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Public and Scientists' Views on Science and Society

Both the public and scientists value the contributions of science, but there are large differences in how each perceives science issues. Both groups agree that K-12 STEM education falls behind other nations.

A PEW RESEARCH CENTER STUDY CONDUCTED IN COLLABORATION WITH THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE (AAAS)

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About This Report

This report is based on a pair of surveys conducted by the Pew Research Center in collaboration with the American Association for the Advancement of Science (AAAS). It looks at the views of the general public and scientists about the place of science in American culture, their views about major science-related issues, and the role of science in public policy.

This is the first of several reports analyzing the data from this pair of surveys. This report focuses on a comparison of the views of the general public and those of AAAS scientists as a whole. Follow up reports planned for later this year will analyze views of the general public in more detail, especially by demographic, religious, and political subgroups. And, some results from the survey of AAAS scientists will be presented in a follow-up report in mid-February.

This report is a collaborative effort based on the input and analysis of the following individuals. Find related reports online at http://www.pewresearch.org/science2015

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The fieldwork for both surveys was conducted by Princeton Survey Research Associates International. Contact with AAAS members invited to participate in the survey was managed by AAAS staff with the help of Princeton Survey Research Associates International; AAAS also covered part of the costs associated with mailing members. All other costs of conducting the pair of surveys were covered by the Pew Research Center. Pew Research bears all responsibility for the content, design and analysis of both the AAAS member survey and the survey of the general public.

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About Pew Research Center

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Summary of Findings

Scientific innovations are deeply embedded in national life – in the economy, in core policy choices about how people care for themselves and use the resources around them, and in the topmost reaches of Americans' imaginations. New Pew Research Center surveys of citizens and a representative sample of scientists connected to the American Association for the Advancement of Science (AAAS) show powerful crosscurrents that both recognize the achievements of scientists and expose stark fissures between scientists and citizens on a range of science, engineering and technology issues. This report highlights these major findings:

Science holds an esteemed place among citizens and professionals. Americans recognize the accomplishments of scientists in key fields and, despite considerable dispute about the role of government in other realms, there is broad public support for government investment in scientific research. The key data:

- 79% of adults say that science has made life easier for most people and a majority is positive about science's impact on the quality of health care, food and the environment.
- 54% of adults consider U.S. scientific achievements to be either the best in the world (15%) or above average (39%) compared with other industrial countries.
- 92% of AAAS scientists say scientific achievements in the U.S. are the best in the world (45%) or above average (47%).
- About seven-in-ten adults say that government investments in engineering and technology (72%) and in basic scientific research (71%) usually pay off in the long run. Some 61% say that government investment is essential for scientific progress, while 34% say private investment is enough to ensure scientific progress is made.

At the same time, both the public and scientists are critical of the quality of science, technology, engineering, and math (STEM subjects) in grades K-12. The key data:

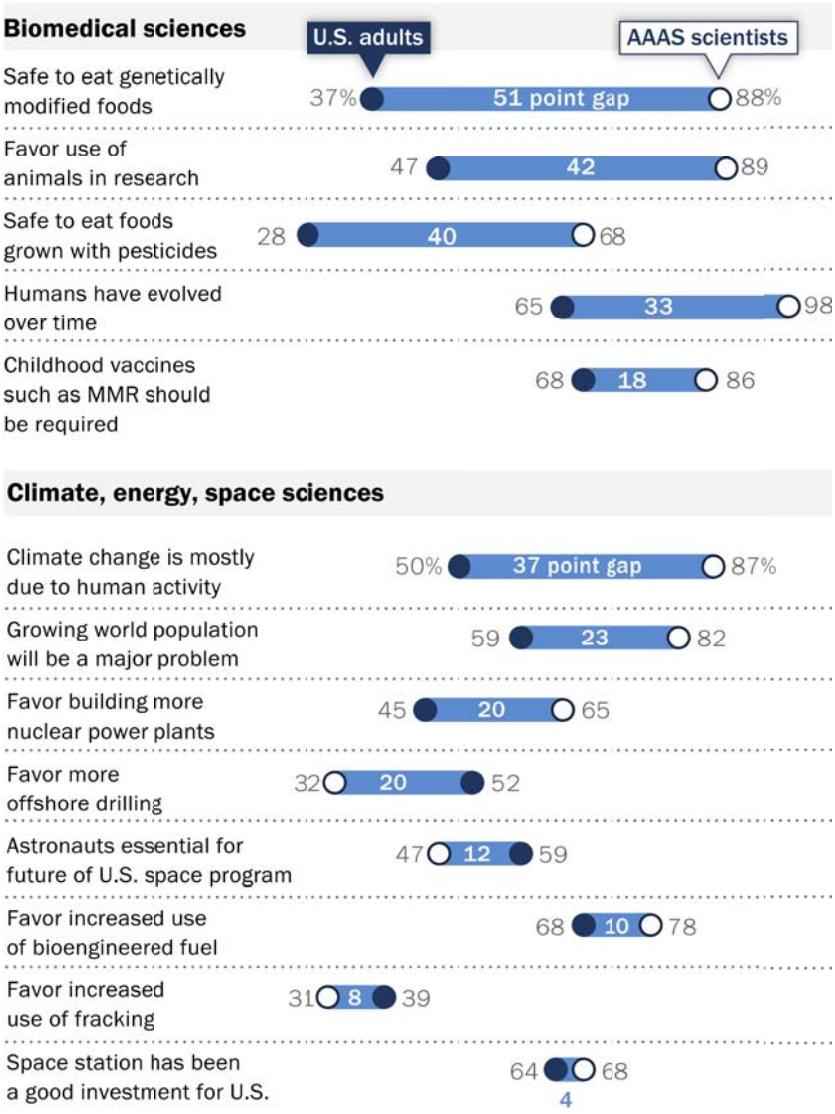
- Only 16% of AAAS scientists and 29% of the general public rank U.S. STEM education for grades K-12 as above average or the best in the world. Fully 46% of AAAS scientists and 29% of the public rank K-12 STEM as "below average."
- 75% of AAAS scientists say too little STEM education for grades K-12 is a major factor in the public's limited knowledge about science. An overwhelming majority of scientists see the public's limited scientific knowledge as a problem for science.

Despite broadly similar views about the overall place of science in America, citizens and scientists often see science-related issues through different sets of eyes. There are large differences in their views across a host of issues. The key data:

- A majority of the general public (57%) says that genetically modified (GM) foods are generally *unsafe* to eat, while 37% says such foods are safe; by contrast, 88% of AAAS scientists say GM foods are generally *safe*. The gap between citizens and scientists in seeing GM foods as safe is 51 percentage points. This is the largest opinion difference between the public and scientists.
- Citizens are closely divided over animal research: 47% favor and 50% oppose the use of animals in scientific research.[1] By contrast,

Opinion Differences Between Public and Scientists

% of U.S. adults and AAAS scientists saying each of the following



Survey of U.S. adults August 15-25, 2014. AAAS scientists survey Sept. 11-Oct. 13, 2014. Other responses and those saying don't know or giving no answer are not shown.

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[1] Animal research is a common short-hand in survey-based reports to describe views about "the use of animals in scientific research" such as medical research that tests the effectiveness of drugs and procedures on animals. The two terms are used interchangeably in this report.

an overwhelming majority of scientists (89%) favor animal research. The difference in the share favoring such research is 42 percentage points.

- In some areas, like energy, the differences between the groups do not follow a single direction — they can vary depending on the specific issue. For example, 52% of citizens favor allowing more offshore drilling, while *fewer* AAAS scientists (32%), by comparison, favor increased drilling. The gap in support of offshore drilling is 20 percentage points. But when it comes to nuclear power, the gap runs in the opposite direction. Forty-five percent of citizens favor building more nuclear power plants, while 65% of AAAS scientists favor this idea.
- The only one of 13 issues compared where the differences between the two groups are especially modest is the space station. Fully 64% of the public and 68% of AAAS scientists say that the space station has been a good investment for the country; a difference of four percentage points.

Compared with five years ago, both citizens and scientists are less upbeat about the scientific enterprise. Citizens are still broadly positive about the place of U.S. scientific achievements and its impact on society, but slightly more are negative than five years ago. And, while a majority of scientists think it is a good time for science, they are less upbeat than they were five years ago. Most scientists believe that policy regulations on land use and clean air and water are not often guided by the best science. The key data:

- While a majority of the public sees U.S. scientific achievements in positive terms, the share saying U.S. scientific achievements are the best in the world or above average is down 11 points to 54% today, compared with 65% in 2009.
- 79% of citizens say that science has made life easier for most people, while just 15% say it has made life more difficult. However, the balance of opinion is slightly less positive today than in 2009 when positive views outpaced negative ones by a margin of 83% to 10%. A similar pattern is found in views about the effect of science on the quality of health care, food, and the environment. In each case, while most adults see a positive effect of science, there is a slight rise in the share expressing negative views.
- 52% of AAAS scientists say this is generally a good time for science, down 24 percentage points from 76% in 2009. Similarly, the share of scientists who say this is generally a good time for their scientific specialty is down from 73% in 2009 to 62% today. And, the share of AAAS scientists saying that this is a good or very good time to begin a career in their field now stands at 59%, down from 67% in 2009.
- Only 15% of scientists say they believe policy choices about land use are guided by the best science most of the time or always; 27% think the best science frequently guides regulations about clean air and water; 46% think the best science is frequently used in food safety

regulations and 58% say the same when it comes to regulations about new drug and medical treatments.

These are some of the findings from a new pair of surveys conducted by the Pew Research Center in collaboration with the AAAS. The survey of the general public was conducted by landline and cellular telephone August 15-25, 2014 with a representative sample of 2,002 adults nationwide. The margin of sampling error for results based on all adults is plus or minus 3.1 percentage points. The survey of scientists is based on a representative sample of 3,748 U.S.-based members of AAAS; the survey was conducted online from Sept. 11 to Oct. 13, 2014.[2]

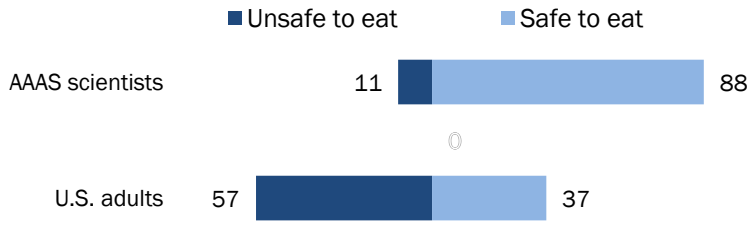
A Sizable Opinion Gap Exists Between the General Public and Scientists on a Range of Science and Technology Topics

Citizens' and scientists' views diverge sharply across a range of science, engineering and technology topics. Opinion differences occur on all 13 issues where a direct comparison is available. A difference of less than 10 percentage points occurs on only two of the 13.

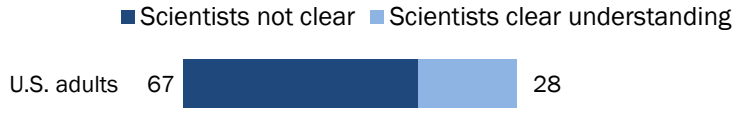
The largest differences between the public and the AAAS scientists are found in beliefs about the safety of eating genetically modified (GM) foods. Nearly nine-in-ten (88%) scientists say it is generally safe to eat GM foods compared with 37% of the general public, a difference of 51 percentage points. One possible reason for the gap: when it comes to GM crops, two-thirds of the public (67%) say scientists do not have a

Wide Differences Between Scientists and Public on GM Foods, Public Skeptical of Scientific Understanding of Health Effects

% of AAAS scientists and U.S. adults who say it is generally safe or unsafe to eat genetically modified foods



% of U.S. adults saying that scientists have or do not have a clear understanding about the health effects of GM crops



Survey of U.S. adults August 15-25, 2014.Q38-39. AAAS scientists survey Sept. 11-Oct. 13, 2014. Other responses and those saying don't know or giving no answer are not shown.

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[2] The AAAS survey is a sample of the U.S. based membership of the organization The margin of sampling error for estimates about the full U.S.-based membership of AAAS is plus or minus 1.7 percentage points.

clear understanding about the health effects.

Chapter 3 looks at public and scientists' attitudes on each of these issues in more detail along with several topics asked only of the general public, including access to experimental medical treatments, bioengineering and genetic modifications.

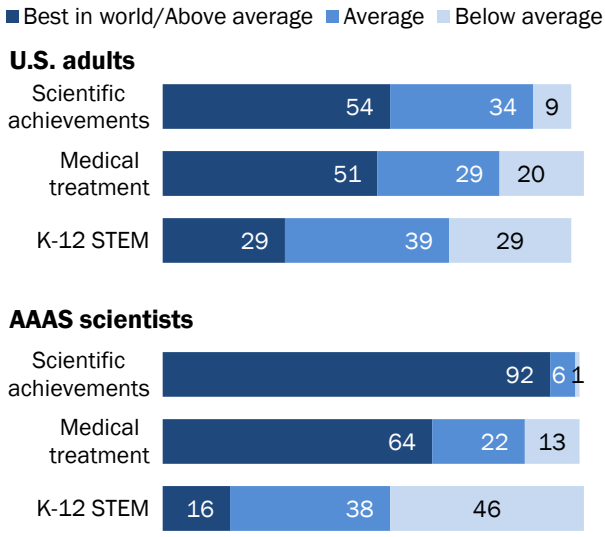
Both the Public and Scientists See U.S. Scientific Achievements in a Positive Light. But They Are Critical of K-12 STEM Education

Despite differences in views about a range of biomedical and physical science topics, both the public and scientists give relatively high marks to the nation's scientific achievements and give distinctly lower marks to K-12 education in science, technology, engineering and mathematics (known as STEM). Just 16% of AAAS scientists and 29% of adults in the general public considers K-12 STEM education in the U.S. to be the best or above average compared with other industrialized countries. Both groups see U.S. scientific achievements and medical treatment in a more positive light, by comparison.

About half of Americans (54%) consider U.S. scientific achievements to be above average or among the best in the world. The only aspect of American society rated more favorably is the U.S. military system (77%). About half (51%) also see U.S. medical treatment as in the top tier compared with other industrialized countries. Public views about K-12 STEM are markedly more negative: 29% say it is the best or above average, while 39% say it is average and another 29% say it is below average. (For more on public assessments of key institutions and industries, including the economy, health care, and the political system see Chapter 2.)

Public and Scientists' Give High Marks for U.S. Scientific Achievements, Are Critical of K-12 STEM Education

% of U.S. adults and AAAS scientists rating scientific achievements, medical treatment, and K-12 STEM education in U.S. compared with other industrialized countries



Survey of U.S. adults August 15-25, 2014. Q2a,gf1,e. AAAS scientists survey Sept. 11-Oct. 13, 2014, Q3,4a,d. Those saying don't know or giving no answer are not shown.

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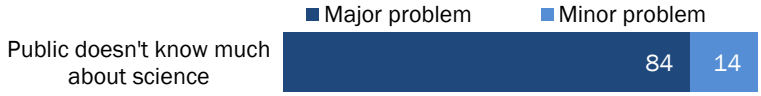
Compared with the general public, scientists are even more positive about the place of U.S. scientific achievements. Fully nine-in-ten (92%) AAAS scientists consider scientific achievements in the U.S. to be the best in the world (45%) or above average (47%). Scientists also have largely positive views about the global standing of U.S. medical treatment (64% say it is the best in the world or above average) as well as other aspects of science and technology including doctoral training (87%), cutting edge basic research (87%) and industry research and development innovation (81%). Just 16% of scientists say the same about K-12 STEM.

Among scientists, the public's knowledge about science—or lack thereof—is widely considered to be a major (84%) or minor (14%) problem for the field.

And when asked about four possible reasons for the public having limited science knowledge, three-quarters of AAAS scientists in the new survey say too little K-12 STEM education is a major factor.

Scientists' Perspective: Limited Public Knowledge About Science Is a Major Problem

% of AAAS scientists saying… is a major or minor problem for science in general



AAAS scientists survey Sept 11-Oct 13, 2014. Q5d. Those saying this is not a problem or giving no answer are not shown.

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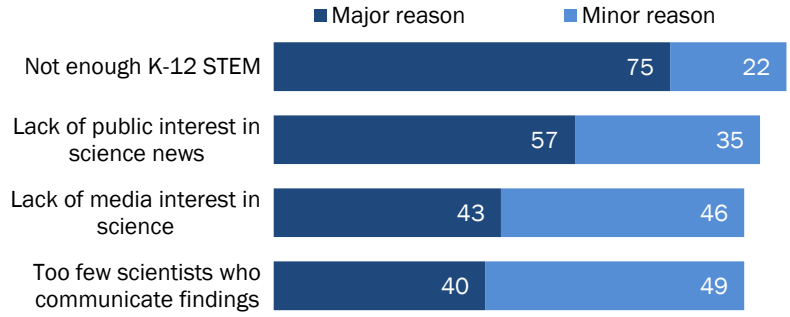
Scientists' Perspective: Too Little K-12 STEM Linked to Limited Public Science Knowledge

% of AAAS scientists saying each is a major/minor reason for the U.S. public having limited knowledge about science



AAAS scientists survey Sept 11-Oct 13, 2014. Q6a-d. Those saying not a reason or giving no answer are not shown.

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Citizens Are Still Broadly Positive About the Achievements of American Science and Its Impact on Society, But Slightly More Are Negative than Five Years Ago. Scientists Are Also Still Largely Positive, But Less Upbeat Than Five Years Ago.

A number of the questions asked in these new surveys repeat questions that Pew Research Center asked citizens and scientists in 2009. In key areas, both the public and AAAS scientists are less upbeat today.

Among the public, perceptions of the scientific enterprise and its contribution to society, while still largely positive, are a little less rosy than five years ago. Fewer citizens see U.S. scientific contributions as top tier compared with other nations. And, while most adults see positive contributions of science on life overall and on the quality of health care, food and the environment, there is a slight rise in negative views in each area. Similarly, most citizens say government investment in research pays off in the long run, but slightly more are skeptical about the benefits of government spending today than in 2009. While the change is modest on several of these measures, the share expressing negative views on each is slightly larger today than in 2009.[3]

Scientists' views have moved in the same direction. Though scientists hold mostly positive assessments of the state of science and their scientific specialty today, they are less sanguine than they were in 2009 when Pew Research conducted a previous survey of AAAS members. The downturn is shared widely among AAAS scientists regardless of discipline and employment sector.

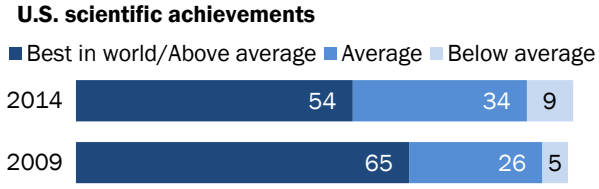
[3]The General Social Survey (GSS) has tracked public confidence in key institutions since the 1970s. In the most recent survey, completed in 2012, four-in-ten (40%) adults had "a great deal of confidence" in the scientific community, 49% had "only some" confidence and 7% had "hardly any" confidence. The share of adults holding a great deal of confidence in the scientific community has been fairly stable since the 1970's, though there has been long-term declines in confidence across the set of 12 institutions. See Tom W. Smith and Jaesok Son, May 2013, "Trends in Public Attitudes about Confidence in Institutions." A multivariate analysis of the same data through 2010 by Gordon Gauchat suggest a long term decline in trust of the scientific community among political conservatives, particularly those with more education. See "Politicization of Science in the Public Sphere: A Study of Public Trust in the United States, 1974 to 2010," *American Sociological Review*, 77(2):167-187.

Perception of U.S. Scientific Achievements

Overall, 54% of adults consider U.S. scientific achievements to be either the best in the world (15%) or above average (39%) compared with other industrial countries. Of the seven aspects of American society rated, only one was seen more favorably: the U.S. military. Compared with 2009, however, the share saying that U.S. scientific achievements are the best in the world or above average is down 11 points, from 65% in 2009 to 54% today. More now see U.S. scientific achievements as "average" in the global context (up from 26% in 2009 to 34% today) or "below average" (up slightly from 5% in 2009 to 9% today). Perceptions of some other key sectors, including U.S. health care, also dropped during this timeframe. See Chapter 2 for details.

Less Stellar Public Image of U.S. Scientific Achievements

% of U.S. adults



Survey of U.S. adults August 15-25, 2014. Q2a.Comparison with survey conducted April 28-May 12, 2009. Those saying don't know are not shown.

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Partisan groups tend to hold similar views of U.S. scientific achievements and, the drop in ratings of U.S. scientific achievements since 2009 has occurred across the political spectrum.

When it comes to policy prescriptions, however, a partisan divide emerges. A separate Pew Research Center report released this month finds that Democrats are more likely than Republicans to prioritize "supporting scientific research" for the President and the Congress in the coming year. Younger adults are also more likely than their elders to say supporting scientific research should be a top priority for the President and the new Congress.[4]

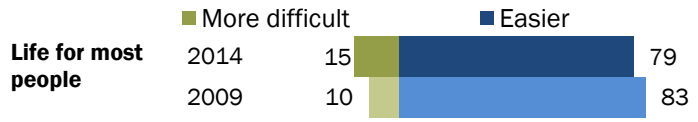
[4]Pew Research Center report "Public's Policy Priorities Reflect Changing Conditions at Home and Abroad," January 15, 2015. Partisan differences in policy priorities also occur on: dealing with global warming, protecting the environment, and dealing with the nation's energy problem.

Effects of Science on Society

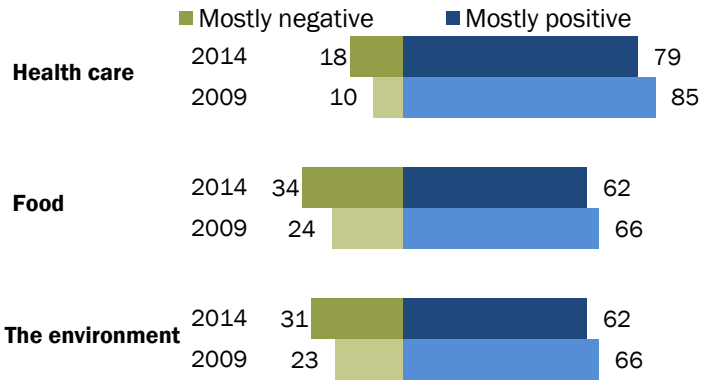
Overall the American public tends to see the effects of science on society in a positive light. Fully 79% of citizens say that science has made life easier for most people, while just 15% say it has made life more difficult. However, the balance of opinion is slightly less positive today than in 2009 when positive views outpaced negative ones by a margin of 83% to 10%.

Public Still Largely Positive About the Contribution of Science to Society, But Uptick in Negative Views

% of U.S. adults saying science has made life easier or more difficult for most people



% of U.S. adults saying effect of science on the quality of each area in the U.S. has been mostly positive or negative



Survey of U.S. adults August 15-25, 2014.Q4,5a-c. Comparison with survey conducted April 28-May 12, 2009. Those saying don't know or volunteering no effect are not shown.

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Similarly, a majority of adults says the effect of science on the quality of U.S. health care, food and the environment is mostly positive as was also the case in 2009. The share saying that science has had a negative effect in each area has increased slightly. For example, 79% of adults say that science has had a positive effect on the quality of health care, down from 85% in 2009 while negative views have ticked up from 10% in 2009 to 18% today.

When it comes to food, 62% of Americans say science has had a mostly positive effect, while 34% say science has mostly had a negative effect on the quality of food. The balance of opinion is a bit less rosy on this issue compared with 2009 when positive views outstripped negative ones by a margin of 66% to 24%.

Similarly, more say science has had a positive (62%) than negative (31%) effect on the quality of the environment today. But, the balance of opinion on this issue has shifted somewhat compared with 2009 when 66% said science had a positive effect and 23% said it had a negative effect.

These modest changes over time have occurred among both Republicans (including independents who lean Republican) as well as Democrats (including independents who lean Democratic). However, Republicans' views about the effect of science on health care and food have changed more than those of Democrats.

Both Republicans and Democrats have shifted by about the same amount in their assessment of science's effect on the quality of the environment; there are no significant differences by party affiliation when it comes to the overall effect of science on the environment. Two-thirds (66%) of Republicans and independents who lean to the Republican Party say the effect of science on the quality of the environment in the U.S. has been mostly positive, as do 61% of Democrats and independents who lean toward the Democratic Party. (A detailed look at attitudes about science and technology topics by political groups is forthcoming later this year).

