ELSEVIER CustomerInsights

RESEARCH FUTURES

Researcher survey results

February 2019

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Approach to survey of researchers

About Research Futures research

- Understanding what the research landscape might be like in ten years' time
- What will be the opportunities and challenges for the research community
- This survey is part of a larger study the full report is on the Elsevier.com website* which also includes:
  - A literature review to understand current systems, agents and macro trends
  - 56 in-depth interviews with range of stakeholders (funders, researchers, librarians, technologists, futurists, government and senior Elsevier personnel)
  - Workshops with Elsevier personnel and external stakeholders to develop scenarios

Research objectives are to:

- Test attitudes towards (emerging) solutions, technologies and policy shifts
- Map expectation, desire and behaviour (in respect to funding and research outputs)

About the survey

- 2,055 researchers responded to a survey of 146669 individuals randomly selected from database of 3.6 million researchers (1.4% response rate).
- Survey tool: Online survey available in English only. Survey took 20 minutes to complete (median average). Fieldwork took place in Spring 2018.
- Results: Responses have been weighted to be representative of the global researcher population by country (UNESCO data). Base sizes shown in this report are weighted unless otherwise stated
- Statistical testing: Maximum error margin for 2055 responses is ± 1.8% at 90% confidence levels. When comparing main group and sub-group we have used a Z-test of proportion to identify differences between the overall average and the sub-group (90% confidence levels).

*www.elsevier.com/connect/elsevier-research-futures-report

EXECUTIVE SUMMARY

RESEARCH FUTURES: EXECUTIVE SUMMARY (1 OF 6)

Pathways to Open Science

Open Science* is an umbrella term that encompasses a number of different aspects of research. For many a key component of open science is the open availability of **research data**. More than half of researchers (52%) expect most data to be available once the related research is published (22% thought most research data would not be available and the rest were undecided). Engineering researchers (35%) were least confident that research data would be available.

Open Access is another aspect of open science. In recent years Open Access publishing has not grown at the rate expected by many, but looking ahead to 10 years' time, researchers expect that **Open Access** journals will dominate over subscription journals; 56% expect all publications to be Open Access vs. 18% that expect all publications to be subscription. The expectation is higher in life science (63%) where Open Access publishing is currently most prevalent. Furthermore researchers in the UK (69%) and US (61%) are more likely to expect a fully Open Access future than researchers from China (46%).

Another component of open science, is the ability to reproduce prior research. In recent years **reproducibility** has been discussed widely among scholars and has been described as a crisis, This research indicates that researcher experience of reproducing prior research is mixed. Moreover, they do not believe any difficulties will be resolved soon. Researchers expect to still be frustrated by the inability to reproduce research in 10 years' time; only 48% think it is likely that nearly all research in their field will be replicable; with researchers in Western Europe and North America even more sceptical (43% and 42% respectively).

Within the last year 52% of researchers have undertake a replication study. Almost a third of researchers attempted to reproduce another researcher's study, 37% were successful, 6% unsuccessful (most were at least partly successful).

Researchers report a lack of incentive to conduct replication studies due to concerns that studies will not be accepted for publication and too much focus on replication of existing studies will hold back innovation and career.

*See the definition in the full report. www.elsevier.com/connect/elsevier-research-futures-report

RESEARCH FUTURES: EXECUTIVE SUMMARY (2 OF 6)

Funding the future

As competition for research funding and the need to demonstrate ROI for public finances grows, **funders may expect more control** in the scientific process, but how is that received by researchers?

Funding of research has been a hot topic since the 2008 global financial crisis, so perhaps unsurprisingly researchers are not optimistic about funding for research in the future.

There is a considerable gap between the proportion of researchers that *want* more funding and those that *expect* there to be more funding (in real terms in 10 years' time compared to today). This is particularly true in economically mature regions (North America, Western Europe and Australasia) where around nine in ten *want* more funding, but less than four in ten *expect* there to be more funding available. Conversely in Asia 71% *expect* there to be more funding compared to only 63% that *want* more funding.

In a future where public funding falls short it is feasible that other sources will make up the shortfall. Researchers are ambivalent about other sources such as **philanthropic and corporate** funds in the future; especially in North America and Western Europe (indeed a number neither want it nor expect to use such funding sources).

Comments from researchers suggest they are more accepting of philanthropic/charitable funds than of funding from corporations (whom they believe may want to influence the outcome and dissemination of studies in order to favor their own interests).

Researchers in Engineering, Life Sciences and Health Sciences are more open to using these alternative funding sources.

Only one in five researchers *want* funders to influence how results are communicated or how studies are designed; however almost two in five think it is *likely* funders will want to do this.

Generally researchers are more willing to comply with funders determining the communication of results (providing researchers can also publish in a peer-reviewed journal of their choosing) but they are less willing to alter their study design to appease funders. Researchers believe funders may not have sufficient knowledge of experimental design to set requirements or may bias results towards a certain outcome.

Related to funding and ROI is the need to **demonstrate impact**. Researchers are largely in agreement that the majority of research should have an impact on society, moreover, many believe their own research will have an impact; however, much fewer think it is likely that most research will have an impact.

The best **measures of impact** are mainly around publications and related outputs and attention rather than tangible changes to society; however this varies by specialty. Medical researchers are more likely to view improved life expectancy as an impact of their research and social scientist mention changes to government policy.

RESEARCH FUTURES: EXECUTIVE SUMMARY (3 OF 6)

Technology … revolution or evolution

Technology has already brought significant change to research and the communication of research, notably the transformation of print to electronic dissemination over the last decade.

In terms of the research process, more than three-quarters of researchers globally agree they will use **technological advances to increase the amount of research** and believe this is both likely and desirable.

However, this viewpoint is not true across all fields: social scientists/ arts & humanities less likely to agree it is desirable (59% vs 77% overall).

Technology brings advantages in larger scale: faster data collection and analysis as well as better equipment/ facilities. Researchers note however, that even though technology is likely to increase the quantity of research, and drive further research, technological advances (notably **artificial intelligence (**AI)), will not be the creative driving force of new knowledge, rather that will be the researchers themselves.

Researchers are generally willing recipients of the advantages that AI bring, but are sceptical about its value in certain areas, specifically **AI being used to determine the appropriateness of an article** for a journal. They felt that AI would be too simplistic and reject novel studies. Despite this negative reaction, almost two-fifths think use of AI in the review process is likely to happen.

Mathematicians are more accepting of this practice with 44% agreeing they will read articles in journals that rely on AI instead of peer review compared to 25% of researchers on average.

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How researchers work

The research article is perhaps the most visible stage of the research process enabling research outcomes to be shared with the research community.

The **research article** is expected to endure for at least the next ten years (though likely in an OA format), despite fewer wanting articles to endure (80% *expect* it vs. 65% *wanting* it). Researchers in mathematics, social sciences and Western Europe are less likely to believe that the primary channel for sharing research results will be via journal articles.

The article will endure likely due to the '**publish or perish**' paradigm, indeed the pressure to publish is expected to increase (seen as *likely* but *undesirable*) due to competition between researchers/institutions and the continued assessment based on the quantity of articles. Funding organisations and Research Administrators will be the main sources of pressure though early career researchers also feel pressure from their managers/more senior researchers and potential employers.

The pressure to publish frequently is linked to the desire to secure tenure (a permanent position) at a university. This pressure will likely increase, only 25% of researchers believe researchers will be **permanent** members of staff compared to 43% that believe most researchers will be on **temporary contracts** (it is even higher in Western Europe (63%) and among early career researchers (48%)).

One problem in scientific communication that the community and publishers are trying to address is the bias towards publishing studies with positive results (**publication bias**).

Although around two-thirds of researchers want to see negative results published and would submit their own such studies for publication, less than half think it is likely they will be published, which suggests that publishers are not expected to keep pace with the interests of the scholarly community.

As science becomes more interdisciplinary and with more centres of expertise dispersed across the world, researchers see advantages in **collaborating across international boundaries**. 84% want to see more projects conducted across international boundaries, and a similar proportion thought their own projects would be international. However, fewer (64%) expect that the majority of research projects will be conducted across international boundaries. Researchers in the USA (39%) envisage less international research than average.

RESEARCH FUTURES: EXECUTIVE SUMMARY (5 OF 6)

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The academy and beyond

The role of universities is to educate as well as perform research; **students** are expected to become future researchers as well as members of the wider workforce. But will there be a shift in focus? Researchers believe higher education in ten years' time will focus on producing students that are '**suited for work**' (41%) rather than '**intellectually curious**' (25%). The view of students being work-suited is particularly widespread in mathematics (66%), social sciences/arts (50%), North America (46%) and Western Europe (51%).

A small minority (36%) believe that 'campus of the future' will be campus based, whilst slightly fewer (27%) believe it could be **virtual**. Life (40%) and social scientists (32%) think remote education is more likely than average.

Building the future research information system

Increasingly traditional publishers and newer niche start-ups are developing **workflow tools** for researchers. These tools can be used to find relevant literature and funding, engage with peers, store experiment data, for writing articles and show impact of research.

Three-quarters of researchers want integrated end-to-end research workflow tools, however slightly fewer (three-fifths) think researchers in their field will be using them.

All researchers believe their research will have impact, but the most common impact is increased scientific knowledge and understanding, rather than commercial application.

36% believe success will be primarily judged on articles published in journals while for 38% success will be judged on a range of outputs (including data, pre-prints, conferences as well as articles).

RESEARCH FUTURES: EXECUTIVE SUMMARY (6 OF 6)

Some recommendations for research information providers

Open science: continue developing open access journals and 'flipping' subscription journals to Open Access over the next ten years. Encourage authors to make data available with their journal articles (and record citations for datasets).

Consider how to address issues the contribute to reproducibility difficulties for example:

- flagging validated studies;
- ensure more open availability of data;
- standardising description of the method;
- Launching bespoke journals/repositories for replication studies

Working culture: providers should continue to develop end-to-end research tools. Though research articles likely to remain key form of research communication also offer channels for other formats, such as micro-articles and data-only publications. Service providers should consider how they can help ensure that negative results are published (e.g. pre-registration of studies, bespoke journals/repositories).

Funding: sourcing funding for research is likely to become more competitive. Providers should continue to develop and promote tools to help researchers find funding. These tools should include philanthropic sources but more curation is likely to be needed for corporate sources to ensure researchers will have the autonomy they desire. Publishers should monitor the requirements of large funding proposals for dissemination requirements (e.g. whether they are mandating open access and how they expect impact to be measured) so they can develop channels and tools to support researchers.

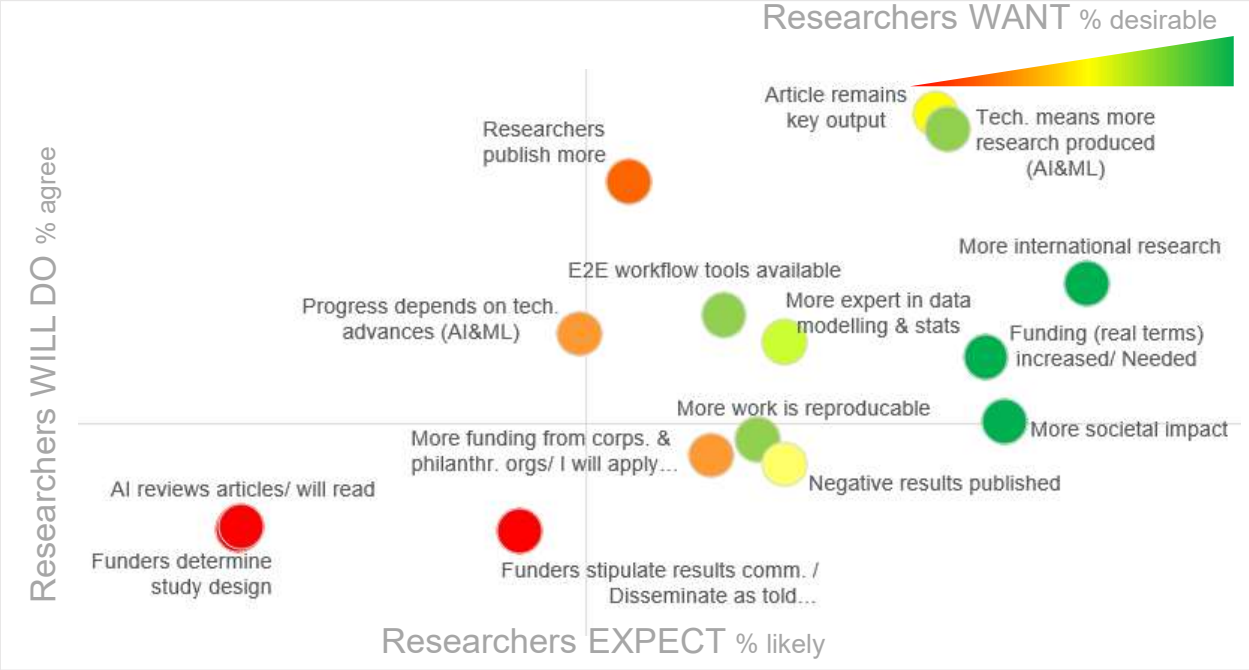
Technology: Advance Artificial Intelligence and use in some tasks in the review process (e.g. plagiarism) in conjunction with 'human' peer review (e.g. for novelty/ quality).

Education and engagement: help researchers demonstrate impact. Is there a role for providers to improve tracking of real-world impact such as commercial application, policy development and clinical practice/ health outcomes.

