website www.DNApolicy.org.

Public Awareness and Attitudes About Genetic Technology

Princeton Survey Research Associates for
The Genetics and Public Policy Center

Topline Results
November 5, 2002

Total n=1,211 adults age 18 and older
Margin of error: Plus or minus 3 percentage points
Dates of interviewing: October 15 – 29, 2002

Note: Because percentages are rounded they may not total 100%.
Note: An asterisk indicates a value of less than .5%

INTRODUCTION: Hello, my name is _____ calling for Princeton Survey Research. We are conducting an opinion survey for Johns Hopkins Bloomberg School of Public Health about some important issues that have been in the news. I'd like to ask a few questions of the youngest male, 18 years of age or older, who is now at home. (IF NO MALE, ASK: May I speak with the oldest female, 18 years of age or older, who is now at home?)

(READ) Before we start, I just want you to know that this call MAY be monitored for quality-control purposes. My first question is . . .

1. How closely do you follow news reports about developments in science and medicine? Would you say you follow this type of news very closely, somewhat closely, not too closely, or not closely at all?

14	Very closely
47	Somewhat closely
23	Not too closely
14	Not closely at all
1	Don't know
1	Refused

2. I'm going to describe a few of these developments that have been in the news and would like you to tell me how much you have heard or read about each of them. (First/Next) (INSERT AND ROTATE) How much have you heard or read about this—a great deal, something but not very much, or nothing at all?

	Great Deal	Something Not much	Nothing	Don't know	Ref.
a. GENETIC TESTING, a technique to find out whether a person HAS or is likely to DEVELOP certain inherited diseases or characteristics.					
Current:	26	57	16	*	*
1996[1]:	16	63	19	2	*
b. "GENETIC ENGINEERING, a technique to CHANGE the D-N-A, or building blocks of life, in order to produce particular characteristics.					
Current:	23	57	20	1	0
c. CLONING, the process of making a genetic COPY of an animal from a SINGLE cell.					
Current:	38	53	8	1	*
d. IN VITRO fertilization, a process to help people have a child by removing eggs from a woman's ovaries, fertilizing them in the laboratory with sperm, then implanting them in a woman's womb, where they grow and are born like other babies.					
Current:	39	51	9	*	*

1 1996 National Opinion Research Center

3. The next few questions will be about genetic TESTING. As far as you know, about how many different kinds of genetic tests are now available to identify whether or not a person has or is likely to develop a certain disease or characteristic—is it fewer than 50 tests, 50 to 200 tests, 200 to 1,000 tests, or more than 1,000 tests?

31	Fewer than 50
20	50 to 200
7	200 to 1,000
6	More than 1,000
36	Don't know
*	Refused

4. As far as you know, does the government regulate the quality and safety of genetic testing, or not?

5b. Do you think the government's genetic testing regulations should be MORE or LESS STRICT than they are now, or are they about right?

40	Government already regulates	
	16	Should be more strict
	12	About right
	2	Should be less strict
	3	Should not regulate at all
	7	Not sure what regulations should be
30	Government does not regulate	
30	Don't know if government regulates, or refused	

5a. Do you think the government SHOULD regulate the quality and safety of genetic testing, or not?

75	Yes
17	No
8	Don't Know
1	Refused

6. As far as you know, is it scientifically possible TODAY to use genetic testing to find out if a person has a greater than average chance of developing certain kinds of cancer?

Current		2000[2]
72	Yes	75
10	No	4
17	Don't know/Refused	21

[2] 2000 trend data are from The University of Maryland Survey Research Center. The wording in 2000 was: "As far as you know, is this statement about the use of genetic testing true or false, or are you not sure: Genetic testing can be used in adults to find out if they have a greater than average chance of developing certain types of cancer?"

7. As far as you know, is it scientifically possible TODAY to use genetic testing to find out if a person has a greater than average chance of developing a mental illness such as depression?

Current		2000[3]
51	Yes	41
21	No	19
27	Don't know/Refused	40

8. In your opinion, if a genetic test shows that someone has a gene that increases the risk of disease, who else do you think has the right to know the results? Does the person's (INSERT AND ROTATE) have the right to know, or not? (INTERVIEWER, USE THIS PROBE IF NECESSARY: "Do you think they have the right to know EVEN IF the person would rather keep the results private?")

	Yes	No	Don't know	Refused
a. Employer	12	85	3	*
b. Insurance company	27	68	5	*
c. Husband, wife or partner	68	29	2	1
d. Immediate family	53	42	4	1

9. As far as you know, is it scientifically possible TODAY to use genetic testing during PREGNANCY to find out whether the baby will develop a disease such as sickle cell disease or cystic fibrosis?