Perceived Contributions of Scientists, Engineers, and Medical Doctors to Society

A 2013 Pew Research report found the military at the top of the list of 10 occupational groups seen as contributing "a lot" to society (78%), followed by teachers (72%), medical doctors (66%), scientists (65%) and engineers (63%). The order of ratings for each of the 10 groups was roughly the same in 2013 as in 2009, though there were modest declines in public appreciation for several occupations.

Public appreciation of scientists' contribution dropped 5 points from 70% in 2009 to 65% in 2013 with a corresponding uptick to 8% in those saying scientists contribute "not very much" or "nothing at all" compared with 5% in 2009. Views of medical doctors' contribution fell 3 points from 69% in 2009 to 66% in 2013. Those of engineers stayed about the same (64% in 2009 and 63% in 2013).

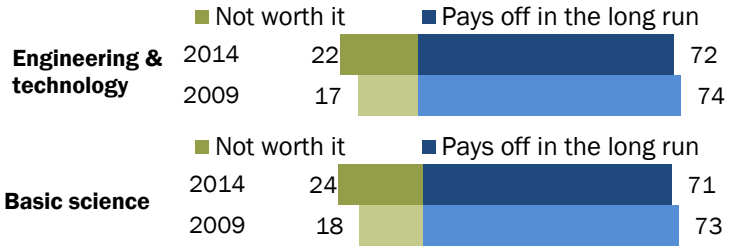
Adults under age 50 and college graduates tended to be more upbeat in their assessments of scientists, engineers and medical doctors. Partisan and ideological differences were found in views about the contribution of scientists and engineers but not in views about medical doctors. For details see "Public Esteem for Military Still High," July 11, 2013.

Public Support for Research Funding Since 2009

A majority of the public sees societal benefit from government investment in science and engineering research. Roughly seven-in-ten adults say that government investment in engineering and technology (72%) as well as basic science research (71%) pays off in the long run while a minority says such spending is not worth it (22% and 24%, respectively). Positive views about the value of government investment in each area is about the same as in 2009, though negative views that such spending is not worth it have ticked up 5 points for engineering and technology research and 6 points for basic science research.

Support for Funding Holds Steady, Slight Rise in Naysayers

% of U.S. adults saying that government investments in each area usually pay off in the long run or are not worth it



Survey of U.S. adults August 15-25, 2014.Q12a-b. Comparison with survey conducted April 28-May 12, 2009. Those saying don't know are not shown.

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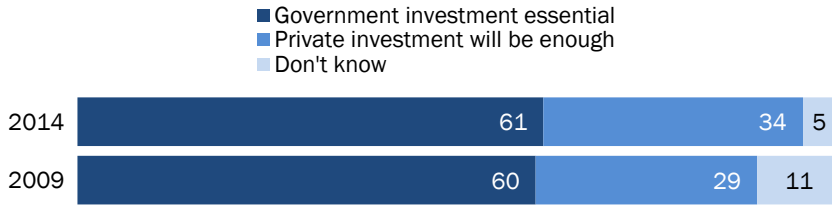
Views About Government, Private Research Funding

% of U.S. adults saying that government investment is essential for scientific progress or that private investment will ensure that enough scientific progress is made, even without government investment



Survey of U.S. adults August 15-25, 2014.Q13 Comparison with survey conducted April 28-May 12, 2009.

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Views about the role of government funding as compared with private investment show steady support for government investment (61% in 2014 and 60% in 2009) but, there is a slight rise in the view that private investment, without government funds, will be enough to ensure scientific progress (from 29% in 2009 to 34% today). The modest difference over time stems from more expressing an opinion today than did so five years ago.

Mixed Perceptions About the Degree of Scientific Consensus

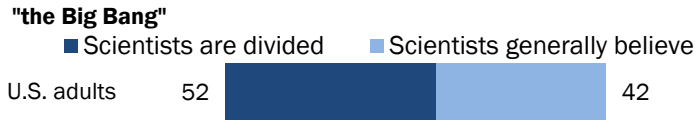
The general public tends to hold mixed views about the degree to which they believe there is scientific consensus on three hot-button science topics — the "Big Bang" theory, climate change and evolution.

Asked whether scientists generally believe that the universe was created in a single violent event often called "the Big Bang," about four-in-ten (42%) say yes while about half (52%) say scientists are generally divided about this issue.

When it comes to climate change and evolution, a majority of adults see scientists as generally in agreement that the earth is getting warmer due to human activity (57%) or that humans have evolved over time (66%), though a sizeable minority see scientists as divided over each. Perceptions of where the scientific community stands on both climate change and evolution tend to be associated with individual views on the issue.

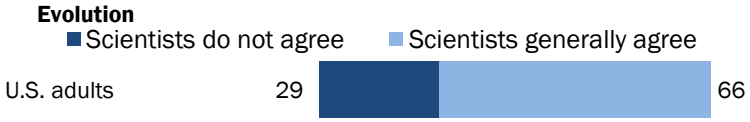
Mixed Perceptions of Scientific Consensus About 'Big Bang,' Climate Change and Evolution

% of U.S. adults saying that scientists generally believe/are divided that the universe was created in a single, violent event often called "the Big Bang"



% of U.S. adults saying that scientists generally agree/do not agree that the earth is getting warmer due to human activity

% of U.S. adults saying that scientists generally agree/do not agree that humans have evolved over time



Survey of U.S. adults August 15-25, 2014. Q32,Q23,Q18. Those saying don't know are not shown.

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Scientists Are Still Largely Positive, But Are Less Upbeat About the State of Science Today Than They Were Five Years Ago.

Scientists' overall assessments of the field, while still mostly positive, are less upbeat than they were in 2009 when Pew Research conducted a previous survey of AAAS members.

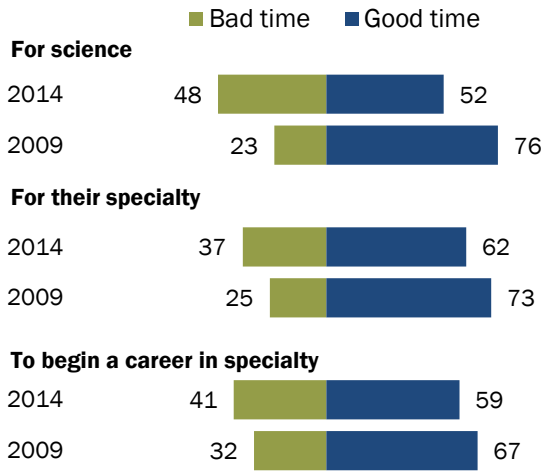
Today, about half of AAAS scientists (52%) say this is good time for science, down 24 percentage points from three-quarters (76%) in 2009.

Scientists are more positive, by comparison, when it comes to the state of their scientific specialty. But here, too, scientists are less rosy in their assessments than five years ago: 62% of AAAS scientists say this is a good time for their specialty area, down 11 percentage points from 2009.

These more downbeat assessments occur among AAAS scientists across all disciplines, among those with both a basic and applied research focus,[5] and across all employer types.

Scientists Less Sanguine About the State of the Field

% of AAAS scientists saying this is a ... for science/their scientific specialty/to begin a career in their specialty



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q1-2,34 AAAS scientists survey May 1 – June 14, 2009. Those giving no answer are not shown.

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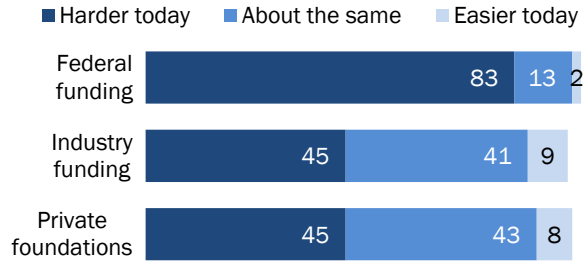
Some 59% of AAAS scientists say this is a good or very good time to begin a career in their specialty, down from 67% in 2009. Assessments about the state of their specialty for new entrants is about the same as 2009 for those focused on applied research (71% in 2009 and 69% today say it a good or very good time), but it is down 15 percentage points among those doing basic research, from 63% in 2009 to 48% today saying this is a good or very good time to begin a career in their specialty area.

[5] AAAS scientists were asked to self-identify whether any scientific research they have been involved in during the past five years primarily addresses basic knowledge questions or applied research questions. The OECD defines basic research as "experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view." The chief difference between basic and applied research is that applied research has a specific practical aim or objective.

There are a number of possible reasons for scientists' less optimistic assessments over this period including the different economic and political contexts,[6] heightened concerns among scientists about the research funding environment, and, perhaps, what scientists see as the limited impact their work is having on policy regulations.

Most Scientists Say Finding Federal Funding Harder Today

% of AAAS scientists saying that compared with five years ago funding in their specialty area from each source is ...



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q9-11. Those giving no response are not shown.

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Fully 83% of AAAS scientists report that obtaining federal research funding is harder today than it was five years ago. More than four-in-ten say the same about industry funding (45%) and private foundation funding (45%) compared with five years ago. Further, when asked to consider each of seven potential issues as a "serious problem for conducting high quality research today," fully 88% of AAAS scientists say that a lack of funding for basic research is a serious problem, substantially more than any of the other issues considered.[7]

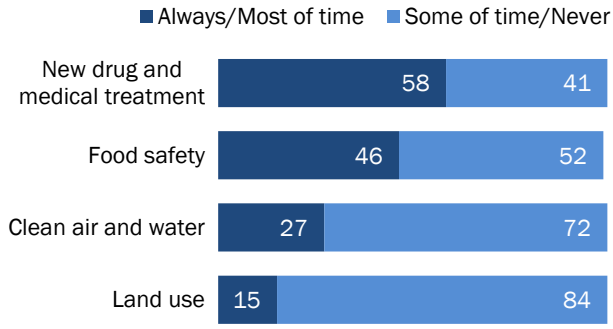
[6] While the 2009 survey was conducted when the Great Recession was taking hold, there was also a promise of scientific funding through the American Recovery and Reinvestment Act of 2009 around the same time.

[7] For data on trends in research funding from government and industry sources see Chapters 4, 5 and 6 in the *Science and Engineering Indicators 2014*. The Congressional Research Office reviews federal research and development funding across agencies over recent years. The AAAS also compiles trend data on federal government research funding.

Scientists have, at best, mixed views about the impact of the research enterprise on four areas of government regulations. A majority of AAAS scientists (58%) say that the best scientific information guides government regulations about new drug and medical treatments at least most of the time, while about four-in-ten (41%) say such information guides regulations only some of the time or never. Views about the impact of scientific information on food safety regulations are more mixed with 46% saying the best information guides regulations always or most of the time and a slightly larger share (52%) saying it does so only some of the time or never. Scientists are largely pessimistic that the best information guides regulations when it comes to clean air and water regulations or land use regulations: 72% and 84%, respectively, say this occurs only some of the time or never.

How Often Does Best Science Guide Government Regulations?

% of AAAS scientists saying the best scientific information guides government regulations in each area always/most of the time or some of the time/never



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q14a-d. Those giving no answer are not shown.

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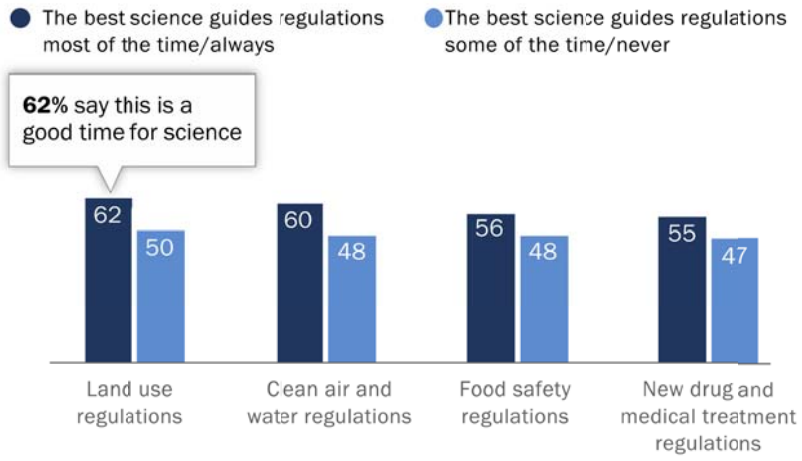
Scientists' views about the impact of research on government regulations in each domain tend to be associated with their views about the state of the overall science environment.

For example, those who see a more frequent impact of scientific findings on land use regulations also tend to be more upbeat about the state of science today; 62% say this is generally a good time for science. By comparison, those who say the best science guides land use regulations only *some* of the time or *never* are less positive. Half (50%) of this group says it is a good time and an equal share says it is a bad time for science overall. The same pattern holds for each of the four types of regulations considered in the survey. Scientists who perceive a more frequent influence of the best science on regulations are also more likely to say this is a good time for science compared with scientists who see less frequent impact of the best scientific information on policy rules.

Positive Views About State of Science Today Are Associated With Perceptions of Influence on Policy

% of AAAS scientists saying this is generally a good time for science, among those saying



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q1.

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Roadmap to the report

The remainder of this report details the findings on both public and scientists' views about science, engineering and technology topics. Chapter 1 briefly outlines related Pew Research Center studies and reviews some of the key caveats and concerns in conducting research in this area. Chapter 2 looks at overall views about science and society, the image of the U.S. as a global leader, perceived contributions of science to society, and views about government funding for scientific research. Chapter 3 covers attitudes and beliefs about a range of biomedical and physical science topics. It focuses on comparisons between the public and AAAS scientists and also covers public attitudes on access to experimental drugs, bioengineering of artificial organs, genetic modifications and perceptions of scientific consensus. Chapter 4 examines the views of AAAS scientists about the scientific enterprise, issues and concerns facing the scientific community, and issues for those newly entering careers in science. It also includes the experiences and background characteristics of the AAAS scientists in the survey. Appendices provide a detailed report on the methodology used in each survey as well as the full question wording and frequency results for each question in this report.

What is the AAAS?

The American Association for the Advancement of Science (AAAS) is the world's largest general scientific society, and as such, encompasses all disciplines in the scientific community. Founded in 1848, AAAS publishes *Science*, one of the most widely-circulated peer-reviewed scientific journals in the world. It is an international non-profit organization whose mission is broadly defined as seeking to "advance science, engineering, and innovation throughout the world for the benefit of all people."

Chapter 1: Pew Research Center Initiative on Science and Society

Science is a big, sprawling cluster of subjects that has drawn regular attention from the Pew Research Center since its founding. Public attitudes about science-related policy matters from pollution to space exploration to medical practices have been part of Pew Research's values questions since the late 1980s. The relative priority that citizens assign to science-related policy issues has been a standard query since the mid-1990s as the center asked people to rank the issues that mattered most to them. Questions about the intersection of people's spiritual and moral beliefs on such matters as evolution, cloning, or end-of-life treatment issues have been subjects of study by the Pew Research Center's since the 1990s. The particular place of digital technology in people's lives has been an ongoing subject for study at Pew Research since 2000.

With this report, the Pew Research Center marks a more deliberate and formal commitment to study the intersection of science with all aspects of society from public opinion, to politics and policy-making, to religious and ethical considerations, to education and the economy. In the coming years, Pew Research plans a sustained effort to understand what citizens and scientists think about science-related matters, how scientific information is disseminated and understood in the new media ecology, where Americans stand in terms of their knowledge about science, how amateurs are contributing to scientific endeavors, where "big data" is making an impact on scientific inquiry, and where people's moral and spiritual issues connect with scientific innovations and shape policies around them.

Pew Research is doing this because scientific advances

About the General Public and AAAS Scientist Surveys

The general public survey was conducted August 15-25, 2014, by landline and cellular telephone, among a nationally representative sample of 2,002 adults. The survey tracks public attitudes about science in society and maps the contours of opinion on a wide range of issues within the domain of science and technology. The margin of error for results based on the full sample is +/- 3.1 percentage points. See Appendix A for more details on the survey methodology.

The survey of AAAS scientists was conducted online with a random sample of 3,748 U.S.-based members of AAAS from Sept. 11 to Oct 13, 2014. The margin of sampling error for estimates about the full U.S.-based membership of AAAS is plus or minus 1.7 percentage points See Appendix B for details about the survey methodology.

Where possible, comparisons are made to a similar pair of surveys conducted in 2009. The general public survey was conducted April 28-May 12, 2009 by landline and cellular telephone with 2,001 adults nationwide. The survey of AAAS members was conducted online May 1 to June 14, 2009 with a random sample of 2,533 U.S.-based members of AAAS. See "Public Praises Science; Scientists Fault Public, Media," July 9, 2009.

and challenges are influencing an ever-greater share of American and global life. The pace of innovation and the urgency of scientific issues have captured a growing share of policy energy and at times generated more and more dispute.

Studying science-related topics comes with some inherent challenges. The breadth and complexity of the issues can be daunting. Translating complicated scientific ideas into research questions that can be addressed by the general public can be particularly hard to do. Even understanding who engages in the scientific enterprise has long been a subject where reasonable minds hold differences of opinion. Thus, we offer this work with some caveats.

Caveats about the survey questionnaires

This pair of surveys is designed to cover a broad spectrum of science, engineering and technology attitudes, but the collection of topics is by no means comprehensive. In the end, the set of topics reflects Pew Research editorial judgment about issues of wide enough public attention to feasibly include in a survey as well as practical time and space limits inherent to the research method.

Most of the survey questions ask for relatively simple judgments about potentially complex issues. For example, questions about the appropriate use of medical advances ask for respondents' summary judgments about what can be difficult ethical issues. Similarly, asking about whether one favors or opposes the increased use of hydraulic fracturing is but one of many questions one could ask about "fracking." It does not capture related judgments about the issue, such as perceived risks or benefits of "fracking" or the relative value of "fracking" compared with other forms of energy development.

In future research, we expect to explore specific topics related to science and technology in more depth. The trade-off in this pair of surveys was to cover a wider range of topics with just one, two or sometimes three questions about each.

Caveats about surveying scientists

Our survey of AAAS scientists canvasses the views of a broad-ranging group of professionally-engaged scientists[8]. They come from a variety of disciplines, employment sectors, and stages of career, from student to retiree. Unlike the broader labor force working in science and engineering occupations, most respondents to the survey hold one or more doctorate degrees. All belong to the AAAS, the largest multidisciplinary scientific professional society in the world. While not intended to be representative of all scientists in the U.S., the survey of AAAS scientists provides a relatively rare window into the views of the scientific community.

[8] While the label of "scientist" is used throughout this report, note that the survey includes engineers who belong to the AAAS.

There are a number of other possible approaches to identifying U.S. scientists.[9] Some consider only a narrow set of fields to be "science" or "science and engineering" careers. Others, such as the National Science Foundation's National Center of Science and Engineering Statistics program, canvass a broad set of disciplines when tracking science and engineering indicators which include: agricultural, physical, earth, atmospheric and ocean sciences, engineering, biological sciences, computer sciences, medical and health sciences, psychology, mathematics and statistics and social sciences. When identifying the science and engineering workforce, the National Science Foundation uses a similarly broad definition: Those who *either* hold a degree in a science and engineering-related field at the bachelor's level or above *or* work in a science and engineering-related field.[10] This is an important distinction since about half of those with a degree in science and engineering are working in field-related occupations while roughly half of those with such training at the bachelor's level or above are working in other occupations.

Help Navigating These and Other Pitfalls

We have tried to be conscious of these issues and to obtain the advice of the scientific community and other stakeholders to help inform this research. We are grateful to a number of outside advisors who shared their expertise with us during the development of the questionnaires and/or in reviewing a draft version of this report. These include: John Besley, associate professor and the Ellis N. Brand chair in public relations at Michigan State University; Bill Colglazier, visiting scientist at the Center for Science Diplomacy; Banning Garrett, independent consultant on global trends; Frank Macrina, vice president for research and innovation at Virginia Commonwealth University; and Cliff Zukin, professor of public policy and political science at Rutgers University. Senior staff at AAAS also generously shared their expertise. These include: Alan Leshner, chief executive officer; Marcia McNutt, editor-in-chief of *Science;* Joanne Carney, director of government relations; Edward Derrick, chief program director of the Center of Science, Policy and Society Programs; Shirley Malcom, head of education and human resources programs; Vaughan Turekian, chief international officer and editor-in-chief of *Science & Diplomacy*; Jennifer Wiseman, director of the Dialogue on Science, Ethics, and Religion; Ginger Pinholster, director of

[9] A different approach was taken in a survey directed by sociologist Elaine Ecklund at Rice University to identify employed scientists in the general public. The survey used a GfK Knowledge Panel sample and analyzed those who a) identify themselves as working in a science-related occupation b) hold at least a four-year college degree and c) report working in the following occupational groups: computer and mathematics, architecture and engineering, life, physical and social sciences, medical doctor, other health care practitioner, health technologist or technician. Preliminary findings were presented at the AAAS meetings in Chicago, IL, Feb. 16, 2014. A number of others have focused on identifying scientists in particular specialty areas, such as climate science. For example, Stenhouse and colleagues conducted a survey of members of the American Meteorological Society. See "Meteorologists' Views About Global Warming," Bulletin of the American Meteorological Society, July 2014. Keane and Martinez built a database of more than 10,000 earth scientists from lists of geoscience faculty at academic institutions and researchers associated with state geological surveys and U.S. federal research facilities which was used to survey geoscientists. See Doran and Zimmerman, 2009, "Examining the Scientific Consensus on Climate Change," *Eos,* vol. 90 (3).
[10] The National Science Foundation's Scientists and Engineers Data System (SESTAT) combines data collected on the National Survey of College Graduates, the National Survey of Recent College Graduates, and the Survey of Doctorate Recipients to track scientists and engineers in the U.S. under age 76 who either hold a college degree in a relevant field or are employed in a science and engineering-related occupation.

the office of public programs; Jeanne Braha, public engagement manager and Tiffany Lohwater, director of meetings and public engagement. Pew Research Center retains sole responsibility for any errors.

Chapter 2: Perspectives on the Place of Science in Society

Science holds an esteemed place in the public imagination and in the minds of professionals. Americans are proud of the accomplishments of their scientists in key fields and, despite considerable dispute about the role of government in other realms, there is broad public support for government investment in scientific research.

At the same time, scientists and citizens are critical of the K-12 education system when it comes to the quality of teaching about science, technology, engineering, and math (called STEM subjects). Scientists are also pessimistic about the state of funding for their research, even as the public largely supports it.

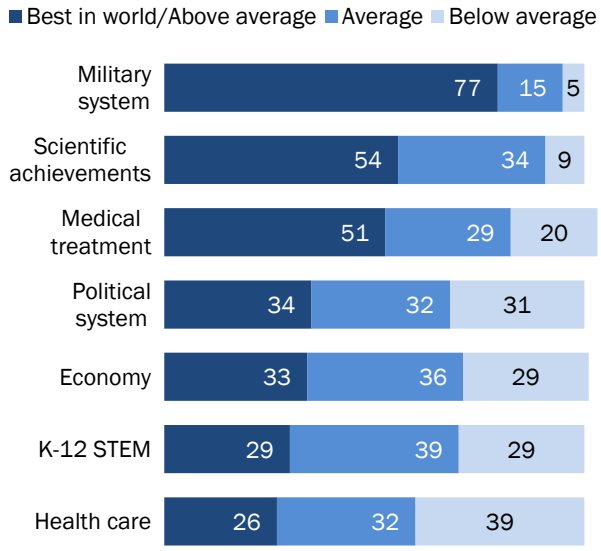
This chapter covers the core findings about the overall place of science as found in the Pew Research survey of the general population and that of a representative group of scientists who belong to the American Association for the Advancement of Science.

The Public Image of the U.S. as a Global Leader in Key Sectors

In the survey, we wanted to understand the public's views about science in the context of other key American institutions and industries, including some outside the realm of science and technology. A mixed picture emerges in people's responses as they generally value U.S. scientific achievements but are critical about the state of science and math education to primary and secondary school students.

Public Esteem for U.S. Military Highest, Scientific Achievements Second in Global Comparison

% of U.S. adults saying each area is the best/above average, average, or below average compared with other industrialized countries



Survey of U.S. adults August 15-25, 2014. Q2a-hf2. Questions about medical treatment and health care were asked of a randomly selected half of respondents. Those saying don't know are not shown.