OVERVIEW OF RESULTS

Researchers expectations of research in 10 years' time

The chart below plots researchers expectation of what will happen (likelihood) on the x-axis against what researchers think they will do on the y-axis. The colour coding shows what researchers want to happen in 10 years' time with statements in green being most desirable and red being least desirable.



BASE: Researchers. N=2054

See results by subject, geographic region, country and age

See wording of statements

There are tensions in researchers' expectations of the future of research

- Expectation there will be pressure to publish more articles, although researchers don't themselves want to publish more
- Researchers will still be frustrated by the inability to reproduce research
- Funders will have more say in research design than researchers would like; moreover they are pessimistic about the amount of funding that will be available
- Researchers do not particularly want the research article to be a key output in communication of research but they expect it will be.
- Research not expected to have as much impact on society as desired.

In the next 10 years…

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Within attribute notable difference*
Higher Score | Lower Score

		DESIR-ABLE	LIKELY	I WILL	High/Low Scoring Attribute
R&D in Global Funding Context	Research funding (in real terms) is/will be greater than it is now | I will *need* more funding in real terms...	78%	56%	79%	Most desirable + likely + action
	Corporations and philanthropic organisations (will) fund a higher proportion of research | I will always apply to corporations and philanthropic organisations for funding if it is available	53%	47%	59%	
	Funders determine how research results are communicated/ where my results are published | I will disseminate results as recommended by funder	21%	39%	45%	Least desirable + likely + action
	Funders determine my study design | Design of most studies in field determined by funders | I will always alter my study design to meet funders demands	20%	39%	25%	
Open Science	Being able to replicate other research findings | Nearly all research in field will be replicable | I will try to replicate other researchers' findings that my work builds on	75%	48%	62%	
Technology	Amount of research produced (will have) increased due to technological advances | I will use tech. advances to increase the amount of research I produce	77%	78%	76%	Most desirable + likely + action
	Scientific progress is dependent upon tech. advances (e.g. AI, ML) | My research will depend on technological advances	46%	59%	50%	
	AI is/ will be used to determine an article's appropriateness for publication in a journal | I will read journals that rely on AI instead of peer review	25%	39%	25%	Least desirable + likely + action
Culture: How Scientists Work	More research projects conducted across international boundaries | Majority of research will be | My research will be…	84%	64%	86%	Most desirable + likely + action
	Integrated end-to-end research workflow tools are readily available | Most researchers in my field will use | I will rely on…	76%	61%	60%	Most desirable + likely + action
	Negative results are/will be published | I will submit my negative results from my experiments for publication	66%	46%	64%	
	Researchers are/ will be expert in advanced data modelling techniques and statistics | I will use advanced modelling techniques and will be expert in statistics	70%	57%	64%	
	Key output from research remains publication of a research article | Main method of communicating my research will be journal articles	65%	80%	75%	Most desirable + likely + action
	Each researcher publishes more articles than they do now | Pressure to publish will be greater | I will publish more articles per project	38%	73%	53%	
Education / public engagement	Majority of research has/ nearly all research will have an impact on society | Research I undertake will impact society	79%	50%	80%	Most desirable + likely + action

BASE: Researchers. N=2055

* ≥ ± 10 percentage points of average of the three scores

See results by subject, geographic region, country and age

Most desirable + likely + action

Least desirable + likely + action

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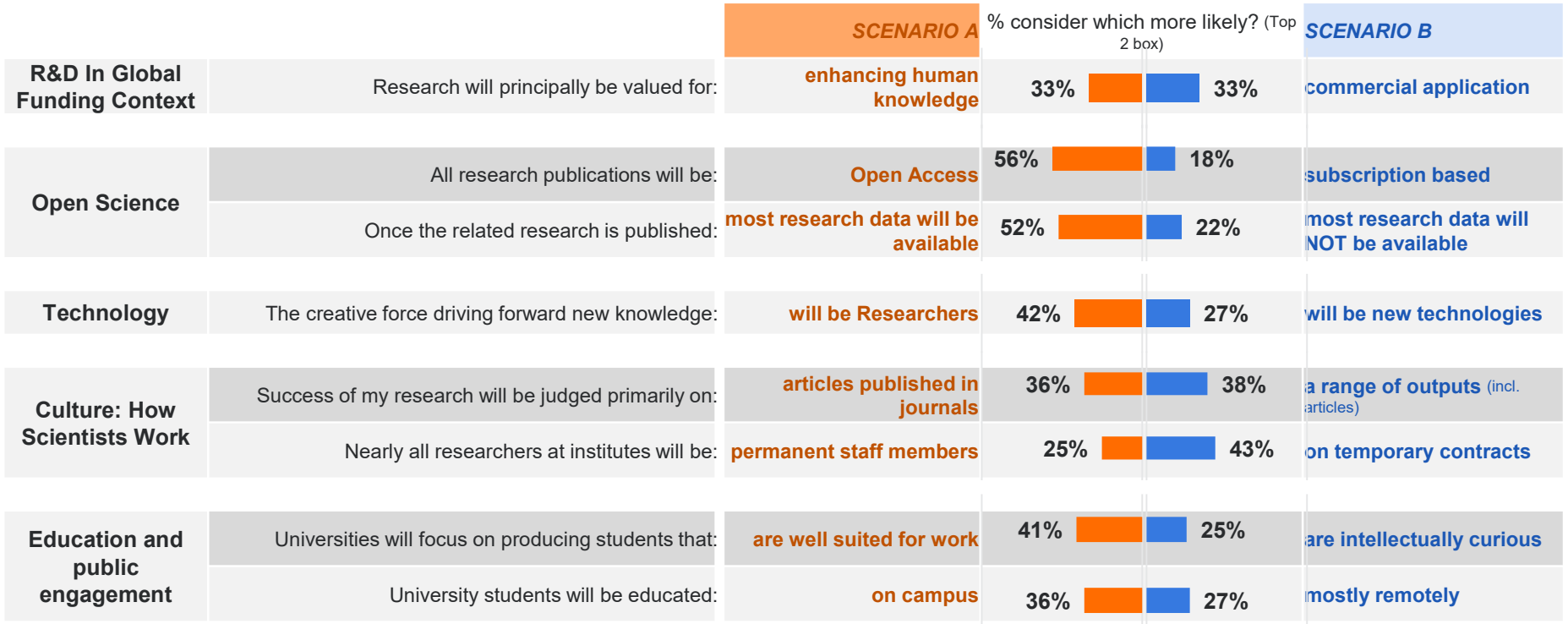
Researchers anticipate research publications will be open access and most research data will be available. Technology will play a supporting role to researchers as the driving force of new knowledge

Q. Please read each pair of statements and decide which one you think is most likely to describe research in 10 years' time.



BASE: Researchers. N=2055

See results by subject, geographic region, country and age

Researchers anticipate research publications will be open access and most research data will be available. Technology will play a supporting role to researchers as the driving force of new knowledge

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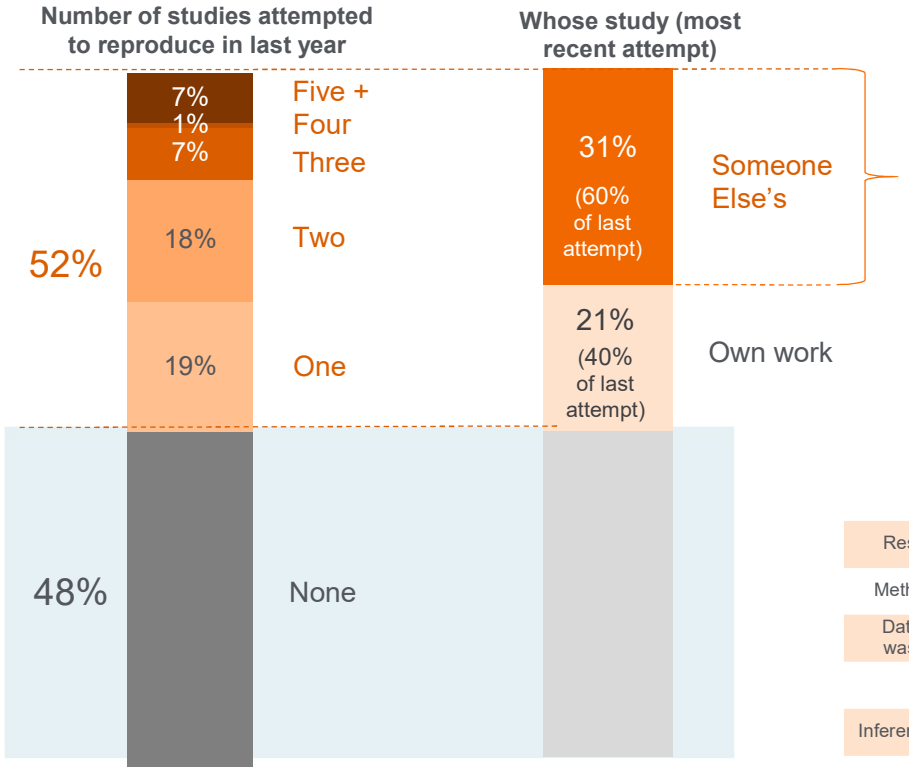
		SCENARIO A	Scenario consider which more likely? (Top 2 box minus bottom 2 box)	SCENARIO B
R&D In Global Funding Context	Research will principally be valued for:	enhancing human knowledge		commercial application
Open Science	All research publications will be:	Open Access		subscription based
	Once the related research is published:	most research data will be available		most research data will NOT be available
Technology	The creative force driving forward new knowledge:	will be Researchers		will be new technologies
Culture: How Scientists Work	Success of my research will be judged primarily:	articles published in journals		a range of outputs (incl. articles)
	Nearly all researchers at institutes will be:	permanent staff members		on temporary contracts
Education and public engagement	Universities will focus on producing students that:	are well suited for work		are intellectually curious
	University students will be educated:	on campus		mostly remotely

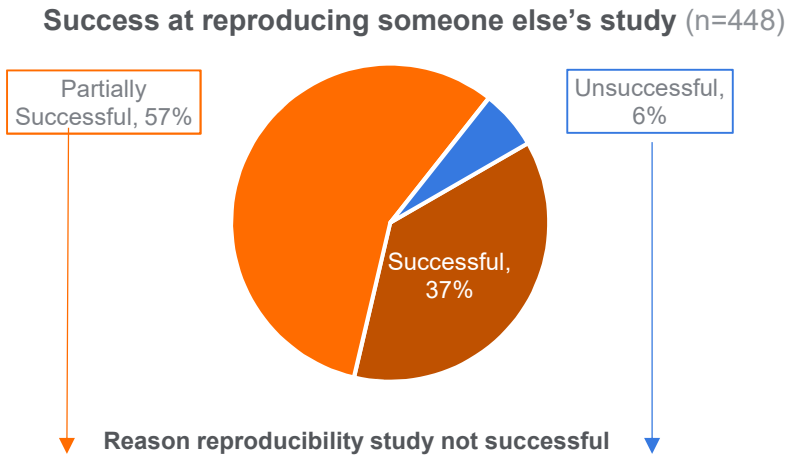
See results by subject, geographic region, country and age

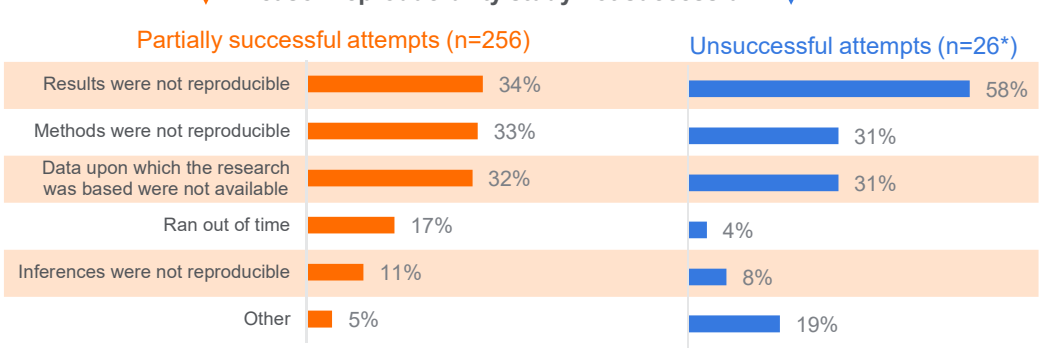
Reproducibility of research

More than half have attempted to reproduce a pre-existing study. 37% of those attempting to reproduce another researcher's study were successful (a further 57% were partially successful).