Current		2000[4]
70	Yes	65
11	No	5
19	Don't know/Refused	30

10. As far as you know, is it scientifically possible TODAY to use genetic testing during pregnancy to find out whether the baby will have a high IQ or intelligence?

19	Yes
52	No
29	Don't know
0	Refused

11a. In general, do you approve or disapprove of the use of genetic testing during pregnancy to find out whether the baby will develop a serious genetic disease?

66	Approve
27	Disapprove
7	Don't know
*	Refused

[3] 2000 trend data are from The University of Maryland Survey Research Center. The wording in 2000 was: "As far as you know, is this statement about the use of genetic testing true or false, or are you not sure: Genetic testing can be used in adults to find out if they have a greater than average chance of developing depression?"

[4] 2000 trend data are from The University of Maryland Survey Research Center. The wording in 2000 was: "As far as you know, is this statement about the use of genetic testing true or false, or are you not sure: Genetic testing can be used during pregnancy to find out whether the baby will develop sickle cell disease or cystic fibrosis?"

11b. Do you approve or disapprove of the use of genetic testing during pregnancy to find out whether the baby will have desirable characteristics such as strength or high intelligence?

20 Approve
74 Disapprove
5 Don't know
1 Refused

12. (READ IF FEMALE: Have you, or) Has anyone you know well ever tried to become pregnant by using the process of in vitro fertilization? (IF NECESSARY: In vitro fertilization is the process where eggs are removed from a woman's ovaries, fertilized in the laboratory with sperm, then implanted in a woman's womb, where they grow and are born like other babies.)

29 Yes
69 No
2 Don't know
* Refused

13. As far as you know, does the government regulate the quality and safety of in vitro fertilization, or not?

14b. Do you think the government's in vitro fertilization regulations should be MORE or LESS STRICT than they are now, or are they about right?

26 Government already regulates

6 Should be more strict
13 About right
* Should be less strict
2 Should not regulate at all
4 Not sure what regulations should be

30 Government does not regulate
45 Don't know if government regulates, or refused

14a. Do you think the government SHOULD regulate the quality and safety of in vitro fertilization, or not?

65 Yes
26 No
8 Don't know
1 Refused

15. In general, do you approve or disapprove of the use of in vitro fertilization?

72	Approve
20	Disapprove
8	Don't know
1	Refused

16. Genetic testing can be done on fertilized eggs produced through in vitro fertilization to SELECT and implant ONLY CERTAIN eggs. For example, a parent may want to implant only eggs with NO genetic diseases, or those of a specific sex, or that have other characteristics. This technology is called P-G-D. Before today, had you heard about P-G-D technology?

24	Yes
76	No
1	Don't know
0	Refused

17. As far as you know, does the government regulate the quality and safety of P-G-D, or not?

18b. Do you think the government's P-G-D regulations should be MORE or LESS STRICT than they are now, or are they about right?

4	Government already regulates
1	Should be more strict
2	About right
0	Should be less strict
1	Should not regulate at all
1	Not sure what regulations should be
8	Government does not regulate
11	Don't know if government regulates, or refused
76	Have not heard of P-G-D

18a. Do you think the government SHOULD regulate the quality and safety of P-G-D, or not?

62	Yes
25	No
12	Don't know
1	Refused

19. Would you approve or disapprove if parents were offered a way to use P-G-D to (INSERT AND ROTATE)? (How about in order to (INSERT)—would you approve or disapprove?)

	Approve	Disapprove	D/K	Ref.
a. Choose the sex of their child	28	68	4	*
b. Make sure their baby does NOT have a serious genetic disease	74	22	4	*
c. Make sure their baby has desirable characteristics such as high intelligence and strength	22	72	5	*
d. Make sure their baby does NOT have a tendency to develop a disease like cancer when he or she is an adult	60	33	6	*
e. Make sure their baby would be a good match to donate his or her blood or tissue to a brother or sister who is sick and needs a transplant	69	25	5	1

20. Next, I have a few questions about genetic ENGINEERING. As far as you know, is it scientifically possible TODAY to use genetic engineering to CHANGE a baby's genetic make-up before it is born to prevent it from having a genetic disease?

23	Yes
35	No
43	Don't know
*	Refused

21. As far as you know, is it scientifically possible TODAY to CHANGE a baby's genetic make-up before it is born so it is smarter, stronger, or better looking?