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Overall, 54% of adults consider U.S. scientific achievements to be either the best in the world (15%) or above average (39%) compared with other industrial countries. In this question series,

the only aspect of American society rated more favorably is the U.S. military system, with 77% of adults saying the U.S. military is the best in the world or above average.

The public's views of how the education system is teaching science, technology, engineering, and math (called STEM) to K-12 students is considerably less glowing. About three-in-ten (29%) adults consider U.S. STEM education for grades K-12 to be above average or better compared with other industrialized countries, another 39% say it is average and 29% say it is below average. [11]

Public assessments of the U.S. medical system vary strongly, depending on the focus of the question. Half of the survey respondents were asked to rate "U.S. medical treatment" while the other half were asked about "U.S. health care." Americans' views of "medical treatment" in the U.S. were considerably more positive than their views of "health care." Some 51% of those asked about medical treatments rated it the best in the world or above average. On the other hand, only 26% said U.S. "health care" was the best or above average. These differences likely arise from different connotations associated with each term. Those assessing "treatments" might have been thinking about medical advances in fighting diseases and creating medical devices and felt the science community is making notable progress. On the other hand, those asked about "health care" might have been making a broader assessment about the system of providing health care in America, the subject of considerable public dispute in recent years.

Public assessments of the U.S. political system and the economy are mixed. Fully 34% of adults say the U.S. political system is the best or above average, another 32% say it is average and 31% say it is below average compared with other industrialized countries. Similarly, a third (33%) of adults say the U.S. economy is the best or above average, 36% say it is average and 29% say is below average.

[11] For international student performance comparisons see "Chapter 1: Elementary and Secondary Mathematics and Science Education" in *Science and Engineering Indicators 2014*.

Changes in Public Image of U.S. Institutions

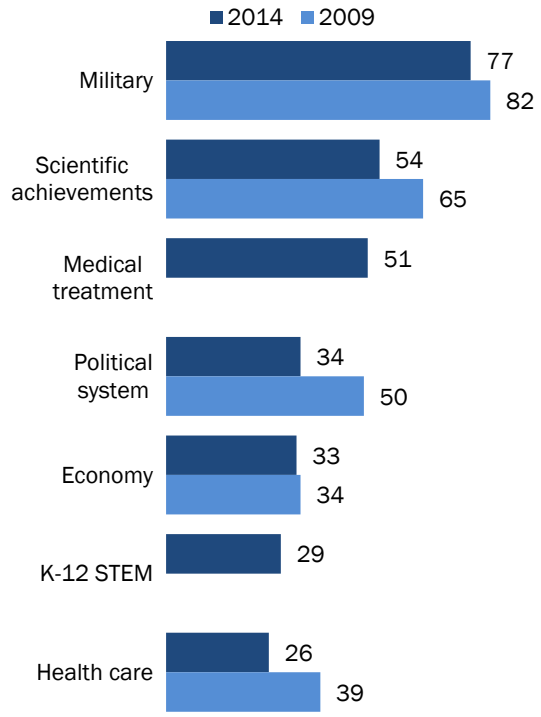
Americans' views about the relative rank order of the topmost institutions is about the same as it was in 2009, when Pew Research last asked the public to rate sectors in this way. But, the public is less enthusiastic about the standing of the U.S. compared with other industrialized countries in several areas including the political system, scientific achievements, and health care.

Public esteem for the military is down modestly from 2009 although most Americans still hold the military in high regard. Fully 77% of adults say the military is among the best or better than average compared with other industrialized countries, down from 82% in 2009.

Scientific achievements, while also seen in largely positive terms, are down 11 points from 65% in 2009 to 54% today saying U.S. scientific achievements are the best or above average compared with other industrialized countries. More now see U.S. scientific achievements as "average" in global comparisons (up from 26% in 2009 to 34% today) or "below average" (up slightly from 5% in 2009 to 9% today).

Lower Marks for U.S. as Global Leader in Politics, Science, Health Care

% of U.S. adults saying each area is the best or above average compared with other industrialized countries



Survey of U.S. adults August 15-25, 2014. Q2a-hf2. Comparison with survey conducted April 28-May 12, 2009. Other responses not shown. Questions about medical treatment and health care were asked of a randomly selected half sample in 2014. Medical treatment and K-12 STEM education were not asked in 2009.

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The public's still-positive ratings of U.S. scientific achievements are followed closely by those for medical treatments with 51% saying it is the best in the world or above average. (The 2009 survey did not ask about medical treatment.)

By contrast, just 26% of adults today say that U.S. "health care" is above average or the best in the world, down 13 points from 39% in 2009.[12] Political differences explain much of this change. In

[12]A randomly selected half of respondents in the new survey rated U.S. "medical treatment" while the other half rated U.S. "health care."

2009, Republicans and independents who lean to the Republican Party were much more inclined than their Democratic counterparts to see the U.S. health care system in a positive light (55% vs. 28% of each group, respectively, said it was the best in the world or above average). But Republicans' opinions about the place of U.S. health care in a global context have dropped sharply since 2009, while views among Democrats' have dropped a more modest 6 points. These partisan differences are likely related to the debate over the Affordable Care Act, also called "Obamacare," during the same period. As a result, both groups now hold roughly similar views of how U.S. health care stacks up in a global context.

Perceptions of the U.S. political system have also dropped over the same time period. Yet, unlike perceptions of health care, people's views about the political system are not associated with party affiliation. Today, 34% of adults say the U.S. political system is the best in the world or above average compared with other industrialized countries, down 16 points from 50% in 2009. Partisan groups hold similar views about the political system, as was also the case in 2009.

People's perceptions of the U.S. economy in global comparison have held steady. A third of adults (33%) says the U.S. economy is the best or above average relative to other industrialized countries, roughly the same as in 2009 (34%).

Patterns Among the General Public

There were some modest demographic differences among respondents in assessing U.S. scientific achievements today. Men are more likely than women (60% vs. 48%) to consider U.S. scientific achievements to be at least above average compared with other nations. Those with a college degree tend to give higher marks to U.S. scientific achievements (as well as several other domains) than do those with less formal education. But, those with a degree in a science field do not differ from other college graduates in their views about U.S. scientific achievements. And, there are no significant differences on this rating by age or political orientation.

There are no or only modest differences in assessments of K-12 STEM education by gender, age, or political leanings. But unlike ratings of U.S. scientific achievements, education is inversely related to ratings of STEM education for grades K through 12: 35% of college graduates say K-12 STEM is below average compared with other nations while 23% of those with no more than a high school diploma say the same.

Comparing Public and AAAS Scientists' Views

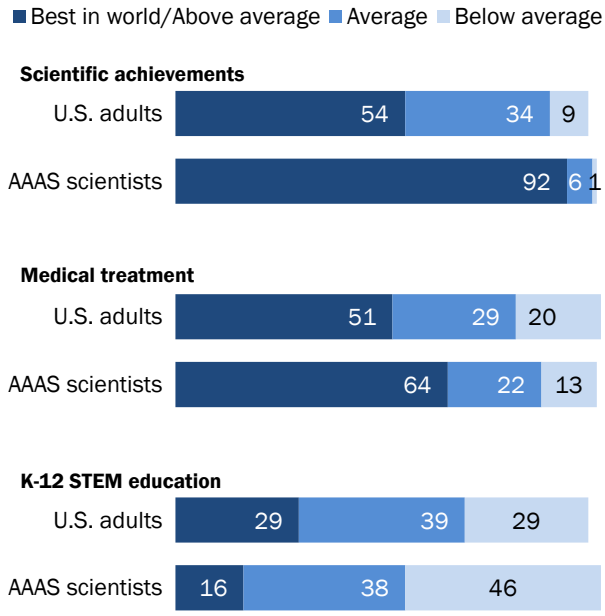
Scientists are far more positive about the country's scientific achievements and its medical treatments than the general public. But, scientists are also more downcast about K-12 STEM education than the public.

Fully nine-in-ten (92%) AAAS scientists say scientific achievements in the U.S. are the best in the world (45%) or above average (47%). In 2009, 94% of scientists said the same. Scientists are also positive about the global standing of U.S. medical treatment; nearly two-thirds of scientists (64%) consider U.S. medical treatment to be above average or better than other industrialized countries. About half of the general public (51%) says the same.

But both AAAS scientists and the general public are markedly less positive about K-12 STEM education – and the scientists are the most critical. Just 16% of scientists and 29% of the general public say that U.S. STEM for grades K-12 is above average or the best in the world.

Scientists' Even More Positive About U.S. Scientific Achievements, Medical Treatment Than Public, And Even More Negative About K-12 STEM Education

% of U.S. adults and AAAS scientists rating scientific achievements, medical treatment and K-12 STEM education in the U.S. compared with other industrialized countries



Survey of U.S. adults August 15-25, 2014. Q2a,gf1,e. AAAS scientists survey Sept. 11 - Oct. 13, 2014, Q3,4a,d. Those saying don't know or giving no answer are not shown.

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Scientists are Less Upbeat Than They Used To Be

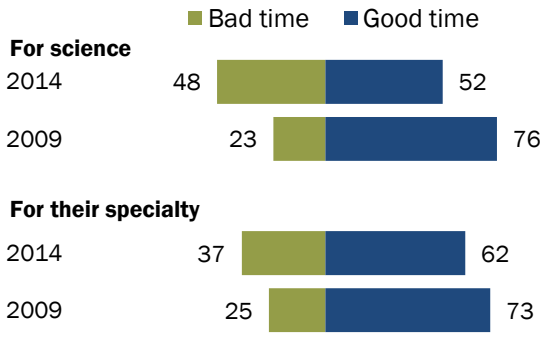
Despite their overall positive views, scientists are more downbeat about the general state of science compared with five years ago. Today, 52% of AAAS scientists say this is good time for science, down from 76% in 2009.

Scientists tend to be more positive, by comparison, when it comes to the state of their scientific specialty. Yet, here too, scientists today are less rosy in their assessments than in our previous survey. Some 62% of AAAS scientists say this is a good time for their specialty area, down 11 percentage points from 2009.

The drop since 2009 in views about the state of science occurred among AAAS scientists of all disciplines, those with a basic and applied research focus, and among those working in industry and those in academia. For more on scientists' assessments of science and technology today and in comparison with other industrialized nations, see Chapter 4.

Scientists Less Upbeat Today About the State of the Field

% of AAAS scientists saying this is a ... for science/their scientific specialty



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q1-2. AAAS scientists survey May 1 – June 14, 2009. Those giving no answer are not shown.

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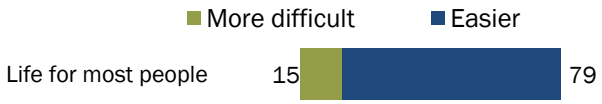
Effects of Science on Society

The general public tends to see the role of science in society positively. About eight-in-ten adults (79%) say that science has made life easier for most people while just 15% say it has made life more difficult. The balance of positive to negative views is a bit less rosy today than in 2009 when 83% said that science had made life easier and 10% said it made life more difficult.

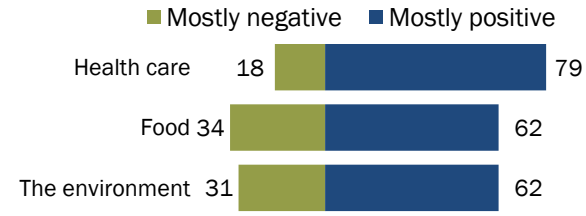
Further, a majority of adults say that the effect of science has been positive when it comes to the quality of three specific aspects of life. Fully 79% say science has been a positive force in the quality of U.S. health care; 62% say science's impact on food is positive; and, 62% say the same thing about the impact of science on the environment.

Most Citizens See Benefits of Science

% of U.S. adults saying science has made life for most people easier or more difficult



% of U.S. adults saying effect of science on the quality of each area in the U.S. has been mostly positive or negative



Survey of U.S. adults August 15-25, 2014. Q4, Q5a-c. Those saying don't know or volunteering other responses are not shown.

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These positive public views about the effect of science in each domain are down modestly from 2009 for health care (6 percentage points lower), for food quality (4 percentage points lower) and for the quality of the environment (4 percentage points lower). The corresponding uptick in negative views is a bit larger (8 to 10 percentage points) because more expressed a judgment on these issues in 2014 than did so in 2009. Thus, the balance of public views is somewhat less positive today than in 2009 for all three areas.

Patterns Among the General Public

Any differences in assessments of the effect of science overall or across these domains by gender, age, education or political leanings tend to be modest. Adults under age 50 are more positive about the effects of science on life for most people and about the effect of science on health care than are those ages 50 and older. But, both age groups have about the same views when it comes to the effect of science on the quality of food and the environment. And, college graduates are more positive than those with less education on three of these four assessments.

Despite increased political differences on assessments of climate change in recent years, two-thirds (66%) of Republicans and independents who lean toward the Republican Party say that the effect of science on the quality of the environment in the U.S. has been mostly positive, as do 61% of Democrats and independents who lean toward the Democratic Party. (A detailed analysis of the differences and similarities among those with different political views about science and technology topics will be issued later this year.)

Modest Shifts in the Perceived Effect of Science on Health Care, Food and the Environment Over Time

% of U.S. adults saying science has had a mostly positive or negative effect on each

	Mostly positive	Mostly negative	No effect (vol.)/ Don't know	
Quality of health care				
2014	79	18	3	=100
2009	85	10	5	=100
Diff. '14-'09	-6	+8	-2	
Quality of food				
2014	62	34	4	=100
2009	66	24	10	=100
Diff. '14-'09	-4	+10	-6	
Quality of the environment				
2014	62	31	7	=100
2009	66	23	10	=100
Diff. '14-'09	-4	+8	-3	

Survey of U.S. adults August 15-25, 2014.Q5a-c. Comparison with survey conducted April 28-May 12, 2009. Figures may not add to 100% due to rounding.

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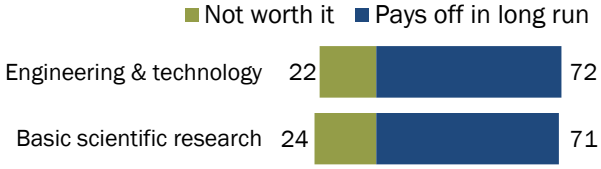
Funding for Research

A solid majority of the public expresses support for government funding for science and technology. About seven-in-ten adults say that government investments in engineering and technology (72%) and in basic scientific research (71%) usually pay off in the long run. While support for funding is about the same as in 2009, negative views that each type of funding is "not worth it" have edged up (5 percentage points for engineering and technology and 6 points for basic science research).

Broad Public Support for Science Research Funding

% of U.S. adults saying that government investments in ... usually pay off in the long run, or are not worth it



Survey of U.S. adults August 15-25, 2014. Q12a-b. Those saying don't know are not shown.

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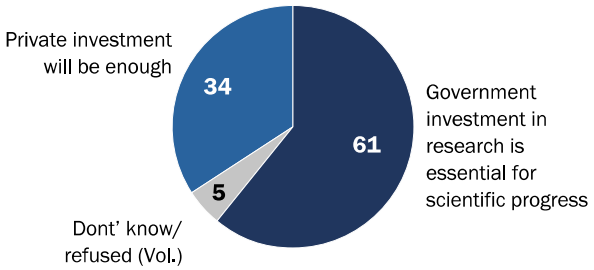
A majority of the public considers government funding critical to the scientific enterprise. Fully 61% say that government investment is essential for scientific progress while 34% say that "private investment will ensure that enough scientific progress is made, even without government investment" in research. A similar share in 2009 said that government investment was essential (60%) and a slightly smaller share, 29%, said private investment would be enough to ensure progress.

Majority of Public Sees Government Research Funding as Essential

% of U.S. adults who say ... comes closest to their view



Survey of U.S. adults August 15-25, 2014. Q13.

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Patterns Among the General Public

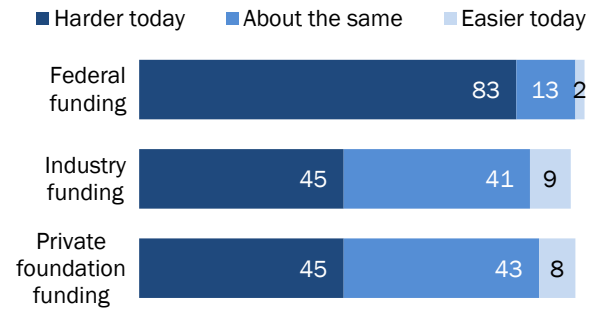
Support for government funding of research tends to be widespread across the demographic spectrum. Fully 74% of women and 68% of men say that government funding of basic science pays off in the long run; men and women are about equally likely to say that government funding of engineering pays off in the long run (72% each). College graduates tend to express more support for research funding than do those with less formal education. Similarly, younger generations are a bit more likely than older ones to say research funding pays off in the long run, but a majority of all age groups say that government funding of both basic science and engineering research pays off in the long run.

Scientists' Views about Funding

These findings come at a time when some leaders in the scientific community have raised concerns about adequate funding for science research.[13] For instance, Francis Collins, head of the National Institutes of Health, recently argued that an Ebola vaccine probably would have been created "if we had not gone through our 10-year slide in research support" by the government.[14] And, new articles in the *Journal of the American Medical Association* (*JAMA*) highlight the slowed U.S. investments in biomedical research and argue this puts the U.S. "at risk for losing its global scientific leadership and competitiveness."[15] The National Science Board's biennial review of science and engineering indicators reports the total research and development (R&D) funding in the U.S., especially industry funding, "broke away from [its] long-term growth trend" during the Great Recession and that while funding recovered somewhat, "the deviation from the long-term trend is still discernible" as of 2011.[16]

Scientists See Funding Environment As Harder Today than Five Years Ago

% of AAAS scientists saying that compared with five years ago funding in their specialty area from each source is harder/ about the same/easier today



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q9-11. Those giving no answer are not shown.

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Fully 83% of AAAS scientists say that getting government funding in their specialty area is harder today than it was five years ago, just 2% say getting federal funding is easier today and 13% say it is about the same. Some 45% of AAAS scientists also say it is harder to get research funding from industry sources or from private foundations today compared with five years ago.

Further, when asked to consider whether each of seven potential issues is a "serious problem for conducting high quality scientific research today" only one was selected by a majority of scientists: lack of funding for basic research. Some 88% of AAAS scientists report that lack of research funding hinders research today.

[13] For data on trends in research funding from government and industry sources see Chapters 4, 5 and 6 in the *Science and Engineering Indicators 2014*. The Congressional Research Office reviews federal research and development funding across agencies over recent years, The AAAS also compiles trend data on federal government research funding.
[14] Reported by Sam Stein, Oct. 12, 2014 "Ebola Vaccine Would Likely Have Been Found By Now If Not for Budget Cuts: NIH Director"
[15] See Moses et al. "The Anatomy of Medical Research: US and International Comparisons," *JAMA, vol.* 313(2):174-189, and accompanying editorial by Dzau and Fineberg,"Restore the US Lead in Biomedical Research," *JAMA*, vol. 313(2):143-144, Jan. 13, 2015.
[16] See the "Overview" in the *Science and Engineering Indicators 2014*.

A majority of AAAS scientists identity funding as a serious problem for conducting research today, regardless of discipline, employment setting, or a basic or applied research focus in their own research.

For more on AAAS scientists' views about funding, problems for conducting research and other issues in science today, see Chapter 4.

Chapter 3: Attitudes and Beliefs on Science and Technology Topics

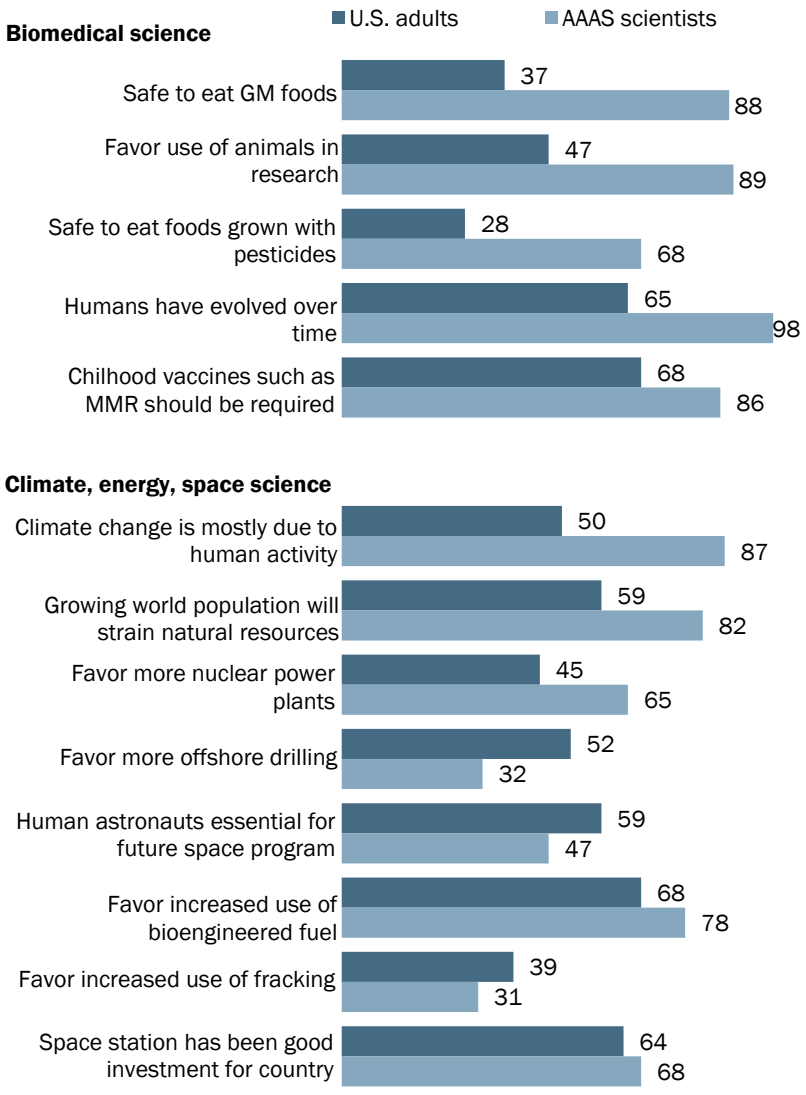
Citizens and scientists often see science-related topics issues through different sets of eyes. This is hardly a new reality, but there are particularly stark differences across the board in these surveys.

The largest differences are found in beliefs about the safety of eating genetically modified foods. Fully 88% of AAAS scientists say it is generally safe to eat genetically modified (GM) foods compared with 37% of the general public who say the same, a gap of 51 percentage points. Sizable opinion differences occur on both biomedical science as well as physical science topics: Only two of the 13 comparisons find a difference of less than 10 percentage points.

There is no single direction of differences between the groups. For example, when it comes to building more nuclear power plants scientists are *more* inclined than the general public to favor the idea (65% vs. 45%, respectively), while when it comes to increasing the use of hydraulic

Opinion Differences Between Public and Scientists

% of U.S. adults and AAAS scientists saying each of the following



Survey of U.S. adults August 15-25, 2014. AAAS scientists survey Sept. 11-Oct. 13, 2014. Other responses and those saying don't know or giving no answer are not shown.

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fracturing scientists are *less* inclined than the general public to favor the idea (31% vs. 39%, respectively).

The remainder of this chapter looks at attitudes of the public and scientists on each of these issues. In addition, we look at opinions on several issues asked only of the general public related to bioengineering, genetic modifications, and perceptions of scientific consensus on evolution, climate change, the creation of the universe, and health effects of genetically modified organisms (GMOs). Throughout, we briefly evaluate patterns in science and technology attitudes by gender, age, race/ethnicity and education. More details on views among the general public by subgroups, including by education, science knowledge, religion and political groups, are forthcoming in a separate report.

Safety of Genetically Modified Foods – 51-Point Gap

A minority of adults (37%) say that eating genetically modified foods is generally safe, while 57% say they believe it is unsafe. By contrast, nearly all AAAS scientists (88%) say they consider eating GMOs to be generally safe.