BASE: Researchers. N=1448





See results by subject, geographic region, country and age

* Unweighted n=41

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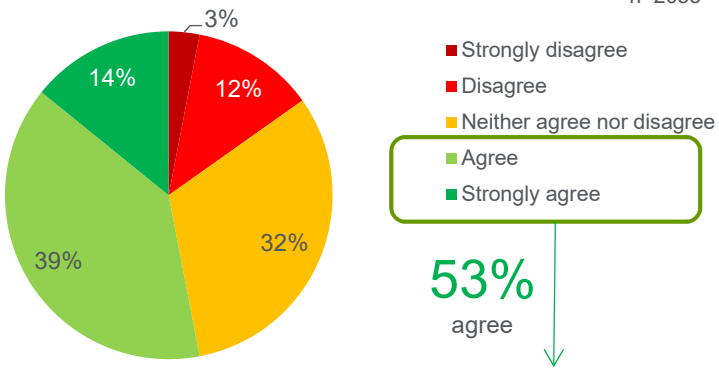
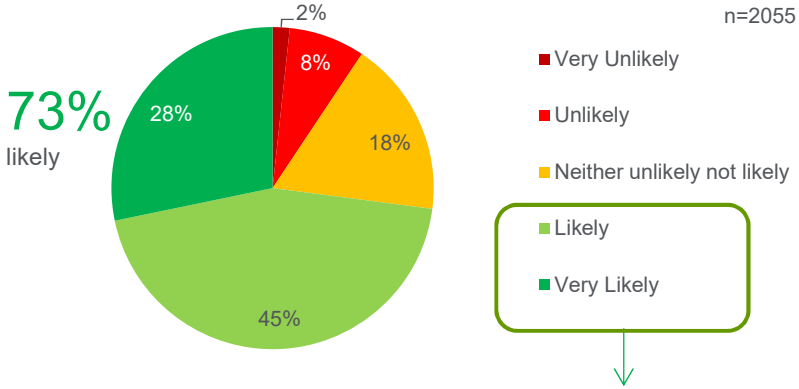
Pressure to publish is expected to increase, researchers expect that they will publish more papers per project. Funding organisations and Research Administrators are main sources of pressure.

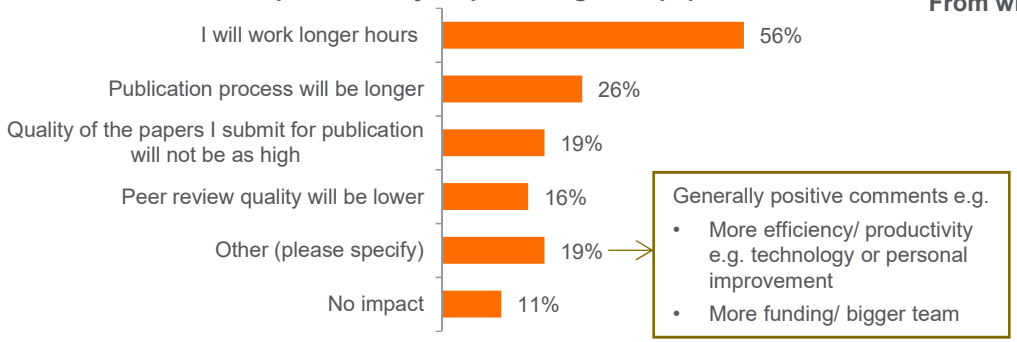
Agreement with: 'I will publish more papers per research project' n=2055



Likelihood that in 10 years: 'The pressure to publish will be greater than it is now in my field' n=2055



What will be the consequence, if any, of producing more papers? n=1052



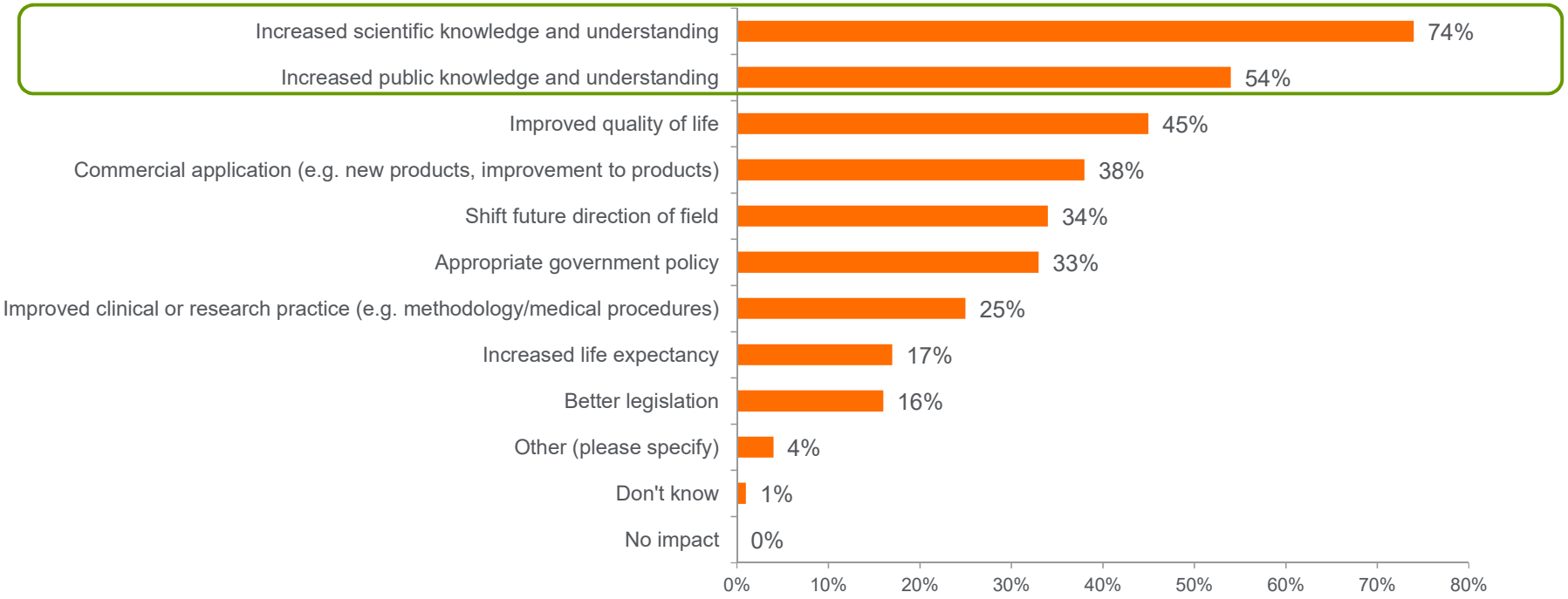
From which of the following sources do you think this pressure will come?* n=1437

* Question was preceded by the statement: You indicated that you agree with the statement: "The pressure to publish more research articles rather than fewer higher quality research articles will increase over the 10 years." X

See results by subject, geographic region, country and age

Researchers consider the increment of scientific and public knowledge and understanding as the main impact of their research

Q. What do you consider to be the impact of your research?

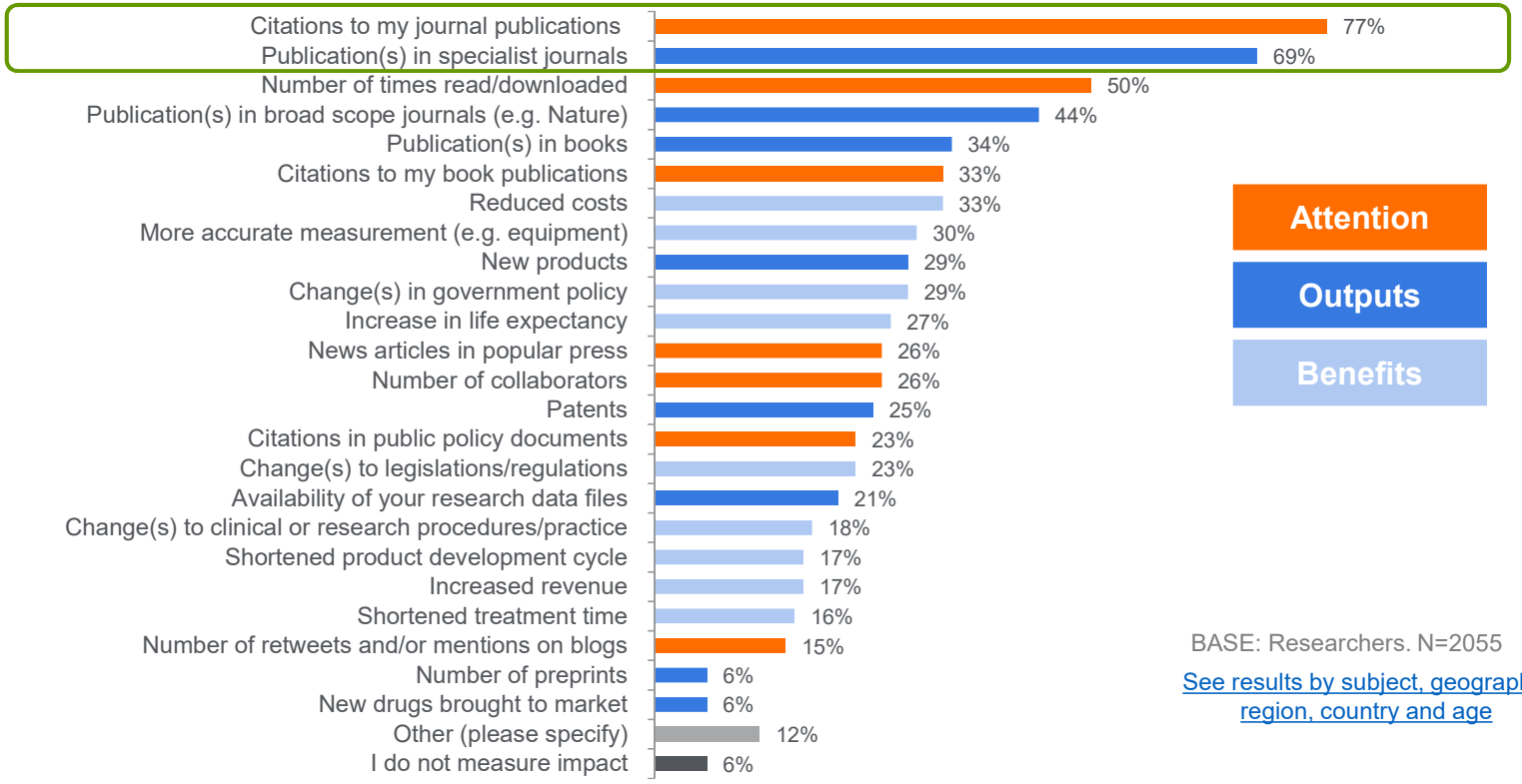


BASE: Researchers. N=2055

See results by subject, geographic region, country and age

Researchers expect to measure the impact of their research mainly through *citations in research publications* and *publication(s) in specialist journals*

Q. Which do you think will be the best measures of the impact of your research?



BASE: Researchers. N=2055

See results by subject, geographic region, country and age

Perception of the future of research

Results by geographic region, country, broad subject area and age group

WHAT WILL RESEARCHERS DO AND EXPECT TO HAPPEN IN 10 YEARS

Chemists more likely to think journal articles will be the main way to communicate their results, but least likely to think they will publish more papers per project; engineers are most likely to think they will publish more papers per project. Earth/Env. Sci. researchers less likely to undertake replication studies, but more likely to think research will have an impact on society in the future.

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See wording of statements

✓ Higher
✓ Lower

Significant difference between subset and total (p=90%)

BY SPECIALTY (1 OF 3)	Chemistry	Comp. Science	Earth & Env. Sci.	Engineering	Global Will	Global Expect
I will need | there will be greater funding	85% 67% ✓	73% 61%	83% 61%	78% 62% ✓	79%	57%
Will always apply for Corp/philan. funding if available | Expect them to fund more	✓ 76% 44%	✓ 70% 51%	59% 42% ✓	58% 55% ✓	59%	47%
I will disseminate as recommended by … | Funders determine comms. of research	✓ 63% 48% ✓	✓ 57% 42%	✓ 53% 38%	✓ 51% 39%	45%	39%
Funders determine study design | I will always alter	33% 42%	✓ 35% 40%	✓ 35% 34%	✓ 34% 53% ✓	25%	39%
Will try to replicate others' research | Expect research to be replicable	✓ 78% 57% ✓	✓ 76% 31% ✓	✓ 55% 54% ✓	58% 57% ✓	62%	48%
(I will use) tech. to increase volume of research	72% 79%	80% 85%	77% 81%	✓ 82% 79%	76%	78%
Progress dependent on tech advances	54% 54%	✓ 71% 81% ✓	✓ 57% 61%	✓ 66% 66% ✓	50%	59%
AI determine publication of articles | I will read journals that rely on AI instead of peer review	✓ 36% 52% ✓	16% 46%	24% 35%	✓ 31% 46% ✓	25%	39%
Majority of/my research will be international	83% 61%	87% 64%	83% 67%	86% 64%	86%	63%
I/res. will use end-to-end research workflow tools	58% 71% ✓	66% 68%	59% 64%	62% 64%	60%	61%
Negative results published | I will submit …	57% 65% ✓	60% 36%	61% 52% ✓	63% 43%	64%	46%
Researchers/I will expert in adv. statistics	✓ 51% 47%	✓ 89% 76% ✓	✓ 74% 67% ✓	✓ 70% 66% ✓	64%	57%
Article is main research output	✓ 85% 94% ✓	67% 59% ✓	80% 82%	73% 72% ✓	75%	80%
I publish more | Pressure to publish will be greater	✓ 34% 71%	✓ 41% 73%	56% 70%	✓ 61% 64% ✓	53%	73%
My research will/ expect nearly all research to impact society	85% 42%	84% 59%	✓ 86% 63% ✓	81% 56%	80%	51%
N	*117*	*69*	*273*	*425*	*2055*	

WHAT WILL RESEARCHERS DO AND EXPECT TO HAPPEN IN 10 YEARS

Fewer life scientists and materials Scientist embrace AI in publication, fewer will read articles in journals using AI.. Mathematicians least likely to use journal articles as main method for communicating research; conversely life sciences more likely to publish via journals. Material Sciences least likely to think they will publish more articles per project