16	Yes
52	No
32	Don't know
*	Refused

22. As far as you know, does the government regulate the quality and safety of genetic engineering, or not?

23b. Do you think the government's genetic engineering regulations should be MORE or LESS STRICT than they are now, or are they about right?

30 Government already regulates

11 Should be more strict
10 About right
1 Should be less strict
3 Should not regulate at all
5 Not sure what regulations should be

34 Government does not regulate
36 Don't know if government regulates, or refused

23a. Do you think the government SHOULD regulate the quality and safety of genetic engineering, or not?

71 Yes
22 No
6 Don't know
* Refused

24. Would you approve or disapprove if parents were offered a way to change their OWN genes in order to have children who would be smarter, stronger, or better looking?

Current		1994[4]
20	Approve	10
76	Disapprove	85
5	Don't know/Refused	5

25. Would you approve or disapprove if parents were offered a way to change their OWN genes in order to prevent their children from having a genetic disease?

Current		1994[5]
59	Approve	55
34	Disapprove	34
7	Don't know/Refused	11

[4] 1994 PSRA "Would you approve or disapprove if scientists offered parents a way to change their genes in order to have children who would be smarter or better looking?"

[5] 1994 PSRA "Would you approve or disapprove if scientists offered parents a way to change their genes in order to have children who could avoid genetically transmitted diseases?"

26. Now, on the subject of cloning,…As far as you know, is it scientifically possible TODAY to create a clone, or genetic COPY, of animals like cows or sheep?

90	Yes
4	No
5	Don't know
0	Refused

27. Do you approve or disapprove of scientists working on ways to clone animals?

Current		1997[6]	1991[7]
37	Approve	39	30
55	Disapprove	50	60
8	Don't know/Refused	11	10

28. As far as you know, is it scientifically possible TODAY to create a clone, or genetic COPY, of a human being?

46	Yes
33	No
20	Don't know
0	Refused

29. Do you believe anyone has ACTUALLY cloned a human already?
[Based on those who say human cloning is possible; n=570]

48	Yes/Probably
38	No
14	Don't know
0	Refused

30. As far as you know, does the government have any regulations to limit the cloning of humans, or not?

[6] 1997 ABC

[7] 1991 PSRA

31b. Do you think the government's regulations to limit the cloning of humans should be MORE or LESS STRICT than they are now, or are they about right?

53 Government already regulates

28 Should be more strict
14 About right
1 Should be less strict
3 Should not regulate at all
7 Not sure what regulations should be

25 Government does not regulate
23 Don't know if government regulates, or refused

31a. Do you think the government SHOULD have regulations to limit the cloning of humans, or not?

84 Yes
11 No
5 Don't know
* Refused

32. Do you approve or disapprove of scientists working on ways to clone humans?

18 Approve
76 Disapprove
5 Don't know
* Refused

33. You have told me how you feel about a number of different topics—genetic testing, in vitro fertilization, genetic engineering, and cloning. In general, would you say you hold your opinions on these issues very strongly, somewhat strongly, not too strongly, or not strongly at all?

37 Very strongly
49 Somewhat strongly
9 Not too strongly
3 Not strongly at all
1 It depends/mixed (VOLUNTEERED)
1 Don't know
* Refused

34. Before today, how much had you thought about these topics—a lot, some, only a little, or not at all?

15	A lot
43	Some
28	Only a little
12	Not at all
1	It depends/mixed (VOLUNTEERED)
1	Don't know
0	Refused

35a. When you think about these topics, which of the following, if any, WORRIES you the MOST (READ 1-5 AND ROTATE ALTERNATIVES 1-5)

34	That using these technologies is too much like playing GOD
7	That the technologies are too new to be used SAFELY
7	That most people will not be able to AFFORD these technologies
35	That the technologies can easily be used for the wrong PURPOSES
6	Or, don't you worry about any of these?
7	It depends/Mixed (DO NOT READ)
2	Don't know (DO NOT READ)
*	Refused (DO NOT READ)

35b. When you think about these topics, which of the following, if any, do you think is the greatest BENEFIT (READ 1-5 AND ROTATE ALTERNATIVES 1-4)

27	That parents can improve the chances their baby will be HEALTHY
2	That parents can improve the chances their baby will have the FEATURES they want
8	That the overall COST of health care in America will be less
41	That certain genetic diseases can be WIPED OUT forever
12	Or, don't you think any of these are benefits?
5	It depends/Mixed (DO NOT READ)
4	Don't know (DO NOT READ)
1	Refused (DO NOT READ)

36. When you think about these topics, do you think of them MAINLY in terms of health and safety or MAINLY in terms of religion and morality? (ROTATE ORDER OF ALTERNATIVES FOR HALF SAMPLES)

54	Mainly health and safety
33	Mainly religion and morality
10	Mixed (VOLUNTEERED)
2	Don't know
1	Refused

DEMOGRAPHICS

Finally, I have just a few questions so we can describe the people who took part in our survey . . .