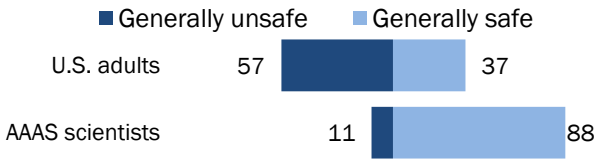
The general public also tends to be skeptical about the scientific understanding of GMO effects. A minority of adults (28%) say they think scientists have a clear understanding of the health effects of genetically modified crops while 67% say their view is that scientists do *not* clearly understand this.

Patterns Among the General Public

Among the general public, those with a college degree are closely divided over whether eating genetically modified foods is safe: 49% of those with college degrees say it is generally safe, while 47% say it is generally unsafe. Those with a college degree are still substantially less likely than AAAS scientists to consider GM foods safe to eat, however (49% compared with 88%).

Eating Genetically Modified Foods

% of each group saying it is generally safe or unsafe to eat genetically modified foods



Survey of U.S. adults August 15-25, 2014. Q38. AAAS scientists survey Sept. 11 – Oct. 13, 2014.Q28 Those saying don't know or giving no answer are not shown

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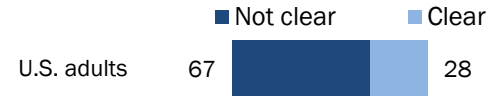
Public Skeptical About Scientific Understanding on GMOs

% of U.S. adults saying scientists have a clear/not clear understanding of the health effects of genetically modified crops



Survey of U.S. adults August 15-25, 2014. Q39. Those saying don't know are not shown

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Fewer women (28%) than men (47%) believe eating GM foods is safe. Opinions also tend to vary by race and ethnicity with fewer blacks (24%) and Hispanics (32%) than whites (41%) saying that GM foods are safe to eat. Views about GMOs are roughly the same among both younger (ages 18 to 49) and older (50 and older) adults.

About half of U.S. adults report that they always (25%) or sometimes (25%) look to see if products are genetically modified when they are food shopping. Some 31% say they never look for such labels and 17% say they do not often look.

Not surprisingly, those who consider GM foods unsafe tend to check for GM food labels more often: 35% of this group always looks to see if products are genetically modified, compared with 9% among those who consider such foods generally safe to eat.

Seeking GMO Labels?

% of U.S. adults who say they look to see if products are genetically modified when food shopping

Always look	25
Sometimes	25
Not too often	17
Never look	31
Don't know/No food shopping (vol.)	2
	100

Survey of U.S. adults August 15-25, 2014. Q37.

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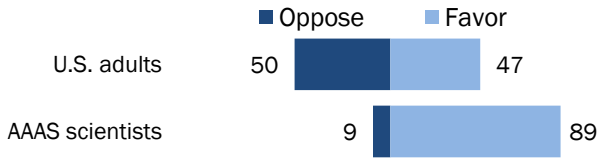
Animal Research – 42-Point Gap

The general public is closely divided when it comes to the use of animals in research. Some 47% favor and a nearly equal share (50%) oppose animal research. Support for the use of animals in research is down slightly from 52% in 2009. By contrast, there is strong consensus among AAAS scientists for the use of animals in research (89% to 9%).

Use of Animals in Scientific Research

% each group saying they favor or oppose the use of animals in scientific research



Survey of U.S. adults August 15-25, 2014. Q24a. AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q22a Those saying don't know or giving no answer are not shown.

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Patterns Among the General Public

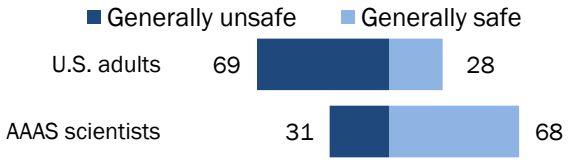
Among the general public, men and women differ strongly in their views about animal research. Six-in-ten men favor the use of animal research. By contrast, 35% of women favor animal research while 62% oppose it. College graduates, especially those who studied science in college, tend to express more support than do those with less education for using animals in scientific research.

Food Grown with Pesticides – 40-Point Gap

A similar pattern occurs when it comes to the safety of eating foods grown with pesticides. About seven-in-ten (69%) adults say that eating such foods is generally *unsafe*, while 28% say it is safe. By contrast, 68% of AAAS scientists consider eating foods grown with pesticides to be generally safe, and 31% say it is generally unsafe.

Eating Foods Grown with Pesticides

% of each group saying it is generally safe or unsafe to eat foods grown with pesticides



Survey of U.S. adults August 15-25, 2014. Q35. AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q27 Those saying don't know or giving no answer are not shown.

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Patterns Among the General Public

As with views about the safety of eating GM foods, those with more education are more likely than those with less schooling to say that foods grown with pesticides are safe to eat. And, more men than women say such foods are safe, though a minority of both groups consider eating foods with grown with pesticides to be safe (38% among men and 18% among women). There are no differences in views on this issue by age.

Beliefs about Human Evolution – 33-Point Gap

About two-thirds (65%) of Americans say that "humans and other living things have evolved over time" while 31% say "humans and other living things have existed in their present form since the beginning of time." Public beliefs about human evolution are similar to when asked in previous Pew Research surveys, including the 2009 poll.

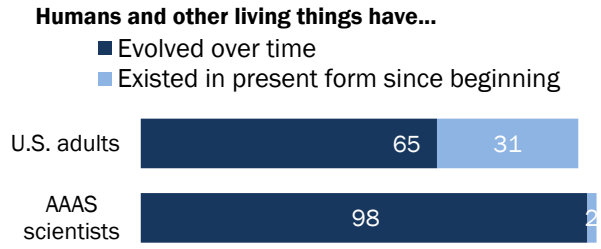
Roughly half of those who say that humans have evolved over time believe that evolution has occurred from natural processes such as natural selection (35% of all adults), while a somewhat smaller share (24% of all adults) believe a supreme being guided the evolution of humans and other living things.

Patterns Among the General Public

Three-quarters (75%) of college graduates believe that humans have evolved over time, compared with 56% of those who ended their formal education with a high school diploma or less. Beliefs about evolution also differ strongly by religion and political group, as was also the case in past surveys. A detailed analysis of religious and political group beliefs about science and technology topics based on these new survey findings is forthcoming.

Beliefs About Human Evolution

%



Survey of U.S. adults August 15-25, 2014. Q16. AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q16. Those saying don't know or giving no answer are not shown.

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Trend on Beliefs About Evolution

% of U.S. adults

	May 2009	Apr 2013	Mar 2014	Aug 2014
Humans have evolved	61	60	61	65
Evolved due to natural processes	32	32	34	35
Supreme being guided evolution	22	24	23	24
Evolved, DK	7	4	4	5
Humans have existed in present form since beginning	31	33	34	31
Don't know	8	7	5	4
	100	100	100	100

Survey of U.S. adults August 15-25, 2014. Q16-17. Trends from Pew Research. Figures may not add to 100% and nested figures may not add to net due to rounding.

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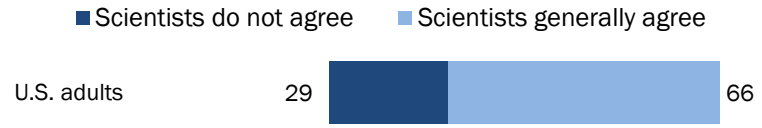
Regardless of their personal beliefs about evolution, 66% of the public say they believe that scientists generally agree that humans have evolved over time while 29% say that scientists do not agree about this.

About half (47%) of those who personally believe that humans have existed in their present form since the beginning of time also see scientists as generally in agreement that humans have evolved. Three-quarters of those who believe humans have evolved also see scientists as largely in agreement about evolution.

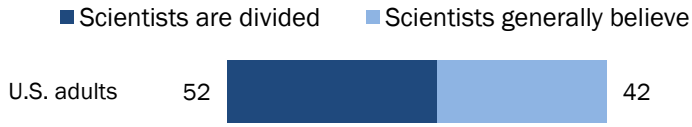
Do Scientists Generally Agree About Evolution?

% of U.S. adults saying scientists generally agree or do not agree that humans evolved over time



Do Scientists Generally Believe in 'Big Bang'?

% of U.S. adults saying scientists generally believe the universe was created in a single, violent event or that scientists are divided in their views about how the universe was created



Survey of U.S. adults August 15-25, 2014. Q18, 32. Those saying don't know are not shown.

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Perceptions of scientific consensus around the creation of the universe are less uniform. Some 42% of the public as whole says that scientists generally agree the universe was created in a single event often called "the big bang," while 52% say that scientists are divided in their views about creation of the universe.

Patterns Among the General Public

Perceptions of scientific consensus on both evolution and the creation of the universe tend to vary by education. About three-quarters of college graduates (76%) say scientists generally agree about evolution, compared with 58% of those with a high school education or less. Similarly, about half of those with a college

Perception of Scientific Consensus by Personal Beliefs About Evolution

% of U.S. adults in each group saying scientists generally agree or do not agree that humans evolved over time

	Scientists agree	Scientists do not agree	Don't know	
Among those who say...				
Humans have evolved over time	76	20	3	=100
Humans existed in present form since beginning	47	46	7	=100

Survey of U.S. adults August 15-25, 2014. Q18. Figures may not add to 100% due to rounding.

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degree (52%) say that scientists generally believe the universe was created in a single, violent event compared with 33% of those with a high school degree or less education who say the same. Perceptions of scientific consensus also tend to vary by age with younger generations (ages 18 to 49) more likely than older ones to see scientists as in agreement on these topics.

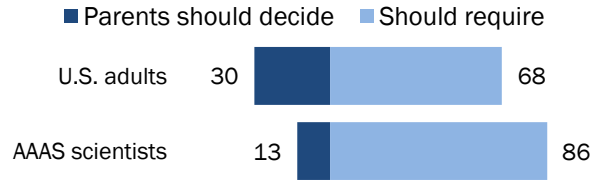
Vaccines and Access to Experimental Treatments – 18-Point Gap

Asked about whether vaccines for childhood diseases such as measles, mumps, rubella (MMR) and polio should be required or left up to parental choice, 68% of adults say such vaccines should be required while 30% say that parents should be able to decide whether or not to vaccinate their children. Scientists are more likely than the general public to say that such vaccines should be required for all children: 86% of scientists say this compared with 68% among the general public.

Opinion about childhood vaccines among both the public and scientists is about the same as in 2009. Scientists are a bit more likely to say that vaccines should be required (up from 82% to 86% today). Thus the divide between public and scientists' views has ticked up from 13 to 18 percentage points today.

Childhood Vaccines

% of each group saying that parents should be able to decide not to vaccinate their children or that all children should be required to be vaccinated



Survey of U.S. adults August 15-25, 2014. Q25. AAAS scientists survey Sept. 11 – Oct. 13, 2014.Q23 Those saying don't know or giving no answer are not shown.

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Patterns Among the General Public

Younger adults are less inclined than older generations to believe vaccines should be required for all children: 37% of adults under age 50 say parents should be able to decide *not* to vaccinate their children compared with 22% of those ages 50 and older. Men and women hold similar views about requiring vaccines. There are no significant differences in views about this issue by education or race and ethnicity.

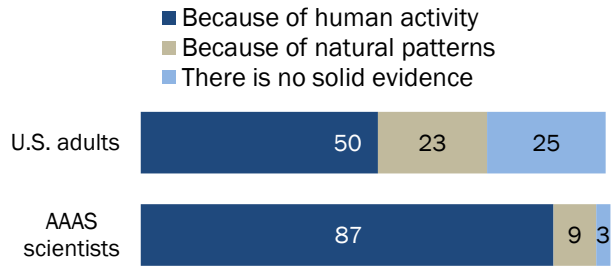
Climate Change – 37-Point Gap

Public attitudes about climate change have become increasingly contentious over the past several years. The new Pew Research survey included two separate measures to gauge public attitudes about climate change. When asked to pick among three choices, 50% say that climate change is occurring mostly because of human activity such as burning fossil fuels, 23% say that climate change is mostly because of natural patterns in the earth's environment, and another 25% say there is no solid evidence the earth is getting warmer. The share of the public saying climate change is due to human activity is about the same as when last asked in a 2009 Pew Research survey, but more now say there is no solid evidence of warming (25% today, up from 11% in 2009) and fewer say that warming is occurring due to natural patterns in the environment (23% today, down from 36% in 2009).

AAAS scientists' views about climate change, using the same three-choice measure, contrast starkly with that of the public. Fully 87% of scientists say climate change is occurring due to human activity, 9% say climate change is mostly due to natural patterns and just 3% of this group says there is no solid evidence the earth is getting warmer. An overwhelming majority of AAAS scientists from all disciplinary specialties believe that climate change is mostly due to human activity. Those with a primary specialty in the earth sciences hold about the same views as all AAAS scientists surveyed (89% say

Beliefs About Climate Change

% of each group saying that the earth is getting warmer because of human activity/because of natural patterns in earth's environment/ or that there is no solid evidence that earth is getting warmer



Survey of U.S. adults August 15-25, 2014. Q20F1. AAAS scientists survey Sept. 11 – Oct. 13, 2014. Those saying don't know are not shown.

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Is Climate Change a Problem?

% in each group who say climate change is a…

	U.S. adults 2013	AAAS scientists 2014
Very serious problem	33	77
Somewhat serious problem	32	17
Not too serious a problem	13	4
Not a problem	20	2
Don't know/No response	2	*
	100	100

Survey of U.S. adults March 13-17, 2013. Question of the general public asked about "global warming." AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q19.

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climate change is mostly due to human activity). In 2009, 84% of AAAS scientists said the earth was warming mostly because of human activity.[17]

Scientists are also considerably more inclined than the general public as a whole to see climate change as a problem. Fully 77% of AAAS scientists say that climate change is a very serious problem. In a 2013 Pew Research survey, a third of adults said that "global warming" was a very serious problem. The highest share of those holding that view since the question was first asked in 2006 was 45% in 2007.

There are a number of ways to canvass opinion about climate change issues. In a separate series of questions, adults in the general public were asked whether or not there is solid evidence that the average temperature of the earth has been getting warmer over the past few decades. Fully 72% of adults say there is solid evidence of warming, while a quarter (25%) say there is no solid evidence of this.

Follow-up questions find that most of those who believe the earth is warming think warming is due to human activity (46% of all adults), rather than natural patterns in the earth's environment (22% of all adults). Those who say there is no solid evidence the earth is getting warmer are split between those who say the evidence is not yet clear (11% of all adults) and that warming is not occurring (13% of all adults).

Public Views About Climate Change

% of U.S. adults

	2014
Yes, there is solid evidence earth is getting warmer	72
Mostly due to human activity	46
Mostly due to natural patterns	22
Don't know reason	3
No, there is no solid evidence earth is getting warmer	25
Just don't know enough yet to say	11
This is not happening	13
Don't know which	1
Don't know	2
	100

Survey of U.S. adults August 15-25, 2014. Q21AF2-Q21CF2. Figures may not add to 100% and nested figures may not add to net due to rounding.

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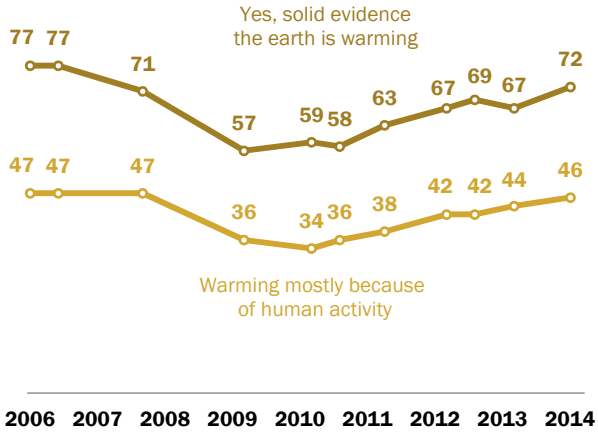
[17] While survey findings typically vary depending on the sample studied and the exact questions asked, these findings are broadly in keeping with studies of earth science and climatology specialists. A number of studies have been done on this topic. For example, a survey conducted circa 2008 found 90% of earth scientists saying that average global temperatures had risen and 82% saying that human activity was "a significant contributing factor in changing mean global temperatures." Those with more direct expertise in climate science were even more likely to say that human activity was a significant factor in climate change. See P.T. Doran and M.K. Zimmerman, 2009. *Eos,* vol. 90 (3). An analysis of publications by climate researchers found 97–98% support "the tenets of ACC outlined by the Intergovernmental Panel on Climate Change." See W.R.L. Anderegg, et al. July 6, 2010. *Proceedings of the National Academy of Sciences*, vol. 107 (27): 12107-12109.

Americans' views of the evidence related to climate change have fluctuated somewhat over the last few years. Since 2012, roughly two-thirds or more of Americans see solid evidence the earth is warming, up from roughly six-in-ten in 2009 to 2010. But when the Pew Research Center asked this question in August 2006 and early 2007, 77% said there was solid evidence that the average temperature on earth had been increasing.

Views about the role of human activity in climate change have followed a similar trajectory.

Trends in Views About Climate Change

% of U.S. adults



Survey of U.S. adults August 15-25, 2014. Q21AF2,Q21BF2. Trends from Pew Research. Other responses and those saying don't know are not shown.

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Patterns Among the General Public

Views about climate change tend to differ by party and political ideology, as also was the case in past surveys. Democrats are more likely than either political independents or Republicans to say there is solid evidence the earth is warming. And, moderate or liberal Republicans are more likely to say the earth is warming than are conservative Republicans. Past Pew Research surveys have also shown more skepticism among Tea Party Republicans that the earth is warming.[18]

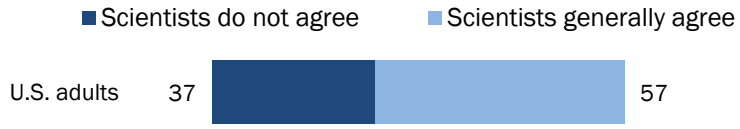
Consistent with past surveys, there are wide differences in views about climate change by age, with adults ages 65 and older more skeptical than younger age groups that there is solid evidence the earth is warming.

[18] Pew Research Center "GOP Deeply Divided Over Climate Change," Nov. 1, 2013.

A majority of Americans (57%) say they believe that scientists generally agree that the earth is warming because of human activity, while 37% say that scientists generally do not agree. Perceptions of where the scientific community stands on climate change have fluctuated from a low of 44% in 2010 who said that scientists agree about human activity as the main cause of warming temperatures to a high of 57% saying this today.[19]

Do Scientists Generally Agree About Climate Change?

% of U.S. adults saying scientists generally agree or do not agree that the earth is getting warmer due to human activity



Survey of U.S. adults August 15-25, 2014. Q23. Those saying don't know are not shown.

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These public perceptions tend to be associated with individual views on the issue. For example, those who believe the earth is getting warmer due to human activity are most inclined to see scientists as in agreement on this point. Those who say either that climate change is occurring due to natural patterns in the earth's environment or who do not believe there is solid evidence of climate change are more inclined to see scientists as divided.

Do Scientists Generally Agree that Human Activity Causes Warming?

% of U.S. adults

	2009	2010	2012	2013	2014
Yes, scientists generally agree that earth is getting warmer due to human activity	56	44	45	54	57
No, scientists do not generally agree	35	44	43	37	37
Don't know	9	12	12	10	6
	100	100	100	100	100

Survey of U.S. adults August 15-25, 2014. Q23. Trends from Pew Research. Figures may not add to 100% due to rounding.

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Patterns Among the General Public

As with perceptions of scientific consensus on other topics, public perceptions that scientists tend to agree about climate change tend to vary by education and age. College graduates are more likely than those with less formal education to say that scientists generally agree the earth is getting warmer due to human activity. Younger generations (ages 18 to 49) are more likely than older ones to see scientists in agreement about climate change.

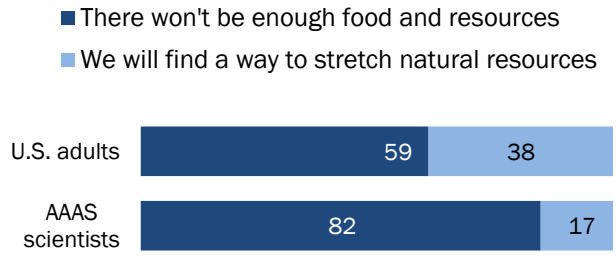
[19] For more on the public's climate change attitudes see Pew Research "GOP Deeply Divided Over Climate Change," Nov. 1, 2013.

Population Growth and Natural Resources – 23-Point Gap

A majority of Americans express concern that world population growth will strain the planet's natural resources: 59% of adults have a pessimistic view about the effect of population growth saying it will be a major problem because there will not be enough food and resources to go around. Nearly four-in-ten (38%) take the view that growth will not be a major problem because the world will find a way to stretch its natural resources.

Resources and Population Growth

% of each group saying the growing world population will or will not be a major problem because…



Survey of U.S. adults August 15-25, 2014. Q28. AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q24. Those saying don't know or giving no response are not shown.

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By comparison, AAAS scientists are particularly likely to express concern about world population growth and natural resources. Fully 82% say population growth will be a major problem while 17% say this will not be a major problem because the world will find a way to stretch its natural resources.

Patterns Among the General Public

African-Americans are more optimistic that new solutions will emerge to address the strains on natural resource caused by a growing world population. Whites and Hispanics, by comparison, are more likely to see the growing world population as leading to a major problem. There are no differences or only modest differences in viewpoints about this issue by gender, age or education.

Energy Issues

Off-shore Drilling and Nuclear Power each has a 20-Point Gap; Fracking has 8-Point Gap

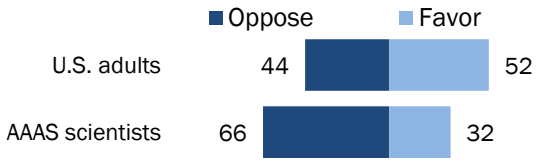
There is a 20-point gap between public and scientists' views on two older energy technologies: offshore oil drilling and nuclear power, but the gap runs in opposite directions for each.[20]

About half of Americans (52%) favor allowing more offshore oil drilling in U.S. waters, while 44% are opposed. By contrast, most AAAS scientists oppose more offshore drilling by a margin of 66% to 32%.

The opposite pattern occurs in views about nuclear power. About half of Americans (51%) oppose building more nuclear power plants, while 45% are in favor. AAAS scientists show more support for nuclear power: 65% favor building more nuclear power plants while 33% are opposed. A majority of scientists support more nuclear power plants regardless of disciplinary specialty.

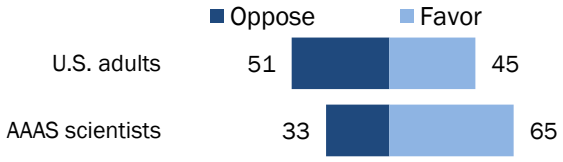
Allow More Offshore Drilling

% of each group saying they favor/oppose allowing more offshore oil and gas drilling in U.S. waters



Building More Nuclear Power Plants

% of each group saying they favor/oppose building more nuclear power plants to generate electricity



Survey of U.S. adults August 15-25, 2014. Q24e,b. AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q22e,b. Those saying don't know or giving no response are not shown.

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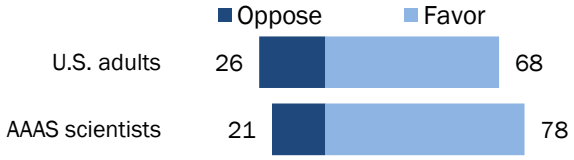
[20] Pew Research surveys about the public's views on "government policies to address America's energy supply" have asked about related issues including opinions about "the government promoting the use of nuclear power" and "government allowing more offshore oil and gas drilling in U.S. waters." See "Continued Support for Keystone XL Pipeline," Sep. 26, 2013.

One newer form of energy development — increased use of genetically-engineered plants as a fuel alternative to gasoline — draws strong support among both the public and AAAS scientists. Fully 68% of Americans and 78% of AAAS scientists favor increased use of this technology.

Views about the increased use of hydraulic fracturing or "fracking" tilt in the opposite direction. A minority of the public (39%) supports the increased use of fracking to extract oil and natural gas from underground rock formations, while about half (51%) are opposed. By comparison, opinion about fracking among AAAS scientists is more negative: 31% of scientists favor the increased use of fracking while66% are opposed. However, scientists' views about fracking vary across specialty areas. Engineers are more supportive of the increased use of fracking (53% favor) while those with biological or medical specialties are less supportive (25% favor). Those with a specialty in the earth sciences fall somewhere in between these two groups (42% favor).