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See wording of statements

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY SPECIALTY (2 OF 3)	Life Science	Materials Science	Maths	Global Will	Global Expect
I will need | there will be greater funding	✓ 87% 52%	✓ 87% 65%	✓ 54% 56%	79%	57%
Will always apply for Corp/philan. funding if available | Expect them to fund more	64% 50%	51% 39%	✓ 45% 32% ✓	59%	47%
I will disseminate as recommended by … | Funders determine comms. of research	✓ 40% 32%	52% 46%	✓ 30% 46%	45%	39%
Funders determine study design | I will always alter	24% 25%	21% 32%	✓ 17% 34%	25%	39%
Will try to replicate others' research | Expect research to be replicable	✓ 70% 48%	✓ 52% 42%	64% 45%	62%	48%
(I will use) tech. to increase volume of research	✓ 82% 89% ✓	✓ 85% 83%	✓ 63% 69% ✓	76%	78%
Progress dependent on tech advances	✓ 38% 61%	51% 68%	✓ 39% 42% ✓	50%	59%
AI determine publication of articles | I will read journals that rely on AI instead of peer review	✓ 19% 33%	✓ 12% 36%	✓ 44% 51% ✓	25%	39%
Majority of/my research will be international	✓ 90% 63%	✓ 71% 48% ✓	89% 69%	86%	63%
I/res. will use end-to-end research workflow tools	✓ 68% 65%	✓ 33% 56%	59% 53%	60%	61%
Negative results published | I will submit …	66% 49%	✓ 47% 35% ✓	✓ 48% 21% ✓	64%	46%
Researchers/I will expert in adv. statistics	67% 63% ✓	✓ 54% 53%	59% 28% ✓	64%	57%
Article is main research output	✓ 82% 87% ✓	80% 86%	✓ 62% 77%	75%	80%
I publish more | Pressure to publish will be greater	57% 80% ✓	✓ 34% 72%	59% 57% ✓	53%	73%
My research will/ expect nearly all research to impact society	77% 50%	✓ 91% 58%	✓ 55% 24% ✓	80%	51%
N	*234*	*101*	*98*	*2055*	

WHAT WILL RESEARCHERS DO AND EXPECT TO HAPPEN IN 10 YEARS

Medical researchers more likely to think they will need more funding, submit negative findings for publication, rely on integrated end-to-end solutions and primarily publish via journal articles. Social Science researchers least reliant on technological advances, but are more likely to think pressure to publish will increase in their field.

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See wording of statements

✓ Higher
✓ Lower

Significant difference between subset and total (p=90%)

BY SPECIALTY (3 OF 3)	Medicine and Allied Health	Physics and Astronomy	SocSci+ArtsHum+Econ	Global Will	Global Expect
I will need | there will be greater funding	✓ 90% 57%	76% 63%	✓ 71% 36% ✓	79%	57%
Will always apply for Corp/philan. funding if available | Expect them to fund more	65% 57% ✓	✓ 46% 48%	57% 42% ✓	59%	47%
I will disseminate as recommended by … | Funders determine comms. of research	31% 37%	45% 37%	✓ 36% 46% ✓	45%	39%
Funders determine study design | I will always alter	24% 40%	✓ 18% 37%	✓ 13% 38%	25%	39%
Will try to replicate others' research | Expect research to be replicable	59% 44%	✓ 75% 54%	60% 38% ✓	62%	48%
(I will use) tech. to increase volume of research	75% 84% ✓	✓ 90% 91% ✓	✓ 62% 64% ✓	76%	78%
Progress dependent on tech advances	46% 60%	✓ 59% 73% ✓	✓ 29% 43% ✓	50%	59%
AI determine publication of articles | I will read journals that rely on AI instead of peer review	23% 41%	✓ 33% 44%	22% 33% ✓	25%	39%
Majority of/my research will be international	84% 59%	89% 76% ✓	88% 59%	86%	63%
I/res. will use end-to-end research workflow tools	✓ 78% 69% ✓	✓ 50% 53%	57% 52% ✓	60%	61%
Negative results published | I will submit …	✓ 80% 61% ✓	64% 45%	68% 42%	64%	46%
Researchers/I will expert in adv. statistics	64% 56%	74% 59%	✓ 55% 47% ✓	64%	57%
Article is main research output	✓ 84% 89% ✓	74% 76%	✓ 67% 81%	75%	80%
I publish more | Pressure to publish will be greater	53% 84% ✓	49% 80%	51% 84% ✓	53%	73%
My research will/ expect nearly all research to impact society	84% 59% ✓	✓ 56% 39% ✓	82% 42% ✓	80%	51%
N	*131*	*128*	*310*	*2055*	

WHAT WILL RESEARCHERS DO AND EXPECT TO HAPPEN IN 10 YEARS

North American and Western European researchers less likely to think their research will be affected by AI or funders requests. They have lower expectations of future funding. They are willing to publish negative results but do not expect there will be channels to do this.

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See wording of statements

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY REGION (1 OF 2)	North America	Latin America	Western Europe	Asia	Global Will	Global Expect
I will need | there will be greater funding	✓ 74% 41% ✓	81% 60%	✓ 74% 40% ✓	81% 71% ✓	79%	57%
Will always apply for Corp/philan. funding if available | Expect them to fund more	60% 45%	64% 47%	✓ 52% 38% ✓	61% 52%	59%	47%
I will disseminate as recommended by … | Funders determine comms. of research	✓ 35% 25% ✓	✓ 39% 26% ✓	✓ 38% 41%	✓ 53% 42%	45%	39%
Funders determine study design | I will always alter	✓ 18% 27% ✓	✓ 17% 34%	✓ 17% 45% ✓	✓ 34% 42%	25%	39%
Will try to replicate others' research | Expect research to be replicable	✓ 68% 42% ✓	✓ 70% 60% ✓	65% 43% ✓	58% 48%	62%	48%
(I will use) tech. to increase volume of research	✓ 67% 72% ✓	74% 82%	✓ 58% 66% ✓	✓ 86% 83% ✓	76%	78%
Progress dependent on tech advances	✓ 34% 40% ✓	✓ 36% 53% ✓	✓ 36% 44% ✓	✓ 62% 71% ✓	50%	59%
AI determine publication of articles | I will read journals that rely on AI instead of peer review	✓ 14% 23% ✓	22% 34%	✓ 14% 34% ✓	✓ 36% 48% ✓	25%	39%
Majority of/my research will be international	✓ 80% 40% ✓	✓ 94% 71% ✓	✓ 90% 69% ✓	83% 66%	86%	63%
I/res. will use end-to-end research workflow tools	✓ 56% 46% ✓	✓ 74% 70% ✓	✓ 54% 54% ✓	61% 66% ✓	60%	61%
Negative results published | I will submit …	✓ 70% 36% ✓	68% 51% ✓	✓ 70% 36% ✓	60% 52% ✓	64%	46%
Researchers/I will expert in adv. statistics	✓ 57% 50% ✓	61% 55%	✓ 50% 46% ✓	✓ 73% 64% ✓	64%	57%
Article is main research output	72% 78%	73% 81%	✓ 67% 76% ✓	✓ 80% 81%	75%	80%
I publish more | Pressure to publish will be greater	✓ 39% 69%	✓ 66% 78%	✓ 33% 76%	✓ 64% 72%	53%	73%
My research will/ expect nearly all research to impact society	83% 40% ✓	83% 66% ✓	✓ 76% 44%	81% 54%	80%	51%
N	*389*	*102*	*420*	*791*	*2055*	

WHAT WILL RESEARCHERS DO AND EXPECT TO HAPPEN IN 10 YEARS

Researchers in Eastern Europe, Middle East and Africa are more likely to agree that they will use advances in technology to increase the amount of research they produce. Eastern European researchers are least likely to think they will submit negative results for publication.

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See wording of statements

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY REGION (2 OF 2)	Eastern Europe	Middle East	Africa	Australasia	Global Will	Global Expect
I will need | there will be greater funding	81% 57%	80% 65%	✓93% 78% ✓	72% 34%	79%	57%
Will always apply for Corp/philan. funding if available | Expect them to fund more	✓ 48% 38% ✓	✓70% 57% ✓	✓80% 66% ✓	59% 57%	59%	47%
I will disseminate as recommended by … | Funders determine comms. of research	✓ 57% 50% ✓	✓ 33% 46%	51% 48% ✓	38% 35%	45%	39%
Funders determine study design | I will always alter	27% 39%	24% 45%	29% 39%	18% 43%	25%	39%
Will try to replicate others' research | Expect research to be replicable	60% 60% ✓	61% 52%	64% 56%	65% 50%	62%	48%
(I will use) tech. to increase volume of research	✓ 87% 92% ✓	✓ 88% 84%	✓87% 87% ✓	✓ 58% 60% ✓	76%	78%
Progress dependent on tech advances	✓ 64% 70% ✓	✓ 63% 74% ✓	55% 71% ✓	✓ 35% 48% ✓	50%	59%
AI determine publication of articles | I will read journals that rely on AI instead of peer review	25% 48% ✓	✓ 38% 43%	28% 39%	22% 40%	25%	39%
Majority of/my research will be international	86% 76% ✓	✓95% 75% ✓	✓96% 79% ✓	85% 54%	86%	63%
I/res. will use end-to-end research workflow tools	59% 68%	✓ 76% 68%	✓85% 81% ✓	52% 56%	60%	61%
Negative results published | I will submit …	✓54% 50%	61% 49%	60% 62% ✓	✓74% 44% ✓	64%	46%
Researchers/I will expert in adv. Statistics	✓ 73% 61%	70% 72% ✓	✓77% 72% ✓	✓ 52% 53%	64%	57%
Article is main research output	✓82% 87% ✓	74% 76%	79% 81%	67% 81%	75%	80%
I publish more | Pressure to publish will be greater	57% 73%	✓66% 73%	✓88% 80% ✓	✓ 32% 71%	53%	73%
My research will/ expect nearly all research to impact society	✓73% 50%	75% 56%	✓94% 81% ✓	75% 45% ✓	80%	51%
N	*186*	*53*	*72*	*33*	*2055*	

WHAT WILL RESEARCHERS DO AND EXPECT TO HAPPEN IN 10 YEARS

Researchers in China and USA envisage less international research than average. Chinese researchers are less likely to publish negative results but more likely to use journal articles as their main way of communicating their results and use technology to increase the amount of research they produce

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See wording of statements

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY COUNTRY*	China	USA	Germany	UK	Global Will	Global Expect
I will need | there will be greater funding	80% 72% ✓	75% 41% ✓	✓62% 46%	74% 24% ✓	79%	57%
Will always apply for Corp/philan. funding if available | Expect them to fund more	60% 58% ✓	61% 46%	✓45% 36% ✓	65% 43%	59%	47%
I will disseminate as recommended by … | Funders determine comms. of research	✓57% 45%	✓37% 25% ✓	✓32% 43%	48% 40%	45%	39%
Funders determine study design | I will always alter	✓39% 42%	✓ 19% 28% ✓	✓ 14% 41%	26% 42%	25%	39%
Will try to replicate others' research | Expect research to be replicable	54% 54%	✓68% 42% ✓	66% 56%	62% 42%	62%	48%
(I will use) tech. to increase volume of research	✓83% 85% ✓	✓ 69% 74% ✓	✓60% 66% ✓	✓57% 64% ✓	76%	78%
Progress dependent on tech advances	✓63% 71% ✓	✓ 34% 41% ✓	✓34% 43% ✓	✓ 28% 33% ✓	50%	59%
AI determine publication of articles | I will read journals that rely on AI instead of peer review	✓38% 40%	✓ 14% 22% ✓	20% 36%	✓ 10% 24% ✓	25%	39%
Majority of/my research will be international	75% 66%	✓80% 39% ✓	92% 74% ✓	85% 55% ✓	86%	63%
I/res. will use end-to-end research workflow tools	64% 70% ✓	56% 47% ✓	✓49% 48% ✓	✓41% 44% ✓	60%	61%
Negative results published | I will submit …	50% 53%	✓70% 37% ✓	✓75% 30% ✓	✓76% 37% ✓	64%	46%
Researchers/I will expert in adv. Statistics	✓76% 70% ✓	✓ 58% 50% ✓	58% 47%	✓44% 29% ✓	64%	57%
Article is main research output	✓83% 84%	72% 79%	✓56% 77%	✓68% 76%	75%	80%
I publish more | Pressure to publish will be greater	61% 69%	✓40% 69% ✓	✓ 21% 72%	✓32% 76%	53%	73%
My research will/ expect nearly all research to impact society	✓89% 57%	83% 41% ✓	✓71% 34% ✓	84% 42% ✓	80%	51%
N	*416*	*345*	*96*	*75*	*2055*	

* Countries within top 10 by UNESCO researcher count with 50 or more responses

WHAT WILL RESEARCHERS DO AND EXPECT TO HAPPEN IN 10 YEARS

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Researchers aged under 36 more likely to think they will rely on integrated end-to-end research tools and use advance data modelling techniques. Also more likely believe they will need more funding in the future, as well as expect it will be available and research will be conducted across international boundaries