D1. RECORD RESPONDENT'S SEX:

48	Male
52	Female

D2. Are you married, living as married, widowed, divorced, separated, or have you never been married?

53	Married
3	Living as married
8	Widowed
12	Divorced
3	Separated
20	Never married
*	Refused

D5. What is your age?

21	18-29
42	30-49
36	50 or older
1	Refused

D3. If you have ever been pregnant, did you have any tests done to see whether the fetus had a genetic disease? **[Based on females; n=641]**

13	Yes
73	No
13	Never pregnant (VOLUNTEERED)
1	Don't know
*	Refused

D4a. Do you have any children, including any step children and adoptive children?

D4b. Do you think you would LIKE to have children sometime in the future?

D4c. Do you feel you would LIKE to have had children?

75	Has children
19	No children, would like/have liked to have had them
5	No children, do/did not want them
1	No children, don't know wishes
*	Don't know/Refused

D6. What is the last grade or class you completed in school? (DO NOT READ)

3	None, or grade 1 to 8
11	High school incomplete (Grades 9-11)
32	High school graduate, Grade 12, or GED certificate
5	Business, technical, or vocational school AFTER high school
24	Some college or university work, but no four-year degree
15	College or university graduate (BA, BS or other four-year degree received)
10	Post graduate or professional schooling after college (including work towards an MA, MS, Ph.D., JD, DDS, or MD degree)
1	Refused

D7. Are you of Hispanic or Latino background, such as Mexican, Puerto Rican, Cuban or other Spanish background?

10	Yes
89	No
*	Don't know
1	Refused

D8. What is your race? Are you white, black, Asian, American Indian or some other race?

82	White
11	Black or African-American
2	Asian or Pacific Islander
1	American Indian or Alaskan Native
1	Mixed-race
*	Other—SPECIFY
1	Don't know
1	Refused

D9. Last year, that is, in 2001, approximately what was your total household income from all sources, before taxes – just tell me when I get to the right category. (READ)

7	Less than $10,000
10	$10,000 to under $20,000
13	$20,000 to under $30,000
13	$30,000 to under $40,000
17	$40,000 to under $60,000
16	$60,000 to under $100,000
9	$100,000 or over
5	Don't know
10	Refused

D10. What is your religious preference – Protestant, Roman Catholic, Jewish, Muslim, or some other religion? (IF OTHER RELIGION, PROBE: What is the name of your religion?)

49	Protestant (INTERVIEWER, THIS INCLUDES: Baptist, Christian, Episcopalian, Jehovah's Witness, Lutheran, Methodist, Presbyterian etc.)
23	Roman Catholic/Catholic
1	Jewish
*	Any Orthodox Christians (Greek, Russian, Eastern Orthodox)
1	Mormon (The Church of Jesus Christ of Latter-Day Saints)
1	Muslim/Islam
1	Buddhist or Hindu
14	Other religion
9	No religion/Atheist/Agnostic
2	Don't know/Refused

D11. Do you consider yourself to be a born-again, or evangelical, Christian, or not?

32	Evangelical Christian
57	Other religion
9	No Religion
2	Religion don't know/refused

D12. In politics TODAY, do you consider yourself a Republican, Democrat, or Independent?

26	Republican
34	Democrat
30	Independent
*	(VOL) Other party
6	(VOL) No preference
1	Don't know
3	Refused

D13a. Have you, or has anyone in your immediate family, ever had a genetic disease?

27	Yes
69	No
4	Don't know
*	Refused

D13b. Have you, or has anyone in your immediate family, ever had a genetic test?

16	Yes
77	No
6	Don't know
*	Refused

END OF INTERVIEW: Thank you very much for taking the time to answer the questions on this survey. We really appreciate it. Have a nice day/evening.

INTERVIEWER: PLEASE RATE THE RESPONDENT

I1. How interested did the respondent seem in the topic of this survey?

32	Very interested
44	Somewhat interested
19	Not too interested
5	Not at all interested
*	Don't know
0	Refused

I2. Did the respondent have difficulty answering the questions?

6	A lot of difficulty
19	Some difficulty
33	Only a little difficulty
43	No difficulty at all
*	Don't know
0	Refused