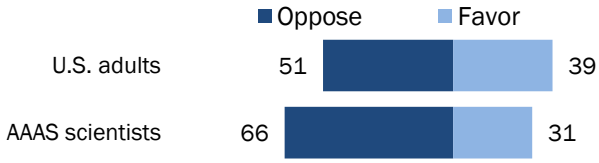
Increase Use of Bioengineered Fuel

% of each group saying they favor/oppose the increased use of genetically engineered plants to create a liquid fuel replacement for gasoline



Increase Use of Fracking

% of each group saying they favor/oppose the increased use of fracking to extract oil and natural gas



Survey of U.S. adults August 15-25, 2014. Q24d,c. AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q22d,c. Those saying don't know or giving no response are not shown.

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Public support for the increased use of fracking has declined since March 2013 when there was more support (48%) than opposition (38%). An earlier Pew Research analysis found that opposition to increased fracking has grown since 2013 particularly among Midwesterners, women, and those under age 50.[21]

Patterns among the general public

Men express more support than women for building nuclear power plants, more offshore drilling, and increased use of fracking. Both men and women hold about the same views when it comes to bioengineered fuel alternatives from plants. There are no or only modest differences by education on these energy issues.

[21] Pew Research Center report, "Little Enthusiasm, Familiar Divisions After GOPs Big Midterm Victory," Nov. 12, 2014. The Nov. 6-9, 2014 Pew Research survey repeated the question about support for fracking among the general public; it found overall support roughly the same as that reported above: 41% favor, 47% oppose the increased use of fracking.

Views about the U.S. Space Program

View of Human Astronauts 12-Point Gap; Modest Difference on Value of Space Station

Many Americans, particularly those among the older generations, recount memories of the "space race" era and the historic events of NASA's Apollo 11 landing a manned aircraft on the moon in 1969.[22] NASA's space shuttle program, which helped build the International Space Station, came to an end in 2011.

A majority of Americans see the space station as a good investment for the country: 64% say the space station has been a good investment, 29% say it has not. Views among AAAS scientists are also broadly positive: 68% of scientists say the space station has been a good investment for the country and 31% dissent from that view.

Space Station

% of U.S. adults and AAAS scientists saying the space station has been ...

	U.S. adults	AAAS Scientists
Good investment for the country	64	68
Not a good investment	29	31
Don't know/ No answer	7	2
	100	100

Survey of U.S. adults August 15-25, 2014. Q29; AAAS scientists survey Sept 11 - Oct. 13, 2014. Q25. Figures may not add to 100% due to rounding.

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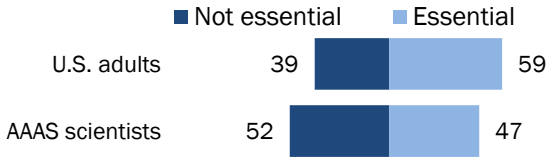
While sending humans into space has been a prominent feature of the U.S. space program in past decades, the future role of human astronauts in the U.S. space program is unclear.[23] The Pew Research survey asked respondents to consider whether the use of human astronauts in the U.S. space program is essential or not essential given the relative costs of manned vs. robotic space exploration. A majority of Americans (59%) take the view that human astronauts are an essential part of future U.S. space exploration. AAAS scientists, by contrast, are closely divided over whether or not human astronauts are essential in the space program going forward; 47% say that human astronauts are essential while 52% say they are not essential.

Space Program and Human Astronauts

% of each group saying it is essential or not essential to include the use of human astronauts in the future of the U.S. space program



Survey of U.S. adults August 15-25, 2014. Q30. AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q26. Those saying don't know or giving no response are not shown.

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[22] In the 2009 Pew Research Center report, 12% of adults cited space exploration or putting a man on the moon as among America's greatest achievements over the past 50 years. For other Pew Research related to the U.S. space program see "Majority Sees U.S. Leadership in Space as Essential," July 5, 2011.

[23] See the National Research Council 2014 report on Pathways to Exploration: Rationales and Approaches for a U.S. Program of Human Space Exploration.

There are only modest differences among scientists by specialty area about this issue. Among those who identify their specialty as physics or astronomy 41% say human astronauts are essential and 58% say they are not essential for the future U.S. space program.

Patterns Among the General Public

Men are more likely than women to say that human astronauts are essential for the future of the U.S. space program (66% vs. 52%, respectively). Views about this issue are roughly the same among age, education racial and ethnic groups.

Access to Experimental Drugs

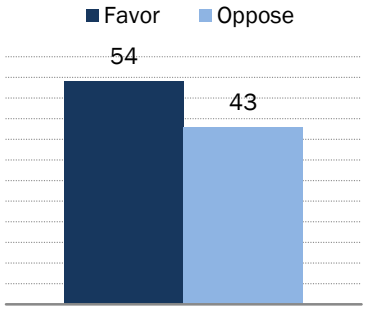
The Pew Research survey also asked the general public (but not the AAAS scientists) for their views about giving more people access to experimental drug treatments before clinical trials have shown whether such drugs are safe and effective for a specific disease or condition. The general public tends to favor this idea by a margin of 54% to 43%.[24]

Patterns Among the General Public

Some 59% of whites favor this idea, compared with about half of Hispanics (48%) and 36% of African-Americans.[25] College graduates and those with higher family incomes tend to be more strongly in favor of this idea than are those with less education or income, respectively. Men and women are about equally likely to favor increased access to experimental drugs before clinical trials are complete, as are those under and over age 50.

Access to Experimental Drug Treatments

% of U.S. adults



Access to experimental drugs before clinical trials show drugs to be safe or effective for that disease or condition

Survey of U.S. adults August 15-25, 2014. Q24f. Those saying don't know are not shown.

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[24] The general issue of access to experimental treatments before new treatments have been fully evaluated the Food and Drug Administration has long been a concern for those suffering from cancer, AIDS, and other life-threatening diseases. Public attention to this issue related to treatment for those with Ebola occurred after this survey was conducted.

[25] This survey cannot provide a definitive explanation of the factors behind such differences. Other Pew Research studies which touch on views about medical treatments have also found sizeable differences among racial and ethnic groups, perhaps stemming from different group experiences as well as differences in religious views. See Chapter 7 in Pew Research Center report "Living to 120 and Beyond: Americans' Views on Aging, Medical Advances and Radical Life Extension," Aug. 6, 2013 and "Views on End-of-Life Medical Treatments," Nov. 21, 2013.

Bioengineering

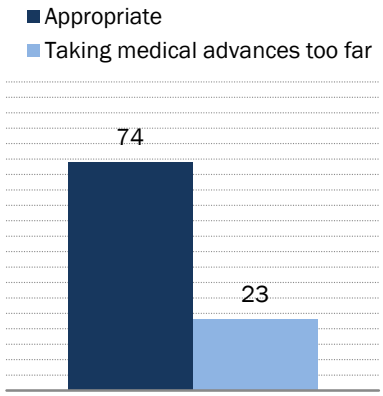
New technologies in science and medicine are generating an increasingly wide array of medical treatments. One such treatment involves creating artificial organs such as hearts or kidneys for transplant in humans needing organ replacement. The Pew Research survey asked the general public (but not the AAAS scientists) whether or not they felt the use of bioengineering to create artificial organs was an "appropriate use of medical advances" or was "taking such advances too far." Fully 74% of adults say that bioengineering of organs is appropriate while 23% say this is taking medical advances too far.

Patterns Among the General Public

Whites are more inclined than African-Americans and Hispanics to say bioengineered organs are appropriate, although majorities in each of the three groups say this is appropriate. There are also modest differences in views about this issue by education and gender; college graduates more so than those with less education say bioengineering of organs is an appropriate use of medical advances. In addition, men more than women say bioengineered organs are an appropriate use of medical advances.

Bioengineering of Artificial Organs

% of U.S. adults saying the use of bioengineering to create artificial organs for humans needing a transplant is ...



Survey of U.S. adults August 15-25, 2014.
Q27. Those saying don't know are not shown.

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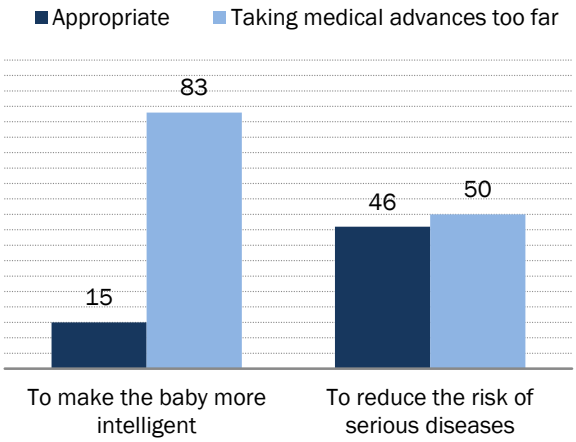
Modifying a Baby's Genes

The survey also asked the public about two possibilities in the realm of genetic modifications. One question sought people's views about changing a baby's genetic characteristics in order to make the baby more intelligent. A separate question asked about changing a baby's genetic characteristics in order to reduce the risk of serious diseases. Public views about the appropriateness of genetic therapies of this sort differ widely depending on the circumstances considered.

Genetic Modifications for Babies

% of U.S. adults saying that changing a baby's genetic characteristics for each purpose is ...



Survey of U.S. adults August 15-25, 2014. Q33-34. Those saying don't know are not shown.

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An overwhelming majority of adults (83%) say that modifying genetic characteristics to make a baby more intelligent is "taking medical advances too far." Just 15% say this would be an appropriate use of medical advances.

By comparison, fewer are negative about genetic treatment to reduce the risk of serious diseases. But opinion about this circumstance is closely divided, with about half of adults (50%) saying genetic changes for this purpose would be taking medical advances too far and a nearly equal share of 46% saying this would be an appropriate use of medical advances.

Patterns Among the General Public

Women are a bit more negative than men about genetic modifications to reduce the risk of serious diseases (54% among women vs. 47% among men say this would be taking medical advances too far). Strong majorities of both men and women are opposed to modifications aimed at increasing a baby's intelligence, although opinion is more negative among women (87%) than it is among men (78%). There are no differences, or only modest differences, in views about genetic modification in these circumstances by race, ethnicity, or education. Younger and older adults also tend to hold similar views on these questions However, those under age 30 are a bit more likely than older adults to say that changing a baby's genetic characteristics in order to reduce disease risk is appropriate.

Chapter 4: AAAS Scientists' Views on the Scientific Enterprise

As scientists size up the culture and their place in it, a majority think it is a good time for science and their own specialty. However, they are notably less upbeat than they were five years ago and express serious concerns about public knowledge of science and the way scientific findings are covered by journalists. Moreover, most scientists believe that policy regulations related to land use and clean water and air are not often guided by the best scientific findings. Notable numbers also say they do not think the best scientific information is often used in crafting policies around food safety and new drug and medical treatments. Additionally, scientists are worried about the prospects for future funding of science and about attracting talent to their fields. This chapter sorts through those issues.

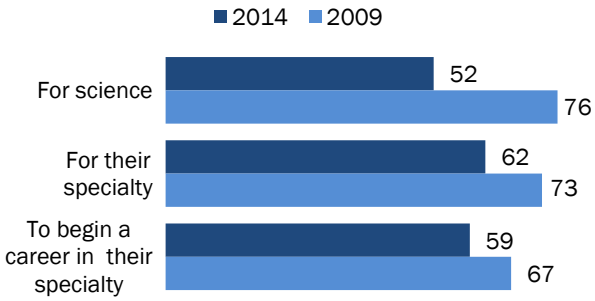
Evaluating Science Today

AAAS scientists are generally less sanguine about the state of science today than they were five years ago at a time when the Great Recession was taking hold.[26] About half of scientists (52%) say this is generally a good time for science, down 24 percentage points from 76% in 2009. Similarly, the share of scientists who say this is generally good time for their scientific specialty is down from 73% in 2009 to 62% today. The drop in positive assessments about the state of science since 2009 occurred among scientists of all disciplines, those with a basic and applied research focus, as well as those working in academia and those working in industry.

When it comes to their own scientific specialty, 59% of AAAS scientists in the Pew Research survey say that this is a good or very good time to begin a career in their field, down from 67% in 2009. Positive assessments about the state of their specialty for new entrants is about the same as in 2009 for those focused on applied research where scientific discoveries are aimed toward a practical purpose. But they are down

Fewer Scientists See Good Times Today

% of AAAS scientists saying it is a good time in each area



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q1-2,Q34. AAAS scientists survey May 1 – June 14, 2009. Those saying bad time or giving no answer are not shown.

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[26] There are, of course, a number of differences in the economic and political context over these time points. While the 2009 survey was conducted during the Great Recession, there was also a promise of scientific funding through the American Recovery and Reinvestment Act of 2009 around the same time.

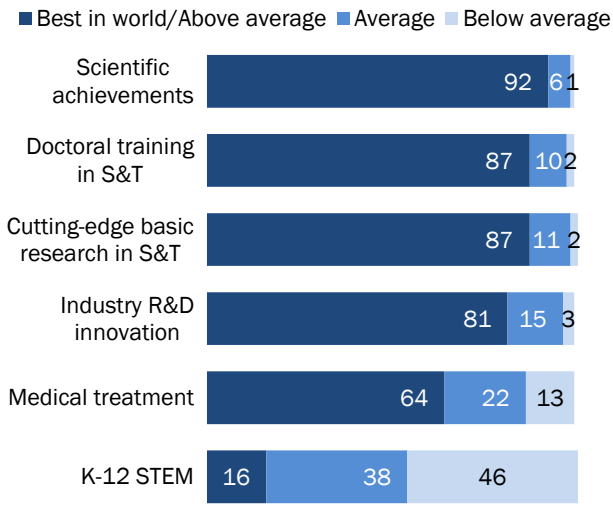
15 percentage points among those doing basic research about the scientific foundations of things. Among basic science researchers views have fallen from 63% who felt it was a good time in 2009 for their discipline to 48% today. Scientists working in a university setting are more downbeat about entering their specialty today than they were in 2009: 49% say it is a good or very good time to begin a career, down 14 points from 63% in 2009. Some 71% of AAAS scientists working in industry say it is a good or very good time to begin a career in their specialty, about the same as said this in 2009 (70%).

U.S. Science Compared with Other Industrialized Countries

AAAS scientists largely agree that U.S. achievements in science are a cut above other industrialized countries. Roughly nine-in-ten (92%) say that U.S. scientific achievements are the best in the world or above average compared with other industrialized countries and there are similarly high assessments when it comes to doctoral training (87%), and cutting-edge basic research (87%). About eight-in-ten scientists (81%) also say that industry research and development (R&D) innovation is above average in a global comparison. Nearly two-thirds (64%) say that U.S. medical treatment is above average.

Scientists Give High Marks to U.S. Science and Technology Compared with Other Industrial Countries, But Are Critical of K-12 STEM Education

% of AAAS scientists saying each area is the best/above average, average, or below average compared with other industrialized countries



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q3-4a-e. Those giving no answer are not shown.

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But when it comes to K-12 science, technology, engineering, and math (STEM) education in America, just 16% of AAAS scientists say that the U.S. is above average or the best in the world compared with other industrialized countries. Some 38% of these AAAS scientists say K-12 STEM education in the U.S. is average, and 46% consider it below average.

The esteem shown for the scientific enterprise in the U.S. is about the same as in 2009. In that survey, 94% of AAAS scientists said that U.S. scientific achievements were the best in the world or above average compared with other industrialized countries. (This is the only question where a comparison over time is available.)

Evidence-Based Government Regulations?

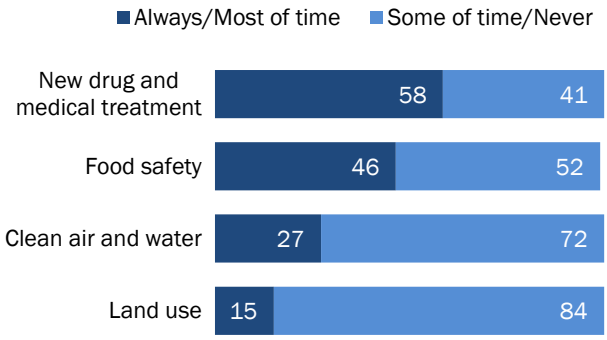
Scientists' views about the frequency with which the best science is implemented in government regulations tend to vary by domain. Some 58% of AAAS scientists say that the best science "always" (4%) or "most of the time" (54%) guides regulations when it comes to new drug and medical treatments while 41% say some of the time (40%) or never (1%).

Nearly half of AAAS scientists (46%) say the best science guides regulations related to food safety at least most of the time.

Views about the use of scientific information in clean air and water regulations are less favorable. Fully 72% of scientists say the best science guides such regulations no more than some of the time. Similarly, when it comes to land use regulations, 84% of AAAS scientists think the best scientific information guides regulations no more than some of the time.

How Often Does The Best Research Inform Government Regulations?

% of AAAS scientists saying the best scientific information guides government regulations in each area



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q14a-d Those giving no answer are not shown.

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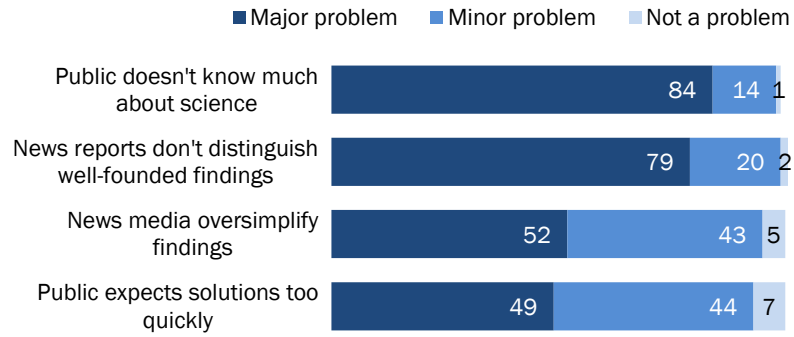
Scientists' Views about the Effect of the Public and Media on Science

The predominant view among scientists is that limited public knowledge about science, and journalism about science, pose problems for science. Fully 84% of AAAS scientists call the limited public knowledge about science a major problem and 14% say it is a minor problem for science.

Scientists Fault Public Knowledge and Media Reports as Problems for Science

% of AAAS scientists saying each is a ... for science in general



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q5a-d Those giving no answer are not shown.

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About eight-in-ten AAAS scientists (79%) say news reports that don't distinguish between well-founded and not well-founded scientific findings are a major problem. About half of scientists (52%) say that oversimplification of science findings by the media and public expectations for a quick solution (49%) are major problems, Opinions on these questions are about the same as in 2009. There has been a modest uptick in the share saying news media not distinguishing between well-founded and not well-founded results is a major problem for science (79% today and 76% in 2009) A slight rise also occurred in the share saying that media oversimplifying research findings is a major problem (52% today and 48% in 2009).

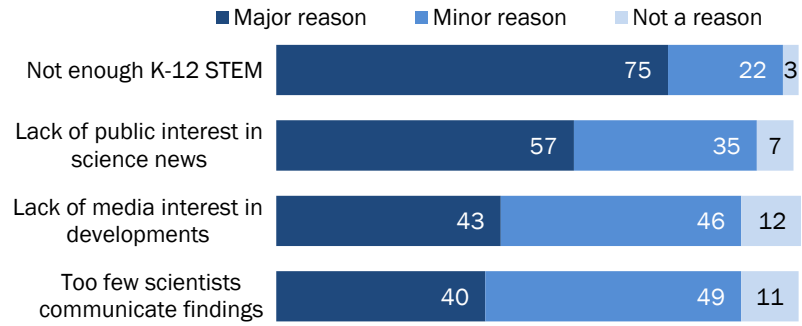
Perceived Reasons for Limited Public Science Knowledge

The Pew Research survey asked AAAS scientists to consider the degree to which each of four possible reasons contribute to the public's limited knowledge about science. Three-quarters of scientists consider too little STEM education in grades K through 12 a major reason the public has a limited knowledge about science, another 22% say this is a minor reason.

A majority of scientists also fault public interest levels in science: 57% say the lack of interest in science news contributes to limited public knowledge. By comparison, fewer fault the media or scientists themselves. About four-in-ten (43%) say a major reason for limited public knowledge about science is a lack of media attention to scientific developments while 40% say that too few scientists communicating their findings through the media and online (40%) is a major reason for limited public knowledge about science. (These questions were not asked in 2009.)

Scientists Say More K-12 STEM Would Help Raise Public Science Knowledge

% of AAAS scientists saying each is a major/minor/or not a reason for the U.S. public having limited knowledge about science



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q6a-d Those giving no answer are not shown.

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Perceived Problems in the Research World Today

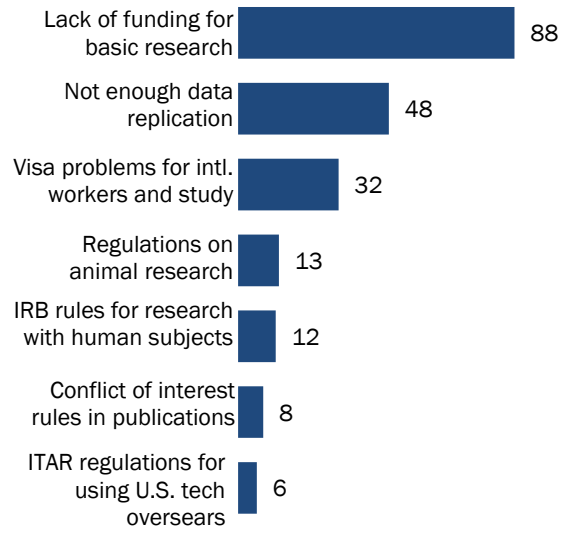
The survey of AAAS scientists included a series of questions to identify how the rules and regulations governing the scientific community and the research they conduct are working today and how they are affecting scientific research.[27]

Funding concerns dominate responses to this list of seven potential issues facing researchers: 88% of AAAS scientists say that lack of funding for basic research is a serious problem. Concerns about adequate funding are widely shared among scientists of all disciplines and employment sectors.

While a majority of AAAS scientists (56%) say they have received some kind of research funding within the past five years, the problem of lack of funding is cited by both those who have recently received funding (91%) and those who have not (83%) as a serious problem. As noted in Chapter 2, 83% of AAAS scientists consider the federal funding environment to be harder today than it was five years ago and a sizable minority view funding from industry (45%) and private sources (45%) to be harder today.

Problems for Conducting Quality Research Today

% of AAAS scientists who identified each as a serious problem for conducting high quality scientific research today



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q8a-g. Those *not* selecting each as a serious problem or giving no answer are not shown.

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Another question focused on scientists' concern about the degree to which foundational research studies are replicated by independent researchers. About half of scientists (48%) say that "not enough data replication of previous research studies" is a serious problem for conducting high quality scientific research. One reason for concern about this issue stems from the building-block nature of scientific progress that may start, for example, with animal research and move to clinical

[27] In 2009, AAAS scientists were asked to rate a similar list of potential problems on a four-point scale from very serious to not serious at all.

trials and eventually to new medical treatments.[28] If important studies are not replicated, it is harder to know how valid they are and how much to base other research on those findings.

Another challenge cited by a sizeable share of scientists was difficulty that foreign scientists face in gaining entrance to the U.S. More than a quarter of the science and engineering workforce is foreign-born, with many in the U.S. on the H1B visas for highly-skilled workers, and more than a third of doctorate recipients in science and engineering fields are international students in the U.S. on temporary visas.[29] Some 32% of AAAS scientists say that visa issues facing foreign scientists wanting to study or work in the U.S. are a problem for conducting quality research. Fully 55% of AAAS scientists who are themselves foreign born and not U.S. citizens cite visa and immigration problems as a serious problem. U.S. citizens, whether foreign-born or U.S.-born, are less inclined to say this is a problem (32% and 30% do so, respectively).

Further down the list of problems cited by scientists as serious problems for research: regulations governing animal research (13% of AAAS scientists say it is a serious problem); the way Institutional Review Boards[30] (IRBs) implement rules to protect human research subjects (12% say it is a serious problem); conflict of interest rules used by publications (8% say it is a serious problem); International Traffic in Arms (ITAR) regulations that limit the way American technology can be used overseas (6% say it is a serious problem).