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY AGE GROUP	Under 36	36-55	56 and over	Global Will	Global Expect
I will need | there will be greater funding	✓ 83% 64% ✓	79% 59%	✓ 72% 46% ✓	79%	57%
Will always apply for Corp/philan. funding if available | Expect them to fund more	✓ 68% 53% ✓	58% 48%	✓ 53% 40% ✓	59%	47%
I will disseminate as recommended by … | Funders determine comms. of research	43% 40%	✓ 50% 43% ✓	✓ 41% 30% ✓	45%	39%
Funders determine study design | I will always alter	✓ 30% 43% ✓	24% 42% ✓	24% 31% ✓	25%	39%
Will try to replicate others' research | Expect research to be replicable	64% 44%	✓ 66% 47%	✓ 56% 56%	62%	48%
(I will use) tech. to increase volume of research	78% 82%	✓ 80% 78%	✓ 66% 76%	76%	78%
Progress dependent on tech advances	✓ 58% 64% ✓	50% 62% ✓	✓ 40% 48% ✓	50%	59%
AI determine publication of articles | I will read journals that rely on AI instead of peer review	✓ 30% 41%	27% 43% ✓	✓ 20% 33% ✓	25%	39%
Majority of/my research will be international	✓ 89% 70% ✓	86% 65%	✓ 82% 57% ✓	86%	63%
I/res. will use end-to-end research workflow tools	✓ 70% 61%	✓ 63% 64% ✓	✓ 46% 54% ✓	60%	61%
Negative results published | I will submit …	60% 40% ✓	✓ 69% 51% ✓	62% 44%	64%	46%
Researchers/I will expert in adv. Statistics	✓ 71% 64% ✓	66% 56%	✓ 57% 55%	64%	57%
Article is main research output	73% 77%	74% 81%	78% 82%	75%	80%
I publish more | Pressure to publish will be greater	54% 74%	✓ 57% 75%	✓ 46% 69% ✓	53%	73%
My research will/ expect nearly all research to impact society	77% 50%	✓ 84% 52%	77% 49%	80%	51%
N	*518*	*977*	*517*	*2055*	

DESIRABILITY OF FUTURE SCENARIOS:

corporate and philanthropic funding most desirable in engineering, life science and medical research. E2E tools most desirable in Medicine, earth/environmental science and computer science

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

Please indicate how desirable the following are: **% desirable+ highly desirable**

BY SPECIALTY	Chemistry	Comp. Science	Earth & Env. Sci.	Engineer-ing	Life Science	Materials Science	Maths	Medicine AH	Physics & Astro.	SSE + ArtsHum	GLOBAL
Greater funding in field	74%	80%	83%✓	70%✓	78%	67%✓	82%	84%✓	79%	83%	78%
More corporate/philanthropic funding	60%	46%	57%	61%✓	59%✓	56%	33%✓	62%✓	41%✓	44%✓	53%
Funders determine comms. of research	7% ✓	15%	33%✓	27%✓	23%	24%	22%	19%	11%✓	16%✓	21%
Funders determine my study design	36%✓	18%	21%	28%✓	21%	39%✓	11%✓	15%	11%✓	9% ✓	20%
Being able to replicate others' research	86%✓	69%	78%	74%	81%✓	47%✓	70%	85%✓	83%✓	70%✓	75%
Tech increase volume of research	80%	76%	85%✓	80%	86%✓	75%	71%	80%	88%✓	59%✓	77%
Progress dependent on tech advances	51%	52%	51%	56% ✓	49%	54%	48%	40%	46%	25%✓	46%
AI determine publication of article	40%✓	28%	32%✓	25%	17%✓	32%	36% ✓	26%	31%	18%✓	25%
More international research	84%	83%	83%	84%	86%	72%✓	85%	89%✓	82%	89%✓	84%
E2E research workflow tools available	75%	87%✓	83%✓	74%	74%	63%✓	78%	84%✓	73%	77%	76%
Negative results published	46%✓	68%	61%	65%	67%	35%✓	57%✓	74%✓	69%	82%✓	66%
Researchers expert in adv. statistics	72%	87%✓	78%✓	65%✓	77%✓	64%	50%✓	77%✓	77%	64%✓	70%
Article is main research output	77%✓	59%	71%✓	66%	71%✓	62%	62%	74%✓	69%	55%✓	65%
Researchers publish more articles	18%✓	34%	55%✓	36%	40%	46%	20%✓	51%✓	29% ✓	32% ✓	38%
Most research has impact on society	89%✓	87%✓	84%✓	79%	77%	69%✓	65%	83%	66% ✓	79%	79%
N	*117*	*69*	*273*	*425*	*234*	*101*	*98*	*131*	*128*	*310*	*2055*

DESIRABILITY OF SPECIFIC FUTURES

Researchers from the Americas, Western Europe and Australasia most likely to want negative results published.to replicate other's work

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

Please indicate how desirable the following are: **% desirable+ highly desirable**

BY REGION	North America	Latin America	Western Europe	Asia	Eastern Europe	Middle East	Africa	Australasia	GLOBAL
Greater funding in field	90% ✓	84% ✓	89% ✓	63% ✓	87% ✓	71%	82%	91% ✓	78%
More corporate/philanthropic funding	49% ✓	67% ✓	47% ✓	51%	72% ✓	57%	73% ✓	48%	53%
Funders determine comms. of research	11% ✓	18%	9% ✓	31%	24%	36% ✓	34%	8% ✓	21%
Funders determine my study design	7% ✓	18%	11% ✓	30% ✓	25%	20%	27% ✓	5% ✓	20%
Being able to replicate others' research	91% ✓	85% ✓	84% ✓	63% ✓	70%	69%	74%	86% ✓	75%
Tech increase volume of research	74%	80%	62% ✓	84% ✓	85% ✓	78%	86% ✓	66% ✓	77%
Progress dependent on tech advances	30% ✓	42%	28% ✓	56% ✓	62% ✓	68% ✓	72% ✓	26% ✓	46%
AI determine publication of article	13%	18%	10%	37%	35% ✓	37% ✓	40% ✓	16%	25%
More international research	85%	88%	89% ✓	81%	83%	85%	92% ✓	88%	84%
E2E research workflow tools available	82% ✓	83% ✓	80% ✓	70% ✓	75%	75%	85% ✓	77%	76%
Negative results published	82%	64%	83% ✓	50%	60%	59%	57% ✓	84% ✓	66%
Researchers expert in adv. statistics	72%	74%	63% ✓	72%	71%	69%	81% ✓	70%	70%
Article is main research output	57% ✓	56% ✓	52% ✓	74% ✓	83% ✓	52% ✓	74% ✓	54% ✓	65%
Researchers publish more articles	28% ✓	52% ✓	21% ✓	46% ✓	40%	51% ✓	82% ✓	32%	38%
Most research has impact on society	75% ✓	84% ✓	77%	81%	79%	75%	92% ✓	74%	79%
N	*389*	*102*	*420*	*791*	*186*	*53*	*72*	*33*	*2055*

DESIRABILITY OF SPECIFIC FUTURES:

Researchers in USA most likely to want to replicate research findings. Chinese researchers most likely to desire technological advancements in research process and want researchers to publish more articles, but least likely to want negative results published

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

Please indicate how desirable the following are: **% desirable+ highly desirable**

BY COUNTRY	China	USA	Germany	UK	GLOBAL
Greater funding in field	58% ✓	90% ✓	84%	94% ✓	78%
More corporate/philanthropic funding	43% ✓	50%	41% ✓	50%	53%
Funders determine comms. of research	35% ✓	11% ✓	7% ✓	8% ✓	21%
Funders determine my study design	40% ✓	7% ✓	10% ✓	4% ✓	20%
Being able to replicate others' research	62% ✓	92% ✓	83%	77%	75%
Tech increase volume of research	85% ✓	75%	63% ✓	63% ✓	77%
Progress dependent on tech advances	60% ✓	31% ✓	24% ✓	24% ✓	46%
AI determine publication of article	36% ✓	12% ✓	7% ✓	8% ✓	25%
More international research	76% ✓	85%	88%	84%	84%
E2E research workflow tools available	62% ✓	84% ✓	72%	80%	76%
Negative results published	34% ✓	82% ✓	86% ✓	91% ✓	66%
Researchers expert in adv. statistics	73%	73%	64%	65%	70%
Article is main research output	74% ✓	57% ✓	56%	46% ✓	65%
Researchers publish more articles	49% ✓	29% ✓	12% ✓	25% ✓	38%
Most research has impact on society	79%	75% ✓	80%	73%	79%
N	*416*	*345*	*96*	*75*	*2055*

DESIRABILITY OF SPECIFIC FUTURES:

researchers under 36 more likely to want end to end research workflow tools, to replicate research findings and the amount of research to increase due to technological advances

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

Please indicate how desirable the following are: **% desirable+ highly desirable**

BY AGE GROUP	Under 36	36-55	56 and over		GLOBAL
Greater funding in field	77% ✓	75% ✓	85% ✓		78%
More corporate/philanthropic funding	58%	51%	52%		53%
Funders determine comms. of research	20%	23%	20%		21%
Funders determine my study design	19%	21%	18%		20%
Being able to replicate others' research	80% ✓	73%	75%		75%
Tech increase volume of research	82% ✓	77%	74%		77%
Progress dependent on tech advances	46%	49%	39% ✓		46%
AI determine publication of article	32% ✓	24%	20% ✓		25%
More international research	86%	85%	82%		84%
E2E research workflow tools available	81% ✓	73% ✓	77%		76%
Negative results published	65%	62% ✓	72% ✓		66%
Researchers expert in adv. statistics	75%	69%	68%		70%
Article is main research output	62%	65%	68%		65%
Researchers publish more articles	40%	41% ✓	34%		38%
Most research has impact on society	79%	80%	79%		79%
N	*518*	*977*	*517*		*2055*

Voice of the Researcher

Verbatim comments relating to perception of the future of research

FUNDING IN 10 YEARS' TIME: PROVISION OF MORE FUNDING

Positive | Negative

Want: Research funding in my field (in real terms) is greater than it is now

"Equipment is becoming more and more expensive. Also, young researchers need to be paid more in order to let academia remain at least slightly competitive with industry" (Computer Sciences / IT, Italy, 46-55)

"With more funding available, presumably researchers would not have to spend as much time securing funding and could spend more time on research" (Mathematics, USA, 26-35)

"Because the investment in R&D in my country is limited" (Engineering and Technology, Spain, 36-45)

NO 'UNWANTED' COMMENTS

Agree: I will need more funding for my research (in real terms) than today

"Resources for obtaining significant results are getting more expensive, we rely more and more on sophisticated instrumentation" (Biochemistry, Genetics, and Molecular Biology, Norway, 36-45)

"1. Inflation 2. Publication requires more data that requires more expensive methods." (Chemical Engineering, South Korea, 46-55)

"Most of my research doesn't essentially depend on large amounts of money/third party funding." (Other Specialty, Germany, 36-45)

"Proposals I have written have almost always been funded, sometimes with modifications." (Engineering and Technology, USA, Over 65)

"I get enough funds today if I need. The real constraint is time." (Economics, Econometrics and Finance, Italy, 46-55)

"Probably will be retired in 10 years." (Psychology, Canada, Over 65)

Likely that: Research funding in my field (in real terms) will be greater than today

"I think that there will be newer funding options, and hopefully they will consider not only applied sciences but also pure ones." (Mathematics, Germany, 36-45)

"Both the EU and my home country Hungary is planning to increase funds." (Physics, Hungary, 26-35)

"There is an unfortunate trend of diminishing sources of funding; I do not see this changing." (Electrical / Electronic Engineering, USA, 56-65)

"In my country research doesn't seem to be a priority" (Engineering and Technology, Spain, 36-45)

"Waning interest in the humanities and its relevance" (Arts and Humanities, South Korea, 36-45)

FUNDING IN 10 YEARS' TIME: CORPORATE/PHILANTHROPIC FUNDING

Positive | Negative

Want: Corporations and philanthropic organisations fund a higher proportion of research in my field.

"They will need to offset the anticipated reductions in government funding. I see government funding decreasing and therefore corporations and philanthropic organizations will carry a larger portion of the research funding."
(Engineering and Technology, USA, 56-65)

"We Need more Money for research … but I prefer non-profit organizations, since they do not want to take influence on the outcome."
(Medicine and Allied Health, Germany, 26-35)

"Philanthropic organizations usually promote funding to solve real-world problems and develop technologies that are not economic-driven."
(Engineering and Technology, Japan, 26-35)

"…The government is capable of looking several decades into the future, while corporations are focused on the short-term."
(Pharma., Toxicology, USA, 26-35)

"Research should be funded by big organizations under democratic control, i.e. the government."
(Biochem., Genetics, and Molecular Bio., Germany)

"This has led to biased results in medicine. Why would it be beneficial for other fields?"
(Social Science, USA, 26-35)

Agree: I will always apply to corporations and philanthropic organisations for funding if it is available.

"Federal funding is harder and harder to secure. To survive researchers have to rely on other sources of support, especially for preliminary or pilot work."
(Psychology, USA, 56-65)

"Private funding is an important avenue for supporting research, and in my field the organisations often have goals aligned to my research goals and ethos."
(Chemistry, UK, 26-35)

"IF they provide funding that make it possible for my research to have a higher impact on society, I will apply for it."
(Engineering and Technology, Belgium, 26-35)

"Because I always apply to governmental agencies, not to corporations, neither to philanthropic organisations."
(Physics, Brazil, 56-65)

"The interference of corporations makes me doubt the independence of studies."
(Engineering and Technology, Spain, 26-35)

Likely that: Corporations and philanthropic organisations will fund a higher proportion of the research in my field.