[28]The National Institutes of Health (NIH) announced an initiative to enhance the reproducibility of biomedical research in 2013 in response to growing concern about this issue in the scientific community.
[29] The *Science and Engineering Indicators 2014* finds 36% of science and engineering doctorates have been awarded to students with temporary resident visas (Chapter 2, page 33). And, "compared with the entire college-educated workforce, college graduates working in science and engineering occupations are disproportionately foreign born" (Chapter 3, page 52). The share of international students receiving doctorates in science and engineering fields has grown since 2000 as has the share of foreign-born workers in science and engineering occupations.
[30] IRBs are committees that perform an ethical review of possible risks and safeguards to protect people who participate in research studies such as medical, social and survey research. Most IRB's are affiliated with institutions that conduct research with the financial support of the federal government, such as universities; their role is to implement the policies laid out in the U.S. Dept. of Health and Human Services 45 CFR 46.

When it comes to funding, most scientists say that funders in their field emphasize lower-risk, lower-reward projects over higher-risk projects that have the potential for scientific breakthroughs. A majority of AAAS scientists (56%) say that, overall, funding in their specialty places greater emphasis on projects expected to make incremental progress with lower risk of failure over those with potential for scientific breakthroughs but with a higher risk of failure. In 2009, 59% said funding decisions emphasized projects expected to make incremental progress with a lower risk of failure.

Which Kind of Research Do Most Funders Emphasize?

% of AAAS scientists saying funding in their research specialty places greater emphasis on…

	2009	2014
Projects expected to make incremental progress that have lower risk of failure	59	56
Projects with potential for breakthroughs but with higher risk of failure	5	11
Both types equally	28	30
No answer	7	2
	100	100

AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q12. AAAS scientists survey May 1 – June 14, 2009. Figures may not add to 100% due to rounding.

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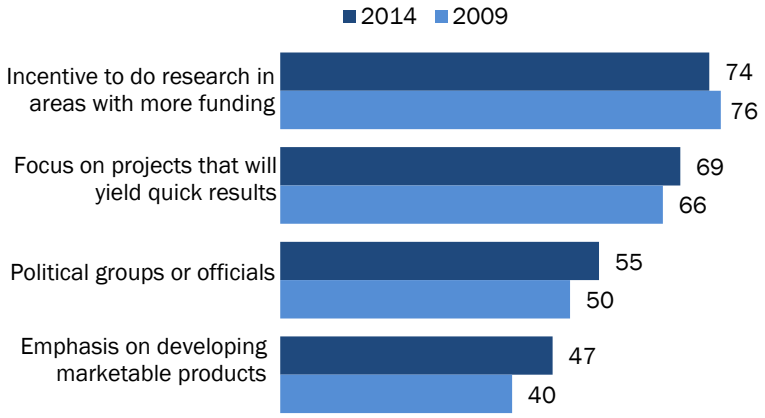
Some 74% of AAAS scientists say the incentive to do research where funding is readily available has too much influence on the direction of research, while 23% disagree, saying such incentives do not have too much influence. Concerns about an undue influence of funding availability on the research process are roughly the same as in 2009.

Is There Undue Influence on the Direction of Research?

% of AAAS scientists saying that each of the following has too much influence on the direction of research in their specialty area



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q13a-d. AAAS scientists survey May 1 – June 14, 2009. Those saying not too much influence or giving no answer are not shown.

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A 69% majority also say that a focus on projects expected to yield quick results has too much influence on the direction of research while 29% disagree. In 2009, 66% of the scientists in this sample said emphasis on quick results had too much influence on the direction of research in their specialty.

There has been a modest uptick in concerns about two other possible influences on research. A majority (55%) of scientists say that political groups or officials have too much influence on the direction of research in their specialty, up 5 points from 50% in 2009 who said the same.

Additionally, 47% of scientists say the emphasis on developing marketable products has too much influence on research directions, while 51% say it does not. Concerns about market influences are up from 2009 when 40% said this had too much influence and 56% said it did not.

Entering a Career in Science Today

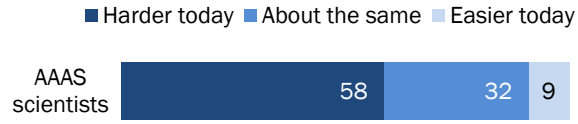
While a majority of AAAS scientists consider this a good or very good time to begin a career in their specialty areas, scientists are more downbeat about entering the profession today than they were five years ago. Some 59% of scientists surveyed say this is a good time to enter their specialty area, down 8 percentage points since 2009. The more pessimistic assessments are primarily among scientists working in basic research as compared with applied research, and among those working in university settings as compared with business or industry.

Among scientists whose research is focused on basic knowledge questions 48% say it is a good or very good time to start a career, down 15 points from 63% in 2009. Some 69% of those in applied research say this is a good time to enter their specialty area, roughly the same share as said this in 2009 (71%). Similarly, among all those working in a university setting, 49% say this is a good or very good time to enter their specialty, down 14 points from 2009. Views among those working in industry have held steady: 71% today and 70% in 2009.

Fully 58% of AAAS scientists consider it harder to attract the best people to the profession today than it was five years ago, 32% say it is about the same and just 9% say it is easier today. Basic researchers (62%) are more likely than applied researchers (55%) to say attracting talent is harder today.

Tougher Times for Attracting Talent

% of AAAS scientists who say that attracting the best young people to a science career is...than it was five years ago



AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q35. Those giving no answer are not shown.

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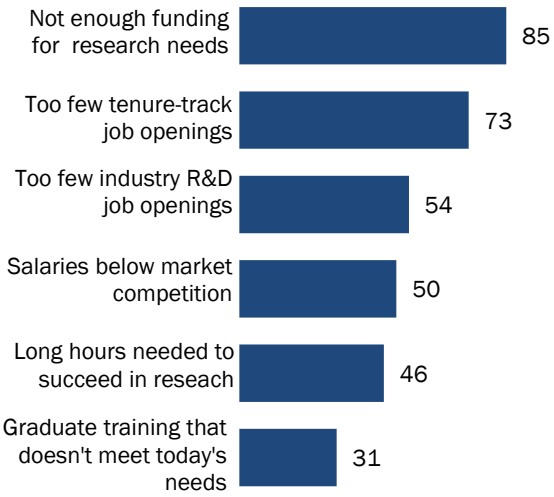
Perceived Challenges for Entering a Research Science Career

% of AAAS scientists who say each is a serious problem for people entering a career as a research scientist these days



AAAS scientists survey Sept. 11 – Oct. 13, 2014.Q36a-f. Those not selecting each as a serious problem or giving no answer are not shown.

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Scientists see a number of hurdles facing new career entrants today. Fully 85% of AAAS scientists say the lack of adequate funding for research is a serious problem for new entrants. They also cite the limited number of tenure-track jobs (73% of AAAS scientists say it is a serious problem) in university settings and too few R&D jobs in industry (54% say it is a serious problem). Half of scientists (50%) consider salary levels to be a serious problem for new career entrants and 46% say the long hours needed to succeed in a research career is a serious problem. By comparison, fewer fault the graduate training being offered today. About three-in-ten (31%) say training that doesn't meet todays' needs is a serious problem.

Looking across a wide range of survey responses, there are relatively few differences in views by age among those responding. To the extent there are differences, they are modest.[31] Larger differences by age among scientists emerge when it comes to perceptions of the hurdles facing new career entrants. Younger scientists (ages 18 to 49) are more likely to see four of the six possible problems asked about in the survey as a serious problems for new career entrants, (too few tenure-track openings, salaries below market competition, long hours needed to succeed and graduate training that doesn't meet today's needs). Scientists under age 50 and those ages 50 to 64 are about equally likely to see the lack of adequate research funding as a serious problem for new entrants (90% and 87%, respectively) while those ages 65 and older are less likely to cite this as a serious problem (78%). There are no differences by age in the perception that the number of job openings in industry R&D is a problem for people entering science research careers.

Age Differences in Perceived Challenges for New Career Scientists

% of AAAS scientists in each age group saying each is a serious problem for people entering a career as a research scientist these days

	18-49	50-64	65 and older
Lack of adequate funding for research needs	90	87	78
Too few tenure-track job openings	83	71	65
Too few industry research and development job openings	55	54	52
Salaries below market competition	66	46	37
Long hours needed to succeed in research	58	46	35
Graduate training that doesn't meet today's needs	38	27	26

AAAS scientists survey Sept. 11 – Oct. 13, 2014.Q36a-f. Those not selecting each as a serious problem or giving no answer are not shown.

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[31] Responses among AAAS scientists by student, employment and retirement status show a similar pattern.

Motivations for Their Own Careers in Science

The survey also asked AAAS scientists to mention the one or two most significant experiences in their own path towards science.[32] Open-ended responses to this question were wide-ranging with some thinking back to childhood experiences and even lifelong expectations of being a scientist and others mentioning adult life events or the serendipity of life experiences.

In all, 30% of AAAS scientists mentioned an intellectual curiosity or desire for intellectual challenge, often saying this was present from their earliest memories. Another 8% talked about wanting to make a difference or contribute society. Some 4% simply offered that they were good at it.

Many talked about the influence of mentors and teachers (24%), courses and schools (6%) or other course-related experiences (6%) that influenced their choices.

Another 8% mentioned childhood experiences that set them on a science path, including extensive time in nature, visiting science museums, or experimenting with a chemistry set; 13% mentioned science fairs or specific lab, fieldwork or internship experiences; and, 8% mentioned some kind of job experience that helped shape their path towards science, and sometimes away from other directions.

One in eight (12%) mentioned the importance of encouragement or inspiration from their

Looking Back: Influences on Their Own Path

% of AAAS scientists who mention each of the following ideas as the "one or two most significant experiences influencing your decision to become a scientist"

Intellectual challenge, lifelong curiosity, love of science or nature	30
Mentors, professors, teachers	24
Lab, fieldwork, internship, science fairs	13
Family encouragement or inspiration	12
Other experiences on the job	8
To make a difference, contribute to society	8
Childhood experiences in natural parks, science museums, star gazing, chemistry set	8
Influence of books, movies, TV on science e.g., Cosmos series, biographies of scientists, and science fiction	7
High school or middle schools courses	6
Other influential courses, teaching experiences	6
Ability to do well, good at it	4
The space race, NASA	4
Practical issues: funding, job availability	4
Kindred spirit with science peers	1
Influence of specific scientists or admired scientists	1
Other scientific discoveries	1
Environmental issues of 1970s	*
No answer	13

AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q41. Open ended responses coded into categories. Responses do not add to 100% because multiple responses are coded for each respondent.

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[32] The 2009 survey of AAAS scientists conducted by Pew Research in collaboration with AAAS asked respondents to rate each of four possible motivations for becoming a scientist. An overwhelming majority (86%) said that "an interest in solving intellectually challenging problems" was a very important in their decision to become a scientist. Forty-one percent (41%) said that "a desire to work for the public good" was very important. 30% said the same about "a desire to make an important discovery" and just 4% said "a desire for a financially rewarding career" was very important in their decision. See "Public Praises Science: Scientists Fault Public, Media," July 9, 2009.

family. Others talked about the influence of books, movies and TV shows –either non-fiction or fiction—that were influential in their lives (7%) and some talked about the influence of the space race era (4%) or more practical concerns such as the availability of research funding or job opportunities (4%).

Profile of AAAS scientists surveyed

AAAS is the largest multidisciplinary scientific society in the world. Those eligible to participate in this survey reflect a broad definition of the professionally-engaged scientific community in the U.S. They come from a range of disciplines and backgrounds, with about half identifying their primary specialty area in the biomedical disciplines and the remainder from a range of other disciplines. They are about evenly divided between those who consider their primary focus to be basic knowledge and applied research.

As a group, they differ from the general public in a number of ways. AAAS scientists are lopsidedly male (71%) and older than the general public as whole (median age 59 years). Both a gender skew favoring men and a relatively older age are also characteristic of the total U.S. workforce in science and engineering.[33]

AAAS scientists are a highly educated group. An overwhelming majority has some post-graduate education, including 72% who have at least one doctoral level degree. Those in science and engineering occupations typically have more schooling than the general public. But, AAAS scientists as a whole stand out for their high levels of education even in comparison to the broader science and engineering workforce.[34]

Compared with the total science and engineering workforce, AAAS scientists are also distinctive for the high share with a background in the biological and medical sciences and for their employment in the educational sector.[35]

Scientists Surveyed

% of AAAS scientists

Men	71
Women	29
18-49	35
50-64	29
65 and older	35
Highest degree held	
Doctorate degree	72
Master's degree	16
All others	12
Research focus past 5 years	
Basic knowledge questions	48
Applied research questions	50
Primary discipline	
Bio/Medical sciences	50
Chemistry	11
Earth sciences	7
Engineering	7
Physics & Astronomy	8
Math & Computer sciences	5
Social, History, Policy	9
Other	4
Employment setting	
University/college	43
Business/industry	15
Other	16
Not employed	25

AAAS scientists survey Sept. 11 – Oct. 13, 2014. Those giving no answer on each question are not shown.

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[33] Science and Engineering Indicators 2014 reports 28% of the science and engineering workforce are women although that share varies widely by field and has been growing over the past decade, particularly in engineering and the physical sciences. (Chapter 3 page 43-44).The median age of the science and engineering workforce was 44 years as of 2010, a figure that has been growing since the 1990s. (Chapter 3 page 40-41).

[34] Only 31% of those working in science and engineering occupations hold a relevant degree above the bachelor's level although, a doctorate degree is the norm among those working in post-secondary education. Science and Engineering Indicators 2014, Chapter 3 page 14.

[35] Science and Engineering Indicators 2014, Chapter 3, Figure 3-2 and Appendix table 3-4.

More than eight-in-ten (82%) AAAS scientists consider their specialty "interdisciplinary" and many have taken part in some kind of activity that draws from more than one discipline. For example, 57% of AAAS scientists say they published a research study with a multidisciplinary team and nearly all (92%) report reading a journal article outside of their primary specialty area in the past year.

Interdisciplinary Activities

% of AAAS scientists

Read a journal article outside of their primary specialty area in past year	92
Primary specialty area is interdisciplinary	82
Published study with a multidisciplinary team	57
Taught a course with material from 2+ fields	47
Completed training in two or more primary fields	30
Held a university position in 2+ disciplines	20

AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q45-46a-e. Those not selecting each item or giving no response are not shown.

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Recent Research Experiences

% of AAAS scientists

Received research funding within past 5 years	56
Conducted animal research within past 5 years	32
Conducted human subjects research within past 5 years	29
Clinical or translational research is primary specialty	27

AAAS scientists survey Sept. 11 – Oct. 13, 2014. Q44, Q55-57. Those saying this did not apply to them or giving no answer are not shown.

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A majority (56%) of AAAS scientists have received research funding within the past five years. Seven-in-ten scientists currently working full-time have received funding within the past five years as have 76% of those working in an academic setting.

Those with recent funding are most likely to have received federal grant funds for research (78%); 46% received direct research support from a university or college and about a third received funding from a private foundation. Smaller shares report funding from industry sources (25%), state government (15%) or from a scientific professional association (6%).

Funding Sources

% with funding from each source among AAAS scientists who received research funding within the past five years

	Yes	No
Federal government	78	22
Direct support from university/college	46	54
Private foundation (non-profit)	32	68
Industry	25	75
State government	15	85
Scientific professional assoc.	6	94

AAAS scientists survey Sept. 11 – Oct. 13, 2014. Based on those who have received research funding in the past five years. Q58a-f.

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Appendix A: About the General Public Survey

The general public survey was conducted by telephone with a national sample of adults (18 years of age or older) living in all 50 U.S. states and the District of Columbia. The results reported here are based on 2,002 interviews (801 respondents were interviewed on a landline telephone and 1,201 were interviewed on a cell phone). Interviews were completed in English and Spanish by live, professionally trained interviewing staff at Princeton Data Source under the direction of Princeton Survey Research Associates International from August 15 to 25, 2014.

Survey Design

A combination of landline and cell random digit dial (RDD) samples was used to reach a representative sample of all adults in the United States who have access to either a landline or cellular telephone. Both samples were disproportionately stratified to increase the incidence of African-American and Hispanic respondents. Within each stratum, phone numbers were drawn with equal probabilities. The landline samples were list-assisted and drawn from active blocks containing one or more residential listings, while the cell samples were not list-assisted but were drawn through a systematic sampling from dedicated wireless 100-blocks and shared service 100-blocks with no directory-listed landline numbers. Both the landline and cell RDD samples were disproportionately stratified by county based on estimated incidences of African-American and Hispanic respondents.

Margin of Sampling Error

Statistical results are weighted to correct known demographic discrepancies, including disproportionate stratification of the sample. The margins of error table shows the unweighted sample sizes and the error attributable to sampling that would be expected at the 95% level of confidence for different groups in the survey.

The survey's *margin of error* is the largest 95% confidence interval for any estimated proportion based on the total sample – the one around 50%. For example, the margin of error for the entire sample is ±3.1 percentage points. This means that in 95 out of every 100 samples drawn using the same methodology, estimated proportions based on the entire sample will be no more than 3.1 percentage points away from their true values in the population. Sampling errors and statistical tests of significance used in this report take into account the effect of weighting. In addition to sampling error, one should bear in mind that question wording and practical difficulties in conducting surveys can introduce error or bias into the findings of opinion polls.

Interviewing Procedures

All interviews were conducted using a Computer Assisted Telephone Interviewing (CATI) system, which ensures that questions were asked in the proper sequence with appropriate skip patterns. CATI also allows certain questions and certain answer choices to be rotated, eliminating potential biases from the sequencing of questions or answers.

Margins of Error

	Sample size	Margin of error in percentage points
All adults	2,002	+/-3.1
Men	1,007	+/-4.3
Women	991	+/-4.4
White, not Hispanic	1,213	+/-4.0
Black, not Hispanic	258	+/- 8.0
Hispanic	360	+/-6.6
18-29	351	+/-7.4
30-49	515	+/-6.1
50-64	610	+/-5.6
65 and older	496	+/-6.2
College graduate or more	813	+/-4.8
Some college	482	+/-6.3
H.S. graduate or less education	698	+/-5.2
Party affiliation		
Republican/lean Rep.	737	+/-5.1
Democratic/lean Dem.	959	+/-4.5

Note: The margins of error are reported at the 95% level of confidence and are calculated by taking into account the average design effect for each subgroup.

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For the landline sample, interviewers asked half of the time to speak with the youngest adult male currently at home and the other half of the time asked to speak with the youngest adult female currently at home, based on a random rotation. If no respondent of the initially requested gender was available, interviewers asked to speak with the youngest adult of the opposite gender who was currently at home. For the cell phone sample, interviews were conducted with the person who answered the phone; interviewers verified that the person was an adult and could complete the call safely.

Both the landline and cell samples were released for interviewing in replicates, which are small random samples of each larger sample. Using replicates to control the release of the telephone

numbers ensures that the complete call procedures are followed for all numbers dialed. As many as seven attempts were made to contact every sampled telephone number. The calls were staggered at varied times of day and days of the week (including at least one daytime call) to maximize the chances of making contact with a potential respondent.

Questionnaire development

The Pew Research Center developed the questionnaire. The design of the questionnaire was informed by consultation with a number of staff at the Pew Research Center, senior staff of the AAAS, and several outside advisors. Questionnaire development is an iterative process. A pilot study was conducted August 5-6, 2014 with 101 adults living in the continental U.S. The sample was drawn from fresh RDD landline phone numbers (n=25) and a sample of cell phone numbers from respondents interviewed in recent RDD omnibus studies (n=76). The tested questionnaire included a number of open-ended questions to gauge what respondents had in mind when thinking about the positive and negative effects of science on society. As a final step, a traditional pretest was conducted August 12, 2014, with 24 adults living in the continental U.S. The sample was drawn from fresh RDD landline phone numbers and a sample of cell phone numbers from respondents interviewed in recent RDD omnibus studies. The interviews were conducted in English under the direction of Princeton Survey Research Associates International. The interviews tested the questions planned for the study questionnaire in the full survey context. The final questionnaire lasted about 22 minutes, on average.

Weighting

Several stages of statistical adjustment or weighting are used to account for the complex nature of the sample design. The weights account for numerous factors including (1) the different, disproportionate probabilities of selection in each strata, (2) the overlap of the landline and cell RDD sample frames and (3) differential nonresponse associated with sample demographics.

The first stage of weighting accounts for different probabilities of selection associated with the number of adults in each household and each respondent's telephone status.[36] This weighting also adjusts for the overlapping landline and cell RDD sample frames and the relative sizes of each frame and each sample. Due to the disproportionately stratified sample design, the first-stage weight was computed separately for each stratum in each sample frame.

After the first-stage weight adjustment, two rounds of poststratification were performed using an iterative technique known as raking. The raking matches the selected demographics to parameters

[36] Telephone status refers to whether respondents have only a landline telephone, only a cell phone or both kinds of telephone.

from the U.S. Census Bureau's 2012 American Community Survey data.[37] The population density parameter was derived from 2010 census data. The telephone usage parameter came from an analysis of the July-December, 2013 National Health Interview Survey.[38] Raking was performed separately for those asked each form of the questionnaire using sample balancing, a special iterative sample weighting program that simultaneously balances the distributions of all variables using a statistical technique called the Deming Algorithm. The raking corrects for differential nonresponse that is related to particular demographic characteristics of the sample. This weight ensures that the demographic characteristics of the sample closely approximate the demographic characteristics of the population.

The first round of raking was done individually for three race/ethnicity groups (Hispanics, non-Hispanic blacks, and all other non-Hispanics). The variables matched to population parameters for each race/ethnicity group were gender, age, education and region. The variables matched to population parameters for Hispanic respondents also included nativity (U.S. born versus foreign born). The variables for other non-Hispanic respondents also included race (white race versus some other or mixed race).

A second round of poststratification raking was performed on the total sample for each form. Each form was raked to the following demographic variables: gender by age, gender by education, age by education, census region, race/ethnicity, population density and household telephone status (landline only, cell phone only, or both landline and cell phone).

[37] ACS analysis was based on all adults excluding those living in institutional group quarters.
[38] See Blumberg, S.J. and J.V. Luke. July 2014. Wireless substitution: Early Release of Estimates from the National Health Interview Survey, July-December, 2013. National Center for Health Statistics.

Appendix B: About the AAAS Scientists Survey

The survey of scientists was conducted online with a random sample of 3,748 U.S.-based members of the American Association for the Advancement of Science (AAAS) from September 11 to October 13, 2014. AAAS is the world's largest general scientific society, and includes members from all scientific fields. Founded in 1848, AAAS publishes *Science*, one of the most widely circulated peer-reviewed scientific journals in the world. Membership in AAAS is open to all. The survey was conducted under the direction of Princeton Survey Research Associates International.

Sampling

A simple random sample of AAAS members was selected for participation by the staff of AAAS. Eligibility was limited to U.S. members but otherwise used a broad definition of the scientific community. AAAS members of any discipline or background were eligible to participate except for those whose membership type indicated that they were primary or secondary educators. AAAS staff and institutional members were also excluded from eligibility.

The sample was designed to replicate that used in the 2009 survey of AAAS members, and thus to maximize comparability of samples between the two time points. While it's possible that the composition of AAAS members could have changed in substantive ways over time, comparisons of population characteristics in the AAAS membership database for 2009 and 2014 as well as sample characteristics from survey respondents suggest that AAAS member characteristics have stayed about the same on a variety of demographic and professional characteristics.

Weighting

Survey-based estimates of the population of AAAS members could be biased if some members are more or less likely than others to participate in the survey. To help ensure sample representativeness, the data were weighted to match population characteristics of AAAS membership for three characteristics: membership category, fellowship status and email availability. Membership categories of the organization adjust for a somewhat lower response rate among student members and a somewhat higher response rate among other membership types including emeritus and professional memberships. AAAS fellows also had somewhat higher response rates compared with non-fellow members and thus weighting adjusts for that differential response rate. As expected, those with no email availability responded at somewhat lower rates, perhaps due to the greater difficulties this group faces participating in an online survey. Weighting also included an adjustment for contact via email or mail-only. Post data collection statistical adjustments require procedures that reflect departures from simple random sampling. The total design effect for this survey is 1.10.