"more big companies will affect the research, they have more money to support the research them public organizations"
(Biological Sciences, China, 36-45)

"As national funding and state funding is cut, we will have to look elsewhere for funds."
(Other subject, USA, 26-35)

"only because govt. funding is getting smaller."
(Social Science, Australia, 26-35)

"I think that astronomy is somewhat outside of the attention of corporations and philanthropic organisations."
(Astronomy, Hungary, Over 65)

"It will not bring profits to corporations."
(Economics, Econometrics and Finance, China, 26-35)

COMMUNICATING RESEARCH:
FUNDERS DETERMINE HOW RESEARCH COMMUNICATED

Voice of the researcher

Positive | Negative

Want: Funders determine how research results are communicated.	Agree: I will disseminate research results as recommended by my funder(s).	Likely that: My funder(s) will stipulate where my research results are published.
"They are paying for the R&D work, so they should define how results should be communicated." (Electrical / Electronic Engineering, Portugal, 36-45)	**"I have already been implicitly forced to move to journal articles even though books work better for my research. Since the entire social sciences change I adjust. I can afford to ignore funders who make more specific demands."** (Social Science, Germany, 46-55)	**"Many of the funding bodies now-a-days have a clear guideline regarding the publishing of results. For example: as open access, in a particular official publication of their own."** (Biological Sciences, India, 26-35)
"Funders may wish to suppress immediate publication so that they can exploit research findings to profit over their competitors. I believe academic research results should be published rapidly so they can be used by all." (Engineering and Technology, United Kingdom, 56-65)	**"Because that might be a condition to get the funding. Additionally, most funders require researchers to follow an open access publication policy, with which I fully agree!"** (Other subject, Norway, 36-45)	**"I work in the industry and for reasons of business confidentiality, I think that is correct."** (Engineering and Technology, Israel, 26-35)
"I consider any form of funder interfering with publication & presentation of results to be in conflict with ethical research practices." (Engineering and Technology, USA, 26-35)	**"I would include but not be limited to their recommendations."** (Environmental Sciences, USA, 36-45)	**"I think the research should be published in the best peer reviewed journals that are appropriate for the field and that funders should not unduly influence where results are published."** (Biological Sciences, USA, Over 65)
"Is important to maintain the integrity of investigations." (Medicine and Allied Health, Portugal, 56-65)	**"That's not for them to decide. If they want results to ALSO be published in their own reports, that's OK as long as it does not create problems with peer-reviewed publishing. Any attempt to influence how results are selected, framed and interpreted would be highly inappropriate."** (Business, Management and Accounting, Australia, 56-65)	**"I would be hesitant to apply for funding from someone who made this stipulation, unless it was a place/means I would normally consider for dissemination anyway."** (Medicine & Allied Health, Canada, 36-45)
	"I believe in the free flow of academic information, and that researchers should be able to share and disseminate their work as they see fit." (Other subject, Japan, 26-35)	**"Funders usually give the freedom to the researcher in my experience"** (Earth and Planetary Sciences, Mexico, 46-55)

FUNDING IN 10 YEARS' TIME:
FUNDERS DETERMINE STUDY DESIGN

Voice of the researcher

Positive | Negative

Want: Funders determine my study design	Agree: I will always alter my study design to meet funder demands.	Likely that: The design of most studies in my field will be determined by funders/sponsors
"If I respond to an RFP, I am providing something that they want and that I am willing to do. I won't give them something that they are not interested in." (Physics, USA, Over 65)	**"Available funding is so limited that you almost have no other option than to comply to the funder's demands, if you want to have a chance at getting the funding."** (Other subject, Belgium, 26-35)	**"I disagree with this tendency, but I already witnessed how my field of study and my research career had already suffered the direct influence by the funders on short and long-run."** (Arts and Humanities, Macedonia, 56-65)
"Funders pose the question they want answered or investigated based on their priorities. However, they are not necessarily expert in how to create an objective study design to address the question. Additionally, the investigator will do their best work if they are using a study design that makes sense to them rather than on that is imposed." (Earth and Planetary Sciences, USA, Over 65)	**"Sometimes it is necessary to get the funds"** (Economics, Econometrics and Finance, Spain, 56-65)	**"There is an overwhelming requirement of experimental designs when applying for the big federal grants. This in some ways stifles innovation and creativity in research design"** (Medicine and Allied Health, USA, 46-55)
"This could introduce a bias towards a design that favors a result the funders want to see/believe. In a broader sense, this could lead to an even higher level of distrust from the general public" (Biological Sciences, USA, 26-35)	**"this is part of the freedom that characterizes academia. Studies should be designed to meet the context, data and the specific research question that is asked and I strongly believe that scholars rather than grant giving organizations have the necessary knowledge to come up with the design that best fits these demands"** (Social Science, Hungary, 36-45)	**"Unfortunately it is the fact that funders not only determine study design but also study results"** (Medicine and Allied Health, Iran, 26-35)
"Funders could be non-scientists and if so then could require experimental designs that are not sufficiently robust." (Agriculture, Malaysia, 56-65)	**"I will tailor some of the methods to meet funder needs but will not compromise the integrity of my research to obtain funding."** (Medicine and Allied Health, USA, 46-55)	**"Because (I hope that) the scientific community will strive to maintain independence, especially when funders are private companies."** (Biochemistry, Genetics, and Molecular Biology, Italy, 46-55)
		"In my field, funders may dictate a desired outcome but I'm not aware that they ever try to dictate how the study must be undertaken." (Electrical / Electronic Engineering, South Africa, 26-35)

APPROACHES TO RESEARCH IN 10 YEARS' TIME: REPLICATION STUDIES

Voice of the researcher

Positive | Negative

Want: Being able to replicate other research findings	Agree: I will attempt to replicate other researchers' findings that my work builds on.	Likely that: Nearly all research in my field will be replicable
"Sometimes scientists take shortcuts, or the research is structured in such a way as to produce a specific result. Scientific research is only valid if another group of scientists can replicate the results." (Electrical / Electronic Engineering, USA, 36-45)	**"In many articles the detailed work flow description is missing. Therefore, the gained results are often difficult to verify."** (Earth and Planetary Sci. Germany, 56-65)	**"Nearly all our research today is replicable. Whether it is actually replicated is another question."** (Biological Sci. Australia, Over 65)
"Too many studies are seen as "proof," with only one or two papers on the topic. The difficulty comes in large scale clinical trials which are too expensive to repeat." (Other subject, USA, 46-55)	**"Our studies include a lot of repetition of others' experiments to highlight mistakes or mis-interpretations in previous work"** (Pharmacology, Toxicology and Pharmaceutics, USA, 26-35)	**"It is a basic understanding in science that only replicable research findings should be reported."** (Biological Sci., Israel, 36-45)
"There will be no innovation if one replicates the research findings of others...almost like plagiarising and reinventing the wheel. That is not research." (Social Sci, South Africa, 46-55)	**"In my field it is usually very clear that a published work is correct and does not need replication. Replication is usually necessary in an experimental science. My field is theoretical."** (Mathematics, USA, Over 65)	**"There is a drive to improve description of methods so it will be possible to repeat research."** (Earth and Planetary Sci., UK, 36-45)
"Lack of diversity and originality The risk of violating research ethics" (Other subject, Japan, 36-45)	**"Those types of work takes the same amount of time as an original work but viewed much less favorable by journals and the profession. Nobody gets tenure through replication projects."** (Economics, USA, 26-35)	**"Psychological research in complex applied settings is difficult to replicate, let alone the lack of resource to perform the replications."** (Engineering and Technology, USA, 36-45)
"In my opinion replication not necessary as much as innovation." (Physics, Turkey, 36-45)	**"If this means copy and paste, it is not ethical. If it means repeating the same experiments it is a waste of time and resources."** (Materials Science, Turkey, 46-55)	**"A lot of research in my field is qualitative research, which is unlikely to be replicable."** (Medicine & Allied Health, UK, 26-35)
		"There is insufficient standardization of methodology and reporting of results." (Biochemistry, Genetics, and Molecular Biology, Canada, 56-65)

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IMPACT OF TECHNOLOGY ON RESEARCH: TECHNOLOGY INCREASES AMOUNT OF RESEARCH

Voice of the researcher

Positive | Negative

Want: The amount of research produced in my field is increased by technological advances.	Agree: I will use technological advances to increase the amount of research I produce.	Likely that: amount of research produced in my field will have increased due to tech. advances.
"New concepts for diagnostic tests for diseases will be developed, and hitherto expensive tools will become more easily available (e.g. microscopy, spectroscopy, gene technology)" (Agriculture, United Kingdom, Over 65)	**"Because technological advances should allow to produce and analyse data more quickly than now. This will allow to have more output from the analysis and convert it more quickly into results to be published."** (Physics, Italy, 36-45)	**"Hardware or software advances can facilitate data collection and data processing. I think this has and will continue to increase the volume of information, research avenues, knowledge and publications. However, this does not necessarily mean that it will be top quality work (quantity versus quality)."** (Biological Sciences, Denmark, 26-35)
"More faster CPU, new software and equipment technologies can help us to do more design and simulations, that can help us do more research works." (Engineering and Technology, Taiwan, 36-45)	**"My area is game-based training. Gaming research has been around for decades, but now we can do a lot of really interesting stuff VERY easily thanks to technological advances."** (Psychology, USA, 26-35)	**"Technological advances have made research easier, cheaper (and sometimes even possible) in the last decade - I guess there will be similar benefits in the future."** (Other subject, Germany, 36-45)
"I don't see how technological advances would help produce more thoughtful, high-quality research -- I think the limiting factors there are the rate at which researchers can come up with brilliant ideas and the time it takes to run an well-controlled experiment in a human or animal model. However, technological advances have helped us churn out far more low-quality, incremental findings -- modern software makes it much easier to reanalyze existing data or data-mine for new findings in existing datasets, churn out a large number of semi-copy-pasted manuscripts and abstracts, and send them out to multiple conferences and journals. I'm sure future technology will make the "salami slicing" approach even easier but I don't think it's a good thing." (Psychology, Canada, 36-45)	**"It has always been thus- more selective and sensitive instruments have been used to repeat work carried out with lower types of technology"** (Pharmacology, Toxicology and Pharmaceutics, UK, Over 65)	**"The collection and mining of data will be enhanced by improvements in technology, including data collection and storage."** (Social Science, USA, 56-65)
	"the type of research that I pursue does not require hi-tech instruments to be successful" (Neuroscience, Italy, 36-45)	**"Research in fossil plant botany fundamentally rests on understanding of basic plant anatomy and morphology: technological advances can assist, but not drive this type of research"** (Biological Sciences, Australia, 56-65)

IMPACT OF TECHNOLOGY ON RESEARCH: PROGRESS DEPENDENT ON TECH. ADVANCES

Voice of the researcher

Positive | Negative

Want: Scientific progress in my field is largely dependent upon technological advances (AI/ machine learning)	Agree: My research will be dependent upon technological advances	Likely that: Scientific progress in my field will largely be dependent upon technological advances
"This is hypothesis for future. Probably some new tools will help reduce time which now we spending for planning research, arranging collaborations, writing applications and reviews, etc." (Earth and Planetary Sciences, Russian Federation, Over 65)	**"technological advances are crucial for novel discoveries. The more you can observe, measure and the more you can specifically influence processes, the more information you can get."** (Immunology and Microbiology, Netherlands, 36-45)	**"Technological advances will allow new and more precise methods of research and scientific investigation, thus scientific progress can be strongly enhanced and results more significant"** (Engineering & Technology, Belgium, 56-65)
"We are in the era of big data, and as we collect more data, we will need AI to help analyze the results." (Biochem., Genetics, & Molecular Biology, USA, 36-45)	**"Bioinformatics is a field that directly depend on the technological advances to produce better data. As AI (for example) improve, I will see myself using it more often"** (Biochemistry, Genetics, and Molecular Biology, Canada, 36-45)	**"Relatively straightforward tasks that require man power and time could be easily adapted for machines/AI"** (Biological Sciences, UK, 26-35)
"Theory testing is a bigger goal that inductive data mining. The former contributes to progress, the latter often leads to "fishing" for statistically significant results instead of explicitly testing propositions that are of relevance to developing existing theories." (Social Science, USA, 26-35)		**"Because it is available. Whatever is available will be used, and later it becomes unavoidable"** (Electrical / Electronic Engineering, Switzerland, 56-65)
"Because I believe that human factor is a key element in furthering science. I.e. progress in my mind should depend both on better/advanced data interpreting skills of researchers as on technology." (Biological Sciences, Latvia, 36-45)	**"Human element (understanding motivation and context) is still difficult to deal with AI."** (Business, Management and Accounting, United Kingdom, 56-65)	**"AI and machine learning require large amounts of data to train the models. Such large amounts of data, focused on a single question, are often not available in my field."** (Materials Science, Canada, 36-45)
"Scientific progress should always depend on academic thinking. The technological advances should be tools to help us to do a better/quicker job." (Biochemistry, Genetics, and Molecular Biology, Spain, 36-45)		**"There is no substitute for the human brain as far as analyzing research results are concerned, nor for interpretation of negative and/or positive experimental outcomes."** (Materials Science, USA,)

IMPACT OF TECHNOLOGY ON RESEARCH:
AI USED TO DETERMINE PUBLICATION OF ARTICLES

Voice of the researcher

Positive | Negative

Want: AI used to determine an article's appropriateness for publication in a journal.	Agree: I will read articles in a journal that relies on AI instead of peer review.	Likely that: AI will be used to determine which articles appear in a journal.
"It is now based to much on subjective assessment of editors and reviewers." (Medicine and Allied Health, Netherlands, 26-35)	**"Current technologies are doing great checking grammar, coherence and more. I consider they will greatly advance the way we evaluate papers"** (Environmental Sciences, Mexico, 36-45)	**"In the last years the checking of the texts for plagiarism become more and more popular. So I think this process will continue, and the checking of the manuscripts should be compulsory."** (Arts and Humanities, Bulgaria, 46-55)
"For basic review, such as language, grammars, typos we can rely on AI. However, evaluating novelty of the research result, or correctness of the method still needs a human expert/reviewer. I do not think AI capable to perform such a task." (Electrical / Electronic Engineering, Indonesia, 46-55)	**"I'd be interested to see if better/higher quality/more impactful research is chosen by AI that is still created by humans/peers."** (Psychology, USA, 36-45)	**"I feel that the current nonsensical rush to bibliometry will lead to automatized processes in order to reduce the time between the submission of a paper and its publishing."** (Psychology, Italy, 36-45)
	"This could potentially remove the network-bias in publication" (Economics, Sweden, 26-35)	
"I am just wondering if it would lead to confirmation bias by the AI machine: only selecting those articles that were considered qualitatively good in the past. Can it consider revolutionary papers?" (Psychology, Belgium, 26-35)	**""Reviewing the quality of a manuscript requires deep expertise and nuance, particularly when the topic is interdisciplinary or when novel findings/methods are being reported which do not yet have strong precedence. These factors make it difficult to construct a reliable AI surrogate to human peer review."** (Psychology, United Kingdom, 36-45)	**"Because peer review is a time consuming task, and with an increasing amount of publications, it is still harder to find reviewers."** (Social Science, Denmark, 46-55)
		"Because novel things are usually highly rated in journals, which makes it difficult for AI to judge a publication (i.e. novel lines of thought)." (Environmental Sci., Switzerland, 26-35)
"I have no trust in 100% automatized processes when they relate to complex and subtle decision making such as evaluating appropriateness of a given paper for a given journal." (Psychology, Italy, 36-45)	**"I do not see how a machine can fully understand contextual issues that humans can and so the machine adds an impersonal view of the paper. We are collegial in the research community and it is a small community dependent on people reading each others work and understanding it for our own contexts too."** (Other subject, South Africa, 46-55)	**"Because the 10 years time frame is too short for AI to be fairly accountable to provide qualified evaluation of research"** (Economics, USA, 36-45)

APPROACHES TO RESEARCH IN 10 YEARS' TIME: INTERNATIONAL COLLABORATION

Voice of the researcher

Positive | Negative

Want: more research projects conducted across international boundaries	Agree: I will conduct research projects with colleagues in other countries	Likely that: majority of research projects in field conducted across international boundaries
"In the field of research in which I work, very expensive equipment is used. Often in my country it is absent or very busy. In addition, in different countries, approaches and methods of work are very different. To take this experience is useful." (Chemistry, Russian Federation, 26-35)	**"There are relatively few experts in my field in any one country, and so to work effectively one often needs to seek out and collaborate with the best other researchers, wherever they may be."** (Other subject, UK, 46-55)	**"More and more researchers go abroad for post-doc, short stays etc., developing an international network that favor international projects"** (Psychology, France, 26-35)
"Knowledge is global and expertise is scattered throughout the globe. Hence there will be more international collaborations especially on impactful projects." (Agriculture, Malaysia, 56-65)	**"Collaboration brings in new ideas and may help increase power of the study of rare diseases."** (Medicine & Allied Health, USA, 36-45)	**"Astronomy it expensive and increasingly large projects are international using large internationally funded telescopes"** (Astronomy, Australia, 56-65)
"It allows for greater generalizability as well as comparisons between different contexts." (Psychology, Canada, 26-35)	**"Much research is already conducted over the Internet, and country is irrelevant."** (Computer Sciences / IT, USA, Over 65)	**"Need financial support from larger research lab and specially, knowledge from 1st world researchers."** (Other subject, Brazil, 26-35)
"For compelling reasons, my field has been fairly strongly segregated along national lines for a long time; consequently, there are stark cultural differences between labs in different countries." (Physics, UK, 26-35)	**"more access to colleagues here and easier to pick up the phone."** (Medicine and Allied Health, UK, 36-45)	**"Much of my research deals with social/public health problems that are specific to particular national contexts."** (Social Science, USA, 46-55)
		"Because there is an institutional problem in funding across international boundaries." (Chemical Engineering, Japan, 36-45)
		"I think most project still are born and end within a single research lab." (Computer Sciences / IT, Italy, 36-45)

APPROACHES TO RESEARCH IN 10 YEARS' TIME: INTEGRATED RESEARCHER WORKFLOW TOOLS

Voice of the researcher

Positive

Negative

Want: Integrated end-to-end research workflow tools are readily available	Agree: I will rely on integrated end-to-end research workflow tools	Likely that: Most researchers in my field will be using integrated end-to-end research workflow tools
"Because this are time-consuming activities and to have proper help for it would increase the quality of research and the chances that they are properly funded" (Agriculture, Italy, 56-65)	**"We do so already today. Funding NEEDS to be stated in articles under the acknowledgements, technologies such as Skype, TeamViewer, Dropbox etc. are used for collaboration, data is shared, studies are show cased at conferences and even on YouTube."** (Earth and Planetary Sci., Germany, 36-45)	**"Simplifies work and allows researchers focus on ideas not on implementation and PR."** (Biochemistry, Genetics, and Molecular Biology, USA, 26-35)
"without integrated end-to-end research workflow tools it's quite difficult to collaborate successfully." (Earth and Planetary Sciences, Hungary, Over 65)	**"Collaboration is a key piece in the science evolution, so by using these tools, the researchers could collaborate with others in an easier way, improving the results of all."** (Engineering and Technology, Brazil, 26-35)	**"Everyone will be searching for a competitive advantages and will make use of such tools."** (Engineering & Tech., USA, 26-35)
"I live in a developing country so integrated end to end research workflow tools aren't readily available to us." (Materials Science, Nigeria, 26-35)	**"I live and work in a less developed country and I seriously doubt we will have this kind of infrastructure in the next 10 years. Also, it sounds like even more work and bureaucracy."** (Biological Sciences, Mexico, 56-65)	**"As we are already pushed in that direction by our employers (universities)"** (Arts and Humanities, Australia, 46-55)
"Confidentiality agreement" (Engineering and Technology, China, 26-35)	**"I'm not familiar with any such tools nor have I ever heard about them. That makes me think that even if they prove useful they'll fight an uphill battle for adoption."** (Computer Sciences / IT, Spain, 26-35)	**"These things are usually poorly designed, not user friendly, tend to crash, are unreliable and utterly heartbreakingly frustrating."** (Other subject, UK, age unspecified)
	"The training for and uptake of new tools tends to be slow in my field." (Environmental Sciences, USA, 26-35)	**"I do not envision using such tools and am not convinced, yet, that they will be practical and useful approaches to research."** (Medicine & Allied Health, USA, 56-65)

COMMUNICATING RESEARCH:
PUBLICATION OF NEGATIVE RESULTS

Positive | Negative

Want: Negative results from studies in my field are published.

"Aren't they always published? The key term here is "well-designed studies". That means that the study is based on rational questions and previous research. Thus, key negative results should be considered results none-the-less." (Immunology and Microbiology, USA, 56-65)

"Because of easy access to deposit manuscripts in pre-print servers." (Chemistry, Denmark, 56-65)

"So that it will not discourage other researcher to do the research in the same field with different methodology." (Electrical / Electronic Engineering, Nepal, 46-55)

"Because it may be considered 'fake' news. A negation of a negation is never a positive" (Arts and Humanities, Canada)

Agree: I will submit negative findings from my experiments for publication.

"Sure. Negative findings are findings too. It is time to stop with the publication bias." (Other subject, Brazil, 46-55)

"Reporting negative results helps eliminate duplication of effort." (Biological Sciences, USA, 46-55)

"They don't need to go through a peer review process, better to just post on blogs or arxiv if more formal version needed." (Other subject, USA,)

"No journal in my field accepts papers mainly based on negative findings." (Business, Management and Accounting, USA, 36-45)

Likely that: Negative results from well-designed studies in my field will be published.

"The most interesting information often comes from failed projects, experience reports and similar. If someone fails to reproduce another's experiment, and with apparently sound process and design, then it is a shame to hide this from the field so others might help tease out what are the differences." (Computer Sciences / IT, USA, 56-65)

"Negative results are important for hypothesis generation and for determining prevention and intervention activities that have been examined and found not to be effective to optimally propel science forward." (Medicine and Allied Health, USA, 46-55)

"Too much pressure to publish positive results regardless of their significance. Most reviewers will reject manuscripts with only negative results. Journals should require authors to submit an experimental design, run the experiment, and then allow the results to be published regardless of the outcome. The experimental design should be peer reviewed." (Biochemistry, Genetics, and Molecular Biology, USA, 36-45)

"Because researchers' metrics rely on impact and successful researches are ore likely to be cited." (Materials Science, Italy, 36-45)

"There is little reputation to be gained from publishing negative results.-> Few people will make the effort. Journals are not necessarily interested in publishing them." (Materials Science, Netherlands, 36-45)

COMMUNICATING RESEARCH:
RESEARCH ARTICLE TO REMAIN MAIN OUTPUT

Positive | Negative

Want: The key communication output from a research study remains the publication of a research article.	Agree: The primary method for communicating my results will be journal articles.	Likely that: Research articles will be the primary mechanism for communicating scientific discovery in my field.
"It represents a concise and efficient way to reach the scientific community. The peer reviewer system should allow a trustable publication of the data" (Chemistry, Italy, 46-55)	**"I believe there are several mechanisms for communicating results, including conference proceedings and press releases, but journals offer the unique opportunity to have peer experts review and critique articles, increasing confidence in the validity of study results. This peer-review process is critical for maintaining confidence in scientific study results."** (Earth and Planetary Sciences, USA, 26-35)	**"It is the case now, and has been for decades, and I've not seen any meaningful alternative (social media etc may offer tasters, but the field expect to see work published after peer review in journals with established reputations.)"** (UK, 56-65)
"Peer reviewed research articles are essential to maintain scientific integrity." (Physics, USA, Over 65)		**"Articles are published by publishers who make money with it. Their lobby is strong enough to ensure that money flow for at least a few more decades."** (Engineering and Technology, Germany, 26-35)
"Many research articles remain behind a pay wall and in a format inaccessible to practitioners. Plus the lag time between research results and actual publishing is far too long. There needs to better, quicker and cheaper ways to communicate science if we want it to help inform decisions and have a real time societal impact," (Environmental Sciences, USA, 36-45)	**"Publication lists are one of the main factors when considering someone for a grant or a research position"** (Neuroscience, Switzerland, 26-35)	**"But many people vainly think that the numbers of their published article in first-class journals are the index of their abilities as researchers."** (Mathematics, Japan, 46-55)
	"I am a corporate researcher. Many of my experimental results are communicated only through confidential internal reports. Only selected information is published after all IP issues are resolved." (Materials Science, USA, 46-55)	**"Universities are focused on peer-reviewed articles and often consider publications such as white papers to be less impactful."** (Social Science, USA, 36-45)
"In my research field, software and datasets are key. These should be discussed in a more open form than an article to allow a more flexible interpretation of the results." (Computer Sciences / IT, Germany, 26-35)	**"Because is an old method of publishing results, and not very efficient for readers. The new publishing method should be more collaborative!"** (Electrical / Electronic Engineering, Portugal, 36-45)	**"because publication in scientific journals is a tedious and time-consuming work, and new technologies and communicating tools will offer to communicate the results more readily"** (Medicine and Allied Health, Spain, 46-55)
"Research outputs should be communicated to the general public as well; ideally by the researchers themselves." (Engineering and Technology, Germany, 26-35)	**"there will be alternative open platforms that become credible competitors; based on network effects"** (Economics, UAE, 56-65)	**"Social media and blogs are becoming more relevant in communicating science. Also important are the open source platforms like arxiv.org"** (Physics, India, 26-35)

COMMUNICATING RESEARCH:
RESEARCHERS PUBLISH MORE PAPERS PER PROJECT

Positive | Negative

Want: Each researcher publishes more articles than they do now.	Agree: I will publish more papers per research project.	Likely that: The pressure to publish will be greater than it is now in my field

"All researchers are always being pushed by bosses to write more" (Medicine and Allied Health, Singapore, 36-45)

"Researcher should open more their work than they do today" (Medicine and Allied Health, Spain, Over 65)

"The "publish-or-perish" modality of academic research fails to encourage the pursuit of impactful research, but instead, encourages the premature publication of research. This continually lowers the bar for what can, or should be considered a contribution to the field. The result is an ever-expanding body of literature, but with each piece taking an ever-reducing, incremental step. This results in more researchers spending more time getting less information from the literature, and spending less time advancing the field." (Materials Science, USA, 36-45)

"Focus should be on quality instead of quantity" (Psychology, Netherlands, 46-55)

"Given that I will have an increased experience on the area, I think it is feasible to increase the the amount of data I can analyse, and this will lead to a higher number of publications. This is assuming that I do not get engaged in teaching activities, etc, that prevent me from using all my time on data analysis" (Physics, Japan, 26-35)