The margins of error table shows the unweighted sample sizes and the error attributable to sampling that would be expected at the 95% level of confidence for different subgroups. The survey's margin of sampling error is the largest 95% confidence interval for any estimated proportion. For example, the margin of error for the entire sample is ±1.7 percentage points. This means that in 95 out of every 100 samples drawn using the same methodology, estimated proportions based on the entire sample will be no more than 1.7 percentage points away from their true values in the population, in this case, U.S.-based scientists in the AAAS. Sampling errors and statistical tests of significance used in this report take into account the effect of weighting. In addition to sampling error, one should bear in mind that question wording and practical difficulties in conducting surveys can introduce error or bias into the findings of opinion polls.

Margins of Error

AAAS scientists in the U.S.

	Sample size	Margin of error in percentage points
All AAAS scientists surveyed	3,748	+/- 1.7
Age		
18-49	1,053	+/-3.2
50-64	1,159	+/-3.0
65 and older	1,469	+/-2.7
Primary discipline		
Bio/Medical sciences	1,802	+/-2.4
Chemistry	429	+/-5.0
Earth sciences	270	+/-6.3
Engineering	243	+/-6.6
Math/Computer sciences	182	+/-7.6
Physics and Astronomy	328	+/-5.7
Social sciences and policy	333	+/-5.6
Other	158	+/-8.2

Estimates from this sample of AAAS scientists can be made to the full population of U.S.-based scientists in the AAAS within the survey's margin of sampling error. The margins of error are reported at the 95% confidence level.

PEW RESEARCH CENTER

Survey administration

A total of 19,984 members were mailed a letter requesting participation in the survey. The bulk of selected members (n=18,682) had both an email address and a physical address in the membership database while some had only a physical address available (n=1,302). Multiple contacts via postal mail and email, if available, were made to encourage participation in the online survey.

The invitation letter described the nature and purpose of the survey and included the URL and other access information to the online survey, it used a letterhead showing both AAAS and the Pew Research Center logos, and was signed by the head of each organization. An initial email was also sent to those with email addresses containing information similar to that on the advance letter in addition to a hyperlink to the survey login. A postcard reminder was sent to all who had not yet responded to the survey about two weeks after the initial mailing. A follow up email or letter (if no email address) was sent to those who had not yet responded roughly three weeks after the initial mailing. The online survey was closed as of Oct 13, 2014.

A total of 3,748 members completed the survey for an overall response rate of 18.8%.

Respondent Contact

Dates of contact

For all selected in survey sample	
Invitation letter	Sept. 3
Postcard reminders to all who had not completed	Sept. 22
For members with email addresses	
Email with hyperlink to login	Sept. 11
Reminder email to those who had not completed survey	Sept. 23
For members with mail addresses only	
Reminder letter to those who had not completed survey	Sept. 29

AAAS scientists survey Sept. 11 to Oct. 13, 2014.

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Appendix C: Topline General Public Survey

PEW RESEARCH CENTER
GENERAL PUBLIC SCIENCE SURVEY
TOPLINE
AUGUST 15-25, 2014
N=2,002

NOTE: ALL NUMBERS ARE PERCENTAGES. ANY PERCENTAGES GREATER THAN ZERO BUT LESS THAN 0.5% ARE REPLACED BY AN ASTERISK (*). COLUMNS/ROWS MAY NOT TOTAL 100% DUE TO ROUNDING.

ASK ALL:

Q.1 All in all, are you satisfied or dissatisfied with the way things are going in this country today?

Aug 15-25, 2014[39]	
26	Satisfied
70	Dissatisfied
4	Don't know/Refused **(VOL.)**

ASK ALL:

Q.2 We'd like you to compare the United States to other industrialized countries in a few different areas. (First,) what about... **[INSERT ITEM; READ AND RANDOMIZE]**? **[READ FOR FIRST ITEM, THEN AS NECESSARY:** Do you think the U.S. is the BEST IN THE WORLD, above average, average or below average in [**ITEM]** compared to other industrialized countries?**]**

		Best in the world	Above average	Average	Below average	**(VOL.)** DK/Ref
a.	Its scientific achievements					
	Aug 15-25, 2014	15	39	34	9	3
	Apr 28-May 12, 2009	17	47	26	5	4
	TREND FOR COMPARISON:					
	AAAS scientists survey:					
	Sept 11-Oct 13, 2014[40]	45	47	6	1	*
	May 1-June 14, 2009	49	45	5	1	*
b.	Its military					
	Aug 15-25, 2014	39	37	15	5	3
	Apr 28-May 12, 2009	42	39	13	3	3
c.	Its economy					
	Aug 15-25, 2014	7	26	36	29	2
	Apr 28-May 12, 2009	12	22	33	31	3

[39] Trends not shown. See Pew Research for trends from 1988 to present.
[40] Survey of AAAS members conducted online. The share giving no answer to each question is listed under the "DK/Ref. (VOL.)" column. The question stem for the AAAS survey was "Compared with other industrialized countries, how would you rate the United States with regard to its overall scientific achievements?" RESPONSE OPTIONS: Best in the world; Above average; Average; Below average."

Q.2 CONTINUED…

		Best in the world	Above average	Average	Below average	(VOL.) DK/Ref
NO ITEM D						
e.	Science, technology, engineering and math education for grades K to 12					
	Aug 15-25, 2014	7	22	39	29	3
	TREND FOR COMPARISON:					
	AAAS scientists survey:					
	Sept 11-Oct 13, 2014[41]	1	15	38	46	*
f.	Its political system					
	Aug 15-25, 2014	12	22	32	31	3
	Apr 28-May 12, 2009	19	31	29	16	5
FORM 1 ONLY: [N=1,1001]						
gF1.	Medical treatment					
	Aug 15-25, 2014	17	34	29	20	1
	TREND FOR COMPARISON:					
	AAAS *scientists survey:*					
	Sept 11-Oct 13, 2014[42]	25	39	22	13	*
FORM 2 ONLY: [N=1,001]						
hF2.	Its health care					
	Aug 15-25, 2014	9	16	32	39	3
	Apr 28-May 12, 2009	15	23	32	27	2

ASK ALL:

Now I'd like to ask you some questions about science.

Q.3 How much do you ENJOY keeping up with news about science – a lot, some, not much, or not at all?

Aug 15-25, 2014		Apr 28-May 12, 2009
37	A lot	35
35	Some	41
18	Not much	16
9	Not at all	8
1	Don't know/Refused **(VOL.)**	1

[41] AAAS scientists question stem was: "Compared to other industrialized countries, how would you rate the United States in the following area… science, technology, engineering and math education for grades K to 12?"

[42] AAAS scientists question stem: "Compared to other industrialized countries, how would you rate the United States in the following area…medical treatment?"

ASK ALL:
Q.4 Overall, has science made life easier or more difficult for most people?

Aug 15-25, 2014		Apr 28-May 12, 2009
79	Easier	83
15	More difficult	10
1	Not had much of an effect **(VOL.)**	1
4	Don't know/Refused **(VOL.)**	6

ASK ALL:
Q.5 Has science had a mostly positive or mostly negative effect on the quality of **[INSERT ITEM; RANDOMIZE]** in the U.S.? What about **[NEXT ITEM]**? **[IF NECESSARY:** Has science had a mostly positive or mostly negative effect on the quality of **[ITEM]** in the U.S.?**]**

		Mostly positive	Mostly negative	**(VOL.)** Not had much of an effect	**(VOL.)** DK/Ref
a.	Food				
	Aug 15-25, 2014	62	34	1	3
	Apr 28-May 12, 2009[43]	66	24	2	8
b.	Health care				
	Aug 15-25, 2014	79	18	1	3
	Apr 28-May 12, 2009	85	10	1	4
c.	The environment				
	Aug 15-25, 2014	62	31	2	5
	Apr 28-May 12, 2009	66	23	2	8

QUESTIONS 6 THROUGH 9 HELD FOR FUTURE RELEASE
NO QUESTION 10-11

ASK ALL:
Q.12 In your opinion, do government investments in **[INSERT ITEM; RANDOMIZE]** usually pay off in the long run, or are they not worth it?

		Yes, pay off in the long run	No, aren't worth it	**(VOL.)** DK/Ref
a.	Basic scientific research			
	Aug 15-25, 2014	71	24	5
	Apr 28-May 12, 2009	73	18	9
b.	Engineering and technology			
	Aug 15-25, 2014	72	22	6
	Apr 28-May 12, 2009	74	17	9

[43] In 2009, the question stem did not explicitly mention "in the U.S.". The question wording was: "Has science had a mostly positive or mostly negative effect on the quality of [INSERT ITEM; RANDOMIZE]? What about [NEXT ITEM]? [IF NECESSARY: Has science had a mostly positive or mostly negative effect on the quality of [ITEM]?"

ASK ALL:
Q.13 Which of these comes closer to your view? **[READ AND RANDOMIZE RESPONSE OPTIONS]**

Aug 15-25, 2014		Apr 28-May 12, 2009
61	Government investment in research is ESSENTIAL for scientific progress [OR]	60
34	Private investment will ensure that enough scientific progress is made, even without government investment	29
5	Don't know/Refused **(VOL.)**	11

NO QUESTION 14-15

ASK ALL:
Now a few questions about some issues...

[RANDOMIZE QUESTIONS 16-18 IN BLOCKS WITH QUESTIONS Q20F1 to Q23 IN BLOCKS]
ASK ALL:
Q.16 Which comes closer to your view? **[READ AND RANDOMIZE]:** Humans and other living things have evolved over time **[OR]** Humans and other living things have existed in their present form since the beginning of time.
IF EVOLVED (Q.16=1), ASK:
Q.17 And do you think that…**[READ OPTIONS AND RANDOMIZE]**: Humans and other living things have evolved due to natural processes such as natural selection **[OR]** A supreme being guided the evolution of living things for the purpose of creating humans and other life in the form it exists today?

	----------Evolved over time----------					
	Total	*Due to natural processes*	*Supreme being guided evolution*	***(VOL.) DK/ Ref***	Existed in present form since beginning	**(VOL.)** DK/ Ref
Aug 15-25, 2014	65	35	24	5	31	4
Feb 27-Mar 16, 2014	61	*34*	*23*	*4*	34	5
Mar 21-Apr 8, 2013	60	*32*	*24*	*4*	33	7
Apr 28-May 12, 2009[44]	61	*32*	*22*	*7*	31	8
TRENDS FOR COMPARISON:						
AAAS *scientists survey*						
Sept 11-Oct 13, 2014[45]	98	90	8	1	2	*
May 1-June 14, 2009	97	87	8	2	2	1

[44] Similar questions on beliefs about evolution were asked in Pew Research surveys in July 2006 and July 2005. Beliefs about evolution were preceded by a question about whether or not respondents believed in God. That survey context may influence responses to questions about evolution. For details see topline in "Many Americans Uneasy with Mix of Religion and Politics", August 24, 2006.
[45] The nested Q17 responses do not add to the net of 98% on Q16 due to rounding.

[RANDOMIZE QUESTIONS 16-18 IN BLOCKS WITH QUESTIONS Q20F1 to Q23 IN BLOCKS]
ASK ALL:

Q.18 From what you've heard or read, do scientists generally agree that humans evolved over time, or do they not generally agree about this?

Aug 15-25, 2014		Apr 28-May 12, 2009	TRENDS FOR COMPARISON: July 2006[46]	July 2005
66	Yes, scientists generally agree that humans evolved over time	60	62	54
29	No, scientists do not generally agree that humans evolved over time	28	28	33
6	Don't know/Refused **(VOL.)**	11	10	13

NO QUESTION 19

[RANDOMIZE QUESTIONS 16-18 IN BLOCKS WITH QUESTIONS Q20F1 to Q23 IN BLOCKS]
ASK FORM 1 ONLY: [N=1,001]

Q.20F1 Which of these three statements about the earth's temperature comes closest to your view?
[READ AND RANDOMIZE FIRST TWO OPTIONS; KEEP THIRD OPTION LAST]:

Aug 15-25, 2014		Apr 28-May 12, 2009[47]
50	The earth is getting warmer mostly because of human activity such as burning fossil fuels [OR]	49
23	The earth is getting warmer mostly because of natural patterns in the earth's environment	36
25	There is no solid evidence that the earth is getting warmer	11
2	Don't know/Refused **(VOL.)**	4

TRENDS FOR COMPARISON:

	Mostly b/c of human activity such as burning fossil fuels	Mostly b/c of natural patterns in earth's environment	No solid evidence earth getting warmer	No answer
AAAS *scientists survey*[48]				
Sept 11-Oct 13, 2014	87	9	3	1
May 1-June 14, 2009	84	10	4	2

[46] Question wording for July 2006 and earlier asked "From what you've heard or read, is there general agreement among scientists that humans evolved over time, or not?"
[47] Response options for the 2009 survey were, "The earth is getting warmer mostly because of natural changes in the atmosphere; the earth is getting warmer mostly because of human activity such as burning fossil fuels; the earth is not getting warmer."
[48] Question wording for 2009 and 2014 scientists survey: "From what you've read and heard, do you think … [RANDOMIZE RESPONSE OPTIONS 1 & 2]." One of the response options in 2009 was worded differently. It read "the earth is getting warmer mostly because of natural changes in the atmosphere."

[RANDOMIZE QUESTIONS 16-18 IN BLOCKS WITH QUESTIONS Q20F1 to Q23 IN BLOCKS]
ASK FORM 2 ONLY: [N=1,001]

Q.21AF2 From what you've read and heard, is there solid evidence that the average temperature on earth has been getting warmer over the past few decades, or not?

ASK IF EARTH IS GETTING WARMER (Q.21AF2=1):

Q.21BF2 Do you believe that the earth is getting warmer **[READ AND RANDOMIZE**: mostly because of human activity such as burning fossil fuels/mostly because of natural patterns in the earth's environment**]**?

	----------Yes, solid evidence----------						
	Total	*Mostly b/c of human activity such as burning fossil fuels*	*Mostly b/c of natural patterns in earth's environment*	***(VOL.) DK/Ref***	No	**(VOL.)** Mixed/ some evidence	**(VOL.)** DK/Ref
Aug 15-25, 2014	72	46	22	3	25	1	2
Feb 27-Mar 16, 2014	61	40	*18*	*3*	35	1	3
Oct 9-13, 2013	67	*44*	*18*	*4*	26	2	5
Mar 13-17, 2013	69	*42*	*23*	*4*	27	1	4
Oct 4-7, 2012	67	*42*	*19*	*6*	26	1	6
Nov 9-14, 2011	63	*38*	*18*	*6*	28	1	8
Feb 22-Mar 1, 2011	58	*36*	*18*	*5*	34	2	5
Oct 13-18, 2010	59	*34*	*18*	*6*	32	1	8
Sep 30-Oct 4, 2009	57	*36*	*16*	*6*	33	2	8
April, 2008	71	*47*	*18*	*6*	21	3	5
January, 2007	77	*47*	*20*	*10*	16	1	6
August, 2006	77	*47*	*20*	*10*	17	1	5
July, 2006	79	*50*	*23*	*6*	17	1	3
June, 2006	70	*41*	*21*	*8*	20	1	9

[RANDOMIZE QUESTIONS 16-18 IN BLOCKS WITH QUESTIONS Q20F1 to Q23 IN BLOCKS]
ASK FORM 2 ONLY: [N=1,001]

Q.21AF2 From what you've read and heard, is there solid evidence that the average temperature on earth has been getting warmer over the past few decades, or not?

ASK IF EARTH IS NOT GETTING WARMER (Q.21AF2=2):

Q.21CF2 Do you think that we just don't know enough yet about whether the Earth is getting warmer or do you think it's just not happening?

Aug 15-25, 2014		Feb 27-Mar 16 2014	Oct 9-13 2013[49]
25	NET No solid evidence (Q.21AF2)	35	26
11	*Just don't know enough yet*	*17*	*12*
13	*Just not happening*	*17*	*13*
1	*Don't know/Refused **(VOL.)***	*1*	*1*
75	Solid evidence/Some evidence (VOL.) /Don't know **(VOL.)**(Q.21AF2)	65	74

NO QUESTION 22

[49] Prior to October 2013, follow-up question was not asked of those who said there was no solid evidence.

[RANDOMIZE QUESTIONS 16-18 IN BLOCKS WITH QUESTIONS Q20F1 to Q23 IN BLOCKS]
ASK ALL:

Q.23 From what you've heard or read, do scientists generally agree that the earth is getting warmer because of human activity, or do they not generally agree about this?

Aug 15-25, 2014		Oct 9-13 2013	Oct 4-7 2012	Oct-13-18 2010	Apr 28-May 12 2009
57	Yes, scientists generally agree that the Earth is getting warmer because of human activity	54	45	44	56
37	No, scientists do not generally agree that the Earth is getting warmer because of human activity	37	43	44	35
6	Don't know/Refused **(VOL.)**	10	12	12	9

ASK ALL:

On another topic.

Q.24 All in all, do you favor or oppose **[INSERT ITEM; RANDOMIZE]?** Do you favor or oppose **[NEXT ITEM]**?

		Favor	Oppose	**(VOL.)** DK/Ref
a.	The use of animals in scientific research			
	Aug 15-25, 2014	47	50	3
	Apr 28-May 12, 2009	52	43	6
	TRENDS FOR COMPARISON:			
	AAAS *scientists survey*			
	Sept 11-Oct 13, 2014	89	9	2
	May 1-June 14, 2009	93	5	2
b.	Building more nuclear power plants to generate electricity[50]			
	Aug 15-25, 2014	45	51	4
	Apr 28-May 12, 2009	51	42	7
	TRENDS FOR COMPARISON:			
	AAAS *scientists survey*			
	Sept 11-Oct 13, 2014	65	33	2
	May 1-June 14, 2009	70	27	3
c.	The increased use of fracking, a drilling method that uses high-pressure water and chemicals to extract oil and natural gas from underground rock formations[51]			
	Aug 15-25, 2014	39	51	10
	Sep 4-8, 2013	44	49	7
	Mar 13-17, 2013	48	38	14
	TREND FOR COMPARISON:			
	AAAS *scientists survey*			
	Sept 11-Oct 13, 2014	31	66	3

[50] Other Pew Research surveys have asked for views about "government policies to address America's energy supply" including opinions about "the government promoting the use of nuclear power." See "Continued Support for Keystone XL Pipeline," Sep. 26, 2013.
[51] A Pew Research survey conducted Nov. 6-9, 2014 repeated this question in a three-question set. See "Little Enthusiam, Familiar Divisions After the GOP's Midterm Victory, Q.69 on the topline.

Q.24 CONTINUED…

		Favor	Oppose	(VOL.) DK/Ref
d.	The increased use of genetically engineered plants to create a liquid fuel replacement for gasoline			
	Aug 15-25, 2014	68	26	6
	TREND FOR COMPARISON:			
	AAAS *scientists survey*			
	Sept 11-Oct 13, 2014	78	21	2
e.	Allowing more offshore oil and gas drilling in U.S. waters[52]			
	Aug 15-25, 2014	52	44	4
	TREND FOR COMPARISON:			
	AAAS *scientists survey*			
	Sept 11-Oct 13, 2014	32	66	2
f.	Allowing more people access to experimental drugs before clinical trials have shown the drugs to be safe and effective for that disease or condition			
	Aug 15-25, 2014	54	43	3

ASK ALL:

Q.25 Thinking about childhood diseases, such as measles, mumps, rubella and polio... **[READ AND RANDOMIZE RESPONSE OPTIONS]**

Aug 15-25, 2014		Apr 28-May 12, 2009[53]
68	Should all children be required to be vaccinated [OR]	69
30	Should parents be able to decide NOT to vaccinate their children	28
1	Don't know/Refused **(VOL.)**	3

TRENDS FOR COMPARISON:

AAAS *scientists survey*[54]	All children should be required to be vaccinated	Parents should be able to decide NOT to vaccinate their children	No answer
Sept 11-Oct 13, 2014	86	13	1
May 1-June 14, 2009	82	17	1

NO QUESTION 26

[52] Other Pew Research surveys have asked for views about "government policies to address America's energy supply" including opinions about "the government allowing more offshore oil and gas drilling in U.S. waters." See "Continued Support for Keystone XL Pipeline," Sep. 26, 2013.
[53] Answer choices for 2009 surveys were, "The earth is getting warmer mostly because of natural changes in the atmosphere; The earth is getting warmer mostly because of human activity such as burning fossil fuels; The earth is not getting warmer."
[54] AAAS scientists question wording was "Thinking about childhood diseases, such as measles, mumps, rubella and polio, do you think…[RANDOMIZE REPONSE OPTIONS 1 & 2: Parents should be able to decide NOT to vaccinate their children/All children should be required to be vaccinated]"

ASK ALL:
Q.27 Thinking about the use of biological engineering to create artificial organs for humans needing a transplant operation, would you say this is making appropriate use of medical advances OR is it taking medical advances too far?

Aug 15-25, 2014	
74	Appropriate use of medical advances
23	Taking medical advances too far
3	Don't know/Refused **(VOL.)**

ASK ALL:
Q.28 Which of these statements comes closest to your point of view, even if neither is exactly right? **[READ IN ORDER]**

Aug 15-25, 2014		Mar 21-Apr 8, 2013	Apr 6-May 6, 1999[55]
38	(One) The growing world population will NOT be a major problem because we will find a way to stretch our natural resources [OR]	37	42
59	(Two) The growing population WILL be a major problem because there won't be enough food and resources to go around	61	56
--	Neither/Both equally **(VOL.)**	1	1
3	Don't know/Refused **(VOL.)**	2	1

TREND FOR COMPARISON:

	The growing world population will NOT be a major problem…	The growing world population WILL be a major problem…	No answer
AAAS *scientists survey* Sept 11-Oct 13, 2014	17	82	*

ASK ALL:
On another topic.
Q.29 Do you think the SPACE STATION has been a good investment for this country, or don't you think so?[56]

Aug 15-25, 2014	
64	Good investment
29	Not a good investment
7	Don't know/Refused **(VOL.)**

TREND FOR COMPARISON:

	Good investment	Not a good investment	No answer
AAAS *scientists survey* Sept 11-Oct 13, 2014	68	31	2

[55] In 1999 survey, response options one and two were randomized.
[56] For other Pew Research surveys with questions related to the U.S. space program see "Majority Sees U.S. Leadership in Space as Essential," July 5, 2011.

ASK ALL:

Q.30 The cost of sending human astronauts to space is considerably greater than the cost of using robotic machines for space exploration. As you think about the future of the U.S. space program, do you think it is essential or not essential to include the use of human astronauts in space?

Aug 15-25, 2014	
59	Essential
39	Not essential
3	Don't know/Refused **(VOL.)**

TREND FOR COMPARISON:

AAAS *scientists survey*	Essential	Not essential	No answer
Sept 11-Oct 13, 2014	47	52	1

NO QUESTION 31

ASK ALL:

Q.32 From what you've heard or read, would you say that [**READ AND RANDOMIZE 1-2**]

Aug 15-25, 2014	
42	Scientists generally believe that the universe was created in a single, violent event, often called "the Big Bang"
52	Scientists are divided in their views about how the universe was created
2	Both/Neither **(VOL.)**
5	Don't know/Refused **(VOL.)**

[RANDOMIZE ORDER OF Q33 AND Q34]

ASK ALL:

Q.33 Would you say that changing a baby's genetic characteristics to make the baby more intelligent is making appropriate use of medical advances OR is it taking medical advances too far?[57]

Aug 15-25, 2014	
15	Appropriate use of medical advances
83	Taking medical advances too far
2	Don't know/Refused **(VOL.)**

[57] A similar question was asked on the Virginia Commonwealth University Life Sciences Survey September 3-26, 2003. Question wording was, "Would you say that changing a baby's genetic characteristics for cosmetic purposes such as eye or hair color is making appropriate use of medical advances or is it taking medical advances too far?" Fully 94% of adults said this was taking medical advances too far, 4% said it was an appropriate use of medical advances, 2% volunteered don't know or gave no response. For details see "Public Values Science But Concerned About Biotechnology"

[RANDOMIZE ORDER OF Q33 AND Q34]
ASK ALL:
Q.34 Would you say that changing a baby's genetic characteristics to reduce the risk of serious diseases is making appropriate use of medical advances OR is it taking medical advances too far?

		VCU Life Sciences Survey
Aug 15-25, 2014		Sept 3-26, 2003
46	Appropriate use of medical advances	41
50	Taking medical advances too far	54
4	Don't know/Refused **(VOL.)**	6

ASK ALL:
On a different topic.

Q.35 Do you think it is generally safe or unsafe to eat foods grown with pesticides?

Aug 15-25, 2014	
28	Generally safe
69	Generally unsafe
3	Don't know/Refused **(VOL.)**

TREND FOR COMPARISON:

	Generally safe	Generally unsafe	No answer
AAAS *scientists survey* Sept 11-Oct 13, 2014	68	31	1

NO QUESTION 36

ASK ALL: Scientists can change the genes in some food crops and farm animals to make them grow faster or bigger and be more resistant to bugs, weeds, and disease.[58]
ASK ALL:
Q.37 When you are food shopping, how often, if ever, do you LOOK TO SEE if the products are genetically modified? **[READ]**

Aug 15-25, 2014	
25	Always
25	Sometimes
17	Not too often
31	Never
1	Someone else in HH does the food shopping **(VOL.)**
1	Don't know/Refused **(VOL.)**

[58] Introduction to question set from ABC News, July 2003

ASK ALL:
Q.38 Do you think it is generally safe or unsafe to eat genetically modified foods?

Aug 15-25, 2014	
37	Generally safe
57	Generally UNsafe
6	Don't know/Refused **(VOL.)**

TREND FOR COMPARISON:

AAAS *scientists survey*	Generally safe	Generally unsafe	No answer
Sept 11-Oct 13, 2014	88	11	1

TRENDS FOR COMPARISON:
ABC News: Scientists can change the genes in some food crops and farm animals to make them grow faster or bigger and be more resistant to bugs, weeds, and disease. Do you think this genetically modified food, also known as bio-engineered food, is or is not safe to eat?

	ABC News July 2003	*ABC News July 2001*
Safe	46	35
Unsafe	46	52
No opinion (VOL.)	9	13

ASK ALL:
Q.39 From what you've heard or read, would you say scientists have a clear understanding of the health effects of genetically modified crops OR are scientists NOT clear about this?

Aug 15-25, 2014	
28	Scientists have a clear understanding
67	Scientists do NOT have a clear understanding
4	Don't know/Refused **(VOL.)**

Q40 THROUGH END HELD FOR FUTURE RELEASE[59]

[59] See questionnaire for question wording on demographic background questions.

UNDER EMBARGO UNTIL THURSDAY, JAN. 29 AT 2:00 P.M. EST

Appendix D: Topline AAAS Scientists Survey

PEW RESEARCH CENTER
2014 SURVEY OF AAAS SCIENTISTS
TOPLINE
SEPTEMBER 11 - OCTOBER 13, 2014
N=3,748

NOTE: ALL NUMBERS ARE PERCENTAGES. ANY PERCENTAGES GREATER THAN ZERO BUT LESS THAN 0.5% ARE REPLACED BY AN ASTERISK (*). COLUMNS/ROWS MAY NOT TOTAL 100% DUE TO ROUNDING.

ALL TREND COMPARISONS TO PEW RESEARCH SURVEY OF AAAS SCIENTISTS CONDUCTED MAY 1 TO JUNE 14, 2009, N=2,533

In this survey we will be asking you both about issues pertaining to science in general and to your scientific field or specialty. Most questions will be about science in general, and we will specify when we are particularly interested in your views about your specialty.

ASK ALL:
Q1 Would you say that this is generally a good time or a bad time for science?

2014		2009
52	Good time	76
48	Bad time	23
*	No answer	1

ASK ALL:
Q2 Would you say this is generally a good time or a bad time for YOUR SCIENTIFIC SPECIALTY?

2014		2009
62	Good time	73
37	Bad time	25
1	No answer	2

ASK ALL:
Q3 Compared to other industrialized countries, how would you rate the United States with regard to its overall scientific achievements?

2014		2009
45	Best in the world	49
47	Above average	45
6	Average	5
1	Below average	1
*	No answer	*

[RANDOMIZE QUESTIONS Q4a TO Q4e]
ASK ALL:
Q4a Compared with other industrialized countries, how would you rate the United States in the following area ... medical treatment?

2014	
25	Best in the world
39	Above average
22	Average
13	Below average
*	No answer

ASK ALL:
Q4b Compared with other industrialized countries, how would you rate the United States in the following area ... industry research & development (R&D) innovation?

2014	
29	Best in the world
53	Above average
15	Average
3	Below average
1	No answer

ASK ALL:
Q4c Compared with other industrialized countries, how would you rate the United States in the following area ... doctoral training in science and technology?

2014	
46	Best in the world
41	Above average
10	Average
2	Below average
*	No answer

ASK ALL:
Q4d Compared with other industrialized countries, how would you rate the United States in the following area ... science, technology, engineering and math education for grades K to 12?

2014	
1	Best in the world
15	Above average
38	Average
46	Below average
*	No answer

ASK ALL:

Q4e Compared with other industrialized countries, how would you rate the United States in the following area ... cutting-edge basic research in science and technology?

2014	
40	Best in the world
47	Above average
11	Average
2	Below average
1	No answer

[RANDOMIZE ITEMS Q5A TO Q5D]

ASK ALL:

Q5 How much of a problem, if at all, do you think each of the following are for science in general?

	Major problem	Minor problem	Not a problem	No answer
a. The public expects solutions to problems too quickly	49	44	7	*
Trend 2009	49	45	6	*
b. The news media oversimplify scientific findings	52	43	5	*
Trend 2009	48	45	6	*
c. News reports don't distinguish between well-founded and not well-founded scientific findings	79	20	2	*
Trend 2009	76	22	2	*
d. The public does not know very much about science	84	14	1	*
Trend 2009	85	14	1	*

[RANDOMIZE ITEMS Q6A TO Q6D]

ASK ALL:

Q6 To what extent do you think each of the following are REASONS for the U.S. public having limited knowledge about science?

	Major reason	Minor reason	Not a reason	No answer
a. Not enough science, technology, engineering and math in grades K through 12	75	22	3	*
b. Too few scientists who communicate their findings through the media and online	40	49	11	*
c. Lack of public interest and attention to science news	57	35	7	*
d. Lack of media interest and attention to scientific	43	46	12	*

developments

NO QUESTION 7

[RANDOMIZE ITEMS A TO G WITH ITEM H 'NONE OF THESE ARE SERIOUS PROBLEMS' ALWAYS LAST]
ASK ALL:

Q8 Which of the following, if any, are serious problems for conducting high quality scientific research today? *[Check all that apply.]*

	Selected	NET Not selected/ No answer/ None of these
a. The way Institutional Review Boards (IRBs) implement rules for research involving human subjects	12	88
b. Lack of funding for basic research	88	12
c. Visa and immigration problems facing foreign scientists or students who want to work or study in the U.S.	32	68
d. ITAR regulations on using American technology overseas	6	94
e. Regulations on animal research	13	87
f. Conflict of interest rules used by scientific publications	8	92
g. Not enough data replication of previous research studies	48	52

[RANDOMIZE QUESTIONS Q9, Q10, Q11; RANDOMIZE RESPONSE OPTIONS 1 and 2 FOR Q9, Q10, Q11]
ASK ALL:

Q9 Compared with 5 years ago, would you say getting FEDERAL funding for research in your specialty area is...

2014	
83	Harder today
2	Easier today
13	About the same as five years ago
2	No answer

ASK ALL:

Q10 Compared with 5 years ago, would you say getting INDUSTRY funding for research in your specialty area is...

2014	
45	Harder today
9	Easier today
41	About the same as five years ago
5	No answer

ASK ALL:

Q11 Compared with 5 years ago, would you say getting PRIVATE FOUNDATION funding for research in your specialty area is...

2014	
45	Harder today
8	Easier today
43	About the same as five years ago
5	No answer

[RANDOMIZE RESPONSE OPTIONS 1 AND 2]

ASK ALL:

Q12 When it comes to funding for research in your scientific specialty, which do most funders place greater emphasis on...

2014		2009
56	Projects expected to make incremental scientific progress that have lower risk of failure	59
11	Projects with the potential for scientific breakthroughs, but with higher risk of failure	5
30	Both types of projects about equally	28
2	No answer	7

[RANDOMIZE ITEMS Q13A to Q13D]
ASK ALL:
Q13 Please indicate whether you think each of the following has too much influence, or not, on the direction of research in your scientific specialty.

	Yes, too much influence	No, not too much influence	No answer
a. The emphasis on developing marketable products	47	51	2
Trend 2009	40	56	4
b. A focus on projects that will yield results quickly	69	29	2
Trend 2009	66	31	3
c. The incentive to do research in areas where funding is readily available	74	23	2
Trend 2009	76	20	3
d. Political groups or officials	55	44	2
Trend 2009	50	47	3

[RANDOMIZE QUESTIONS Q14A TO Q14D]
ASK ALL:
Q14a How often do you believe the best scientific information guides government regulations when it comes to ... food safety regulations?

2014	
3	Always
43	Most of the time
50	Some of the time
3	Never
1	No answer

ASK ALL:
Q14b How often do you believe the best scientific information guides government regulations when it comes to ... clean air and water regulations?

2014	
2	Always
26	Most of the time
66	Some of the time
6	Never
1	No answer

ASK ALL:

Q14c How often do you believe the best scientific information guides government regulations when it comes to ... new drug and medical treatment regulations?

2014	
4	Always
54	Most of the time
40	Some of the time
1	Never
1	No answer

ASK ALL:

Q14d How often do you believe the best scientific information guides government regulations when it comes to ... land use regulations?

2014	
1	Always
14	Most of the time
75	Some of the time
9	Never
1	No answer

QUESTION 15 HELD FOR FUTURE RELEASE

[RANDOMIZE Q16-Q17 BLOCK WITH Q18-Q19 BLOCK]
[DISPLAY FOR ALL WITH FIRST QUESTION IN SET:]
Next, a few questions about issues being debated by the public.

ASK ALL:
Q16 **Which comes closer to your view: [RANDOMIZE RESPONSE OPTIONS:** Humans and other living things have evolved over time; Humans and other living things have existed in their present form since the beginning of time**]**

ASK IF EVOLVED (Q16=1): Q17 **Do you think that... [RANDOMIZE RESPONSE OPTIONS:** Humans and over living things have evolved due to natural processes such as natural selection; A supreme being guided the evolution of living things for the purpose of creating humans and other life in the form it exists today**]**

2014[60]		2009
98	Humans and other living things have evolved over time	97
90	Humans and other living things have evolved due to natural processes such as natural selection	87
8	A supreme being guided the evolution of living things for the purpose of creating humans and other life in the form it exists today	8
1	No answer Q17	2
2	Humans and other living things have existed in their present form since the beginning of time	2
*	No answer Q16	1

[RANDOMIZE Q16-Q17 BLOCK WITH Q18-Q19 BLOCK]
ASK ALL:
Q18 **From what you've read and heard, do you think... [RANDOMIZE RESPONSE OPTIONS 1 AND 2]:**

2014		2009[61]
9	The earth is getting warmer mostly because of natural patterns in the earth's environment	10
87	The earth is getting warmer mostly because of human activity such as burning fossil fuels	84
3	There is no solid evidence that the earth is getting warmer	4
1	No answer	2

[60] The nested Q17 responses do not sum to the net of 98% on Q16 due to rounding.
[61] In the 2009 survey, one of the response options was worded differently. It read, "the earth is getting warmer mostly because of natural changes in the atmosphere."

[RANDOMIZE Q16-Q17 BLOCK WITH Q18-Q19 BLOCK]
ASK ALL:
Q19 In your view, how serious a problem is climate change? Is it a...

2014		2009[62]
77	Very serious problem	70
17	Somewhat serious problem	22
4	Not too serious a problem	4
2	Not a problem	2
*	No answer	*

NO QUESTIONS 20 THROUGH 21

[RANDOMIZE QUESTIONS Q22A THROUGH Q22E]
ASK ALL:
Q22a Do you favor or oppose the use of animals in scientific research?

2014		2009
89	Favor	93
9	Oppose	5
2	No answer	2

ASK ALL:
Q22b Do you favor or oppose building more nuclear power plants to generate electricity?

2014		2009
65	Favor	70
33	Oppose	27
2	No answer	3

ASK ALL:
Q22c Do you favor or oppose the increased use of fracking, a drilling method that uses high-pressure water and chemicals to extract oil and natural gas from underground rock formations?

2014	
31	Favor
66	Oppose
3	No answer

[62] In the 2009 survey, the question stem asked, "In your view, how serious a problem is global warming…"

ASK ALL:

Q22d Do you favor or oppose the increased use of genetically engineered plants to create a liquid fuel replacement for gasoline?

2014	
78	Favor
21	Oppose
2	No answer

ASK ALL:

Q22e Do you favor or oppose allowing more offshore oil and gas drilling in U.S. waters?

2014	
32	Favor
66	Oppose
2	No answer

ASK ALL:

Q23 Thinking about childhood diseases, such as measles, mumps, rubella and polio, do you think... [RANDOMIZE RESPONSE OPTIONS]

2014		2009
13	Parents should be able to decide NOT to vaccinate their children	17
86	All children should be required to be vaccinated	82
1	No answer	1

ASK ALL:

Q24 Which of these statements comes closest to your point of view, even if neither is exactly right?

2014	
17	The growing world population will NOT be a major problem because we will find a way to stretch our natural resources
82	The growing population WILL be a major problem because there won't be enough food and resources to go around
*	No answer

ASK ALL:

Q25 Do you think the space station has been a good investment for this country, or don't you think so?

2014	
68	Good investment
31	Not a good investment
2	No answer

ASK ALL:

Q26 The cost of sending human astronauts to space is considerably greater than the cost of using robotic machines for space exploration. As you think about the future of the U.S. space program, do you think it is essential or not essential to include the use of human astronauts in space?

2014	
47	Essential
52	Not essential
1	No answer

ASK ALL:

Q27 Do you think it is generally safe or unsafe to eat foods grown with pesticides?

2014	
68	Generally safe
31	Generally unsafe
1	No answer

ASK ALL:

Q28 Do you think it is generally safe or unsafe to eat genetically modified foods?

2014	
88	Generally safe
11	Generally unsafe
1	No answer

Q29 THROUGH Q32 HELD FOR FUTURE RELEASE

NO QUESTION 33

[DISPLAY FOR ALL:]
A few questions about science as a career...

ASK ALL:
Q34 Overall, how would you characterize this as a time to begin a career in your scientific specialty area? Would you say it is a...

2014		2009
15	Very good time	17
44	Good time	50
33	Bad time	27
7	Very bad time	5
1	No answer	1

ASK ALL:
Q35 Compared with five years ago, would you say attracting the best young people to a science career is...

2014	
9	Easier today
58	Harder today
32	About the same as five years ago
1	No answer

[RANDOMIZE ITEMS A TO F WITH ITEM G 'NONE OF THESE ARE SERIOUS PROBLEMS FOR PEOPLE ENTERING A CAREER AS A RESEARCH SCIENTIST THESE DAYS' ALWAYS LAST]
ASK ALL:
Q36 Which of the following, if any, are serious problems for people entering a career as a research scientist these days? *[Check all that apply.]*

	Selected	NET Not selected/ No answer/ None of these
a. Lack of adequate funding for research needs	85	15
b. Salaries below market competition	50	50
c. Too few job openings for tenure-track positions	73	27
d. Graduate training that doesn't meet today's needs	31	69
e. The long hours needed to succeed in a research career	46	54
f. Too few job openings in industry research & development (R&D) positions	54	46

Q37 THROUGH Q38 HELD FOR FUTURE RELEASE

ASK ALL:

Q39 Thinking about any scientific research that you have been involved with during the past five years, do you think of your work as PRIMARILY addressing... [RANDOMIZE RESPONSE OPTIONS]

2014		2009
48	Basic knowledge questions	49
50	Applied research questions	46
2	No answer	5

NO QUESTION 40

ASK ALL:

Q41 What were the one or two most significant experiences influencing your decision to become a scientist? *[Please type your response in the box.]*

OPEN END RESPONSES CATEGORIZED AS FOLLOWS; MULTIPLE RESPONSES ALLOWED

2014	
30	Intellectually challenging, lifelong curiosity, love of science or nature
8	To make a difference, contribute to society, help others, teach
4	Ability to do well, good at it
24	Mentors, Professors, Teachers (at any level)
6	High school or middle school courses, science magnet school
6	Other influential courses or teaching experience when it “clicked”
13	Lab experience, fieldwork, internships, science fairs
8	Other personal experiences in jobs, including some leading to new direction
8	Childhood experiences with natural parks, science museums, star gazing, chemistry sets
12	Family encouragement or inspiration
1	Kindred spirit with scientists/students
7	Influence of books, movies, TV on science e.g., Cosmos/Sagan, biographies of scientists, and science fiction
1	Influence of specific scientists either through personal experience or admired e.g., Curie, Goodall, Einstein, Ehrlich, Salk, Feynman
4	The space race, NASA, International Space programs
1	Other scientific discoveries e.g. Human Genome Project, Manhattan Project, Cloning, Gene Therapy
*	Environmental issues of the 1970s
4	Practical issues: funding, job availability
13	No answer

ASK ALL:

Q42 What is your primary field or scientific discipline?

2014		TREND FOR COMPARISON	2009[63]
50	Agriculture, Biological & Medical Sciences	Biological & Medical	51
11	Chemistry	Chemistry	14
7	Earth Sciences	Geosciences	6
7	Engineering	Engineering	6
5	Mathematics & Computer science	Math & Computer science	3
8	Physics & Astronomy	Physics & Astronomy	8
9	Social & Behavioral Sciences	Social Sciences & Policy	7
4	Other [please specify]	Other	3
*	No answer	No answer	2

ASK IF Q42=1-7:

Q43 Within the field or discipline of [INSERT Q42=1-7 CATEGORY], what is your primary scientific specialty area? LIST OF OPTIONS WITH OTHER SPECIFY FOR EACH CATEGORY NOT SHOWN

ASK IF Q42=8:

Q43b Within that field or discipline, what is your primary scientific specialty area? *[Please type your response in the box.]* ***[OPEN END]***

RESPONSES TO Q43 NOT SHOWN

ASK ALL:

Q44 Would you describe your own work in your primary specialty area as CLINICAL OR TRANSLATIONAL research, or not?

2014		TREND FOR COMPARISON 2009[64]
27	Yes	11
71	No	88
2	No answer	1

ASK ALL:

Q45 Would you describe your own work in your primary scientific specialty area as INTERDISCIPLINARY, or not?

2014		2009
82	Yes	81
17	No	18
1	No answer	1

[63] In the 2009 survey, primary field or scientific discipline was categorized based on open-end responses and may not be directly comparable to 2014.

[64] In the 2009 survey, the question stem did not include translational research. It asked, "would you describe your own work in your primary specialty area as clinical research, or not?"

[RANDOMIZE ITEMS A TO E WITH ITEM F 'NONE OF THESE' ALWAYS LAST]
ASK ALL:
Q46 Which, if any, of the following have you done? *[Check all that apply.]*

	Selected	NET Not selected/ No answer/ None of these
a. Completed graduate or postdoctoral training in TWO or more primary fields	30	70
b. Published a research study with a multidisciplinary team	57	43
c. Read a scientific journal article in fields outside of your primary specialty area in the past 12 months	92	8
d. Taught a course that drew material from TWO or more primary fields	47	53
e. Held a university research position in TWO or more disciplines	20	80

Q47 THROUGH Q51 HELD FOR FUTURE RELEASE

NO QUESTIONS 52 THROUGH 54

ASK ALL:
Q55 Within the last five years, have you worked on a research project that used animals?

2014		2009
32	Yes	35
67	No	64
1	No answer	1

ASK ALL:
Q56 Within the last five years, have you worked on a research project that used human subjects?

2014		2009
29	Yes	24
70	No	74
1	No answer	2

ASK ALL:

Q57 Within the last five years, have you received any funding for a research project?

2014	
56	Yes
43	No
1	No answer

ASK IF YES, RECEIVED FUNDING WITH PAST 5 YEARS (Q57=1)
ITEMS IN ORDER WITH ITEM G 'NONE OF THESE' LAST

Q58 From which of the following sources did you receive research funding within the last five years?
[Check all that apply.]

BASED ON THOSE WHO RECEIVED FUNDING WITHIN LAST FIVE YEARS N=2,077

	Selected	NET Not selected/ No answer/ None of these
a. Federal government	78	22
b. State government	15	85
c. Private foundations (non-profit)	32	68
d. Industry	25	75
e. Direct support from a university or college	46	54
f. Scientific professional association	6	94

ASK ALL:

E1 Are you currently retired, or not?

2014		2009
23	Yes, retired	19
76	No, not retired	79
1	No answer	1

ASK ALL:

E2 Are you now enrolled in school, either full or part-time, or not?

2014		2009
13	Yes, full-time student	14
3	Yes, part-time	2
83	Not enrolled in school	83
1	No answer	1

ASK ALL:

E3 Are you now employed full-time, part-time or not employed?

2014		2009
62	Full-time	71
12	Part-time	10
25	Not employed	17
1	No answer	1

ASK IF EMPLOYED FULL OR PART-TIME (E3=1,2):

EMPORG. Which of these best describes your current employer?

BASED ON EMPLOYED FULL OR PART-TIME N=2,753

2014		2009
10	Government	9
58	University or college	63
21	Business or industry	15
9	Non-profit organization	8
2	Other (please specify)	5
*	No answer	*

ASK ALL:

EDUC For each of the following, indicate if you currently hold this degree: *[Check all that apply.] Response options a. Master's Degree b. Doctor of Philosophy c. Doctor of Medicine d. Doctor of Dentistry e. Other advanced degree (s) (please specify)*

2014	**HIGHEST DEGREE OBTAINED**
72	Doctorate or medical-related doctorate
16	Master's degree
12	All others: includes those with B.S., degrees in progress, and unclear responses

ASK ALL:

AGE What is your age? OPEN-END

2014		2009
35	18 to 49 years	38
29	50 to 64 years	33
35	65 and older	26
2	No answer	3
55	Mean age	53
59	Median age	55

ASK ALL:
RSEX Are you male or female?

2014		2009
71	Male	72
29	Female	26
*	No answer	2

ASK ALL:
RACE1 What is your race or origin? Select as many as apply.*[Check all that apply.]*
Response options: White; Hispanic, Latino or Spanish origin; Black or African American; Asian or Asian-American; American Indian or Alaska Native; Native Hawaiian or Other Pacific Islander; Some other race or origin (please specify)

2014	SUMMARY OF RACE, ETHNICITY
83	White, non-Hispanic[65]
1	African American, non-Hispanic
4	Hispanic
7	Asian or Asian-American, non-Hispanic
2	Other, Mixed, non-Hispanic
3	No answer/Refused

ASK ALL:
USBORN. Were you born in the United States, in Puerto Rico or another U.S. territory, or in another country?

2014	
83	Born in the U.S.[66]
1	Born in Puerto Rico or a U.S. territory
16	Born in another country
*	No answer

[65] For comparison, a similar question on the 2009 survey found 81% of AAAS scientists were non-Hispanic whites.
[66] For comparison, a similar question on the 2009 survey found 81% of AAAS scientists were born in the U.S., 18% said they were not born in the U.S. Nine-in-ten were either born in the U.S. or naturalized citizens.

ASK IF USBORN=3 OR SKIP:
WHEREBORN. In what country were you born? *Response options with other specify not shown*

BASED ON THOSE BORN OUTSIDE THE U.S. N=604

2014	
36	Europe (including Eastern Europe)
32	Asia & Pacific (including Australia and New Zealand)
14	South America & Caribbean (including Puerto Rico or U.S. territory)
7	Canada
3	Middle East and North Africa
2	Sub-saharan Africa
6	Other unclear/No answer

ASK IF USBORN=3 OR SKIP:
CITIZEN Are you a citizen of the United States?
Response options: Yes; No.

BASED ON TOTAL

2014	
92	NET Citizen or Born in U.S
83	U.S. born
9	Citizen, foreign born
1	Born in Puerto Rico or U.S. territory
7	Foreign born, not a U.S. Citizen
1	No answer

OTHER BACKGROUND QUESTIONS THROUGH END HELD FOR FUTURE RELEASE