"Research projects are nowadays multi-purpose and represent a large part of the researchers' scientific activity, hence material for many publications may be produced" (Engineering and Technology, Italy, 26-35)

"Because of the pressure from my institution to publicate more (not necessarily better)" (Agriculture, Spain, 56-65)

"Today I have more competent PhD students. Due to this I write more scientific papers." (Energy, Estonia, 56-65)

"There are too many papers published now and it is better to publish fewer high quality integrated publications" (Biochemistry, Genetics, and Molecular Biology, United Kingdom, 56-65)

"My publication rate is already very good and I cannot reallocate time to increase my pub rate." (Earth and Planetary Sciences, USA, Over 65)

"I am focusing on publishing fewer papers but of greater significance." (Engineering and Technology, Canada, Over 65)

"Unfortunately, academic research policy is increasingly based on the evaluation of the number of publications and citation reports, rather than their actual scientific impact" (Biochemistry, Genetics, and Molecular Biology, Italy, 56-65)

"My field is getting more and more competitive, especially for faculty positions, so as the competition is increased, more will be expected from us." (Engineering and Technology, USA, 26-35)

"I work in integrated and applied climate science. We are already veering towards alternative methods of research impact, whether it's data visualization or policy change. In my field and generation of research, I see peer-reviewed articles becoming less and less valued." (Environmental Sciences, USA, 36-45)

"It simply cannot be greater than it is already now" (Physics, USA, Over 65)

APPROACHES TO RESEARCH IN 10 YEARS' TIME:
RESEARCHERS EXPERT IN ADVANCED DATA MODELLING

Positive

Negative

Want: Researchers in field expert in advanced data modelling techniques & statistics	Agree: I will use advanced data modelling techniques and will be expert in statistics	Likely that: Researchers in field will be experts in advanced data modelling techniques & statistics
"One of the current challenges in research is having researchers with sufficient data analysis skills (e.g., mathematical modelling, Bayesian techniques, understanding of false positives/false negatives/base rate issues/effect sizes). Hopefully all researchers will have some advanced statistical knowledge or collaborators who do." (Psychology, USA, 36-45)	**"I think that statistical analysis of data is lagging behind in my field of research and not sufficiently taught in university in physics/chemistry etc. I'm trying to learn more about the topic and apply these methods in my projects. ("expert is may a far shot though"** (Materials Science, Netherlands, 36-45)	**"The automatic collection of data through sensors and other technology will require sophisticated analysis and prediction for this information to be usefully analysed for the benefit of society generally. The use of statistics to test for precision is a no-brainer"** (Biochemistry, Genetics, and Molecular Biology, Australia, Over 65)
"Large data sets are commonly accrued in my field of research but our expertise in the application of modelling techniques (in particular) is still lagging behind expectations. This is partly due to the nature of our education." (Earth and Planetary Sciences, Germany, Over 65)	**"Advanced statistics tool will be required to deal with the large amount of data that will be available especially for medical application; They are still not very well used today."** (Mathematics, France, 36-45)	**"Bayesian approaches to statistics are already becoming more common in my field and the advent of high-performance computing makes computer simulations of each hypothesis being tested more desirable than simple statistical tests for goodness of fit."** (Astronomy, USA, 46-55)
"It is more feasible to collaborate with others who are experts in modeling and statistics than expect everyone to become experts." (Electrical / Electronic Engineering, USA, 36-45)	**"Do not need to be an expert in statistics but on the research field. Statistical support can be obtained as part of the research team"** (Medicine and Allied Health, Colombia, 56-65)	**"… a lot of people can simply use statistical software tools while only having basic knowledge of what they need to evaluate in their data"** (Engineering and Tech., Greece, 36-45)
"I don't use mathematical models because my research relies on human intuition and understanding of creative practices." (Arts and Humanities, UK, 46-55)	**"A lot of the research in my field is qualitative or uses case study designs."** (Social Science, United Kingdom, 36-45)	**"Not everyone can be an expert. I think every project will need a statistics expert, but also researcher who are experts in other fields …"** (Psychology, Norway, 36-45)

IMPACT OF RESEARCH:
MAJORITY OF RESEARCH HAS IMPACT ON SOCIETY

Voice of the researcher

Positive | Negative

Want: The majority of research has an impact on society	Agree: Research I undertake will impact society.	Likely that: Nearly all research undertaken in my field will have an impact on society.
"Research is a progress, and hopefully it creates jobs, protects environment and human health. "The majority" does not mean "all". Research for military purposes, or on pesticides, just to say some, should not have an impact on society" (Materials Science, Italy, 36-45)	**"I know it has an impact because I get feedback and quite a few requests for information, based on my research. Also I have a website based on my research and the literature of my area that is very widely used (about 250000 visits monthly) and well-read blogs that allow communication with users."** (Biological Sciences, Mexico, 56-65)	**"The environmental science projects we work on are selected because they have an impact on society."** (Environmental Sciences, USA, 56-65)
"I think research results should lead to practical interventions--such as new treatments or diagnostics or improved policies and guidelines that will have definite benefits for society." (Medicine and Allied Health, USA, 56-65)	**"A lot of the research undertaken today in my field of research is about developing the technical readiness of new technologies. In about 10 years, I believe that a lot of these technologies will have matured enough to have a more direct impact on society."** (Physics, Germany, 26-35)	**"My field, oil and gas technology, is mostly concerned with medium-risk incremental improvements that cut costs for the industry, giving one company an edge over another. While the research body as a whole benefits society, a lot will fail in the commercialisation phase, be outcompeted or otherwise not be used."** (Engineering and Technology, Norway, 36-45)
"Research is funded by society, therefore this investment must return benefits to the society." (Materials Science, Greece, 36-45)	**"research impact is becoming more of a factor in funding decisions - hope that this builds in next 10 years, so more research with social impact is funded"** (Economics, Australia, 46-55)	**"Most research is purely academic or done just to add to the knowledge base, both of which usually do not impact society in a meaningful way."** (Computer Sciences / IT, USA, Under 26)
"Fundamental discoveries in science rarely have immediate impact on society, but are nonetheless needed to improve our understanding." (Neuroscience, Switzerland, 36-45)	**"My basic, academic research may improve our understanding of the world, but it does not have any applied properties that may be translated to new products, services or cures that could be used by society in the near foreseeable future."** (Biological Sciences, USA, 36-45)	**"Forty years into a research career and I haven't seen any impact yet."** (Nursing, USA, Over 65)
		"With the huge amount of articles published in my field, it's unlikely that all of it will have a direct impact on society." (Engineering and Technology, USA, 26-35)

Likelihood of future scenarios

Results by geographic region, country, broad subject area and age group

FUTURE SCENARIOS: Physics, life science and maths researchers most likely to expect research data to be available and medical researchers least likely

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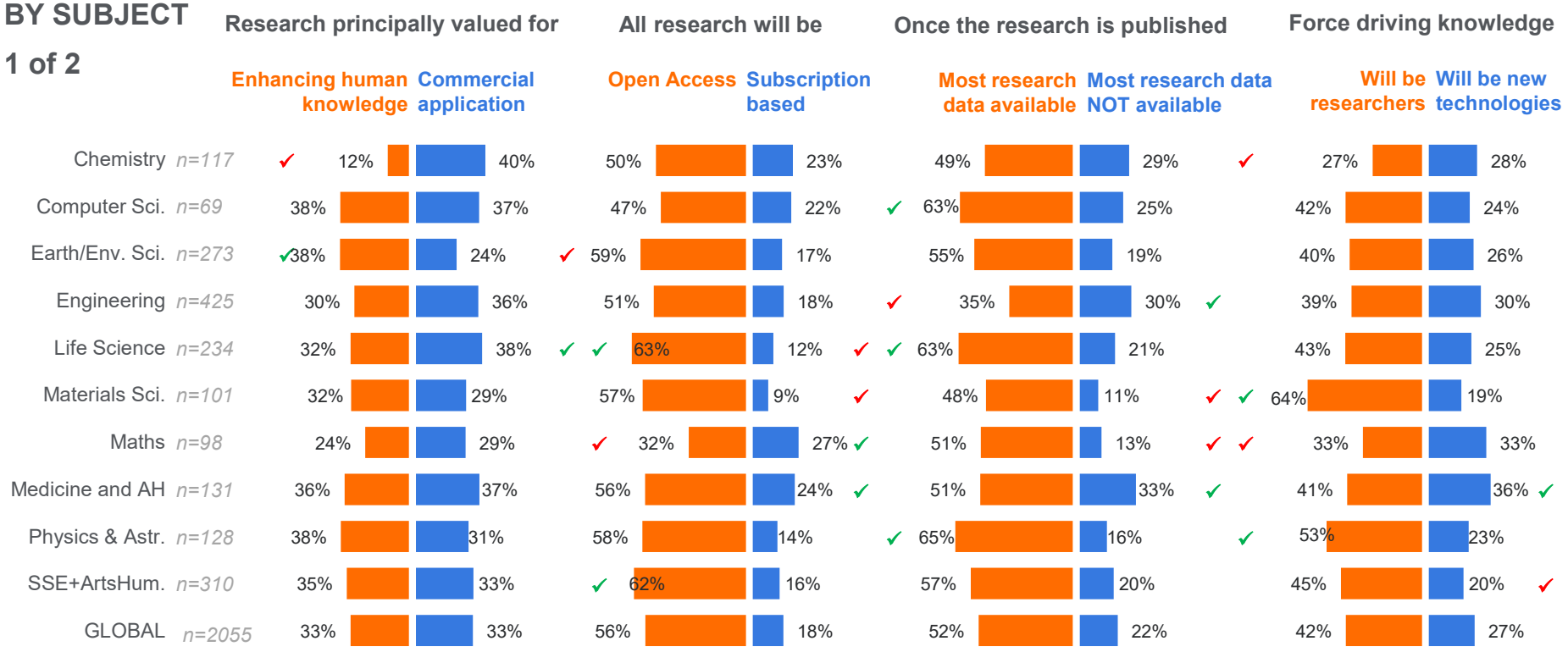
✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY SUBJECT

1 of 2



FUTURE SCENARIOS: Maths researchers were most likely to expect that universities will be producing students that are suited to work

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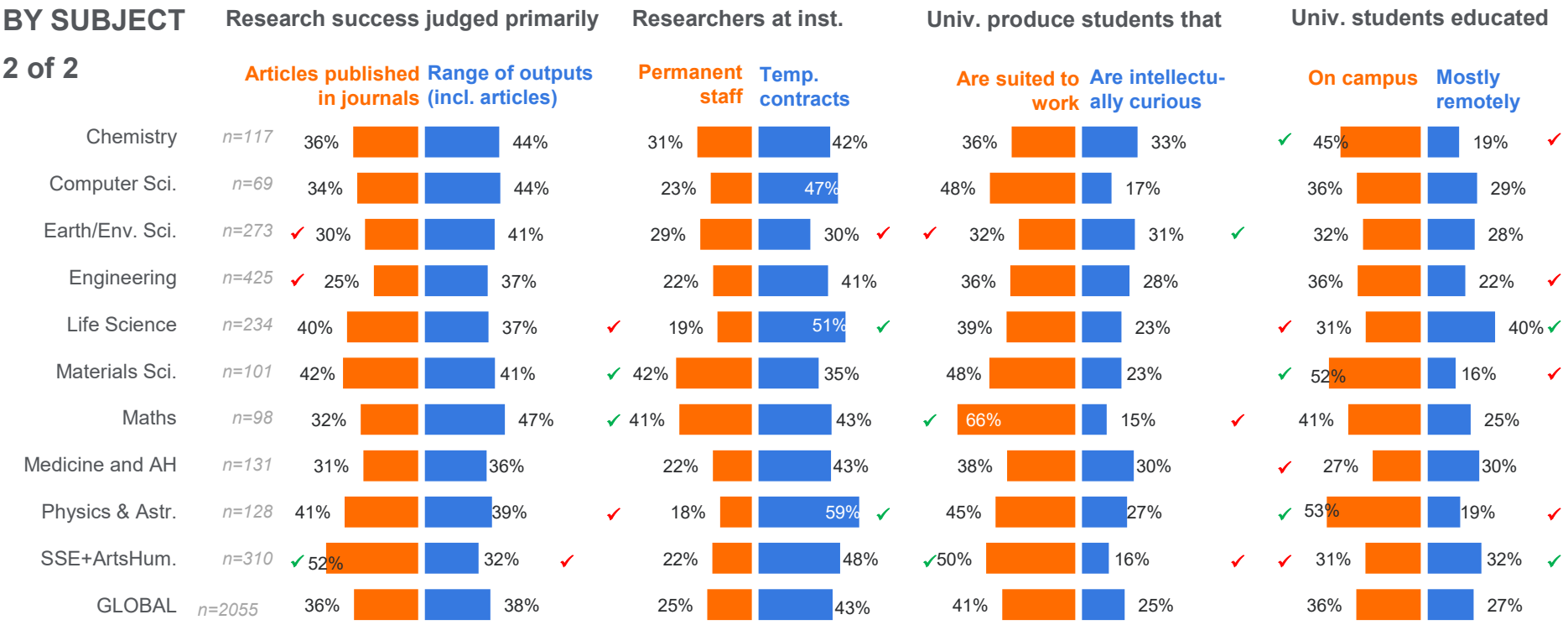
✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY SUBJECT

2 of 2



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FUTURE SCENARIOS: More North Americans and Western Europeans envisage a future in which research is valued for its commercial application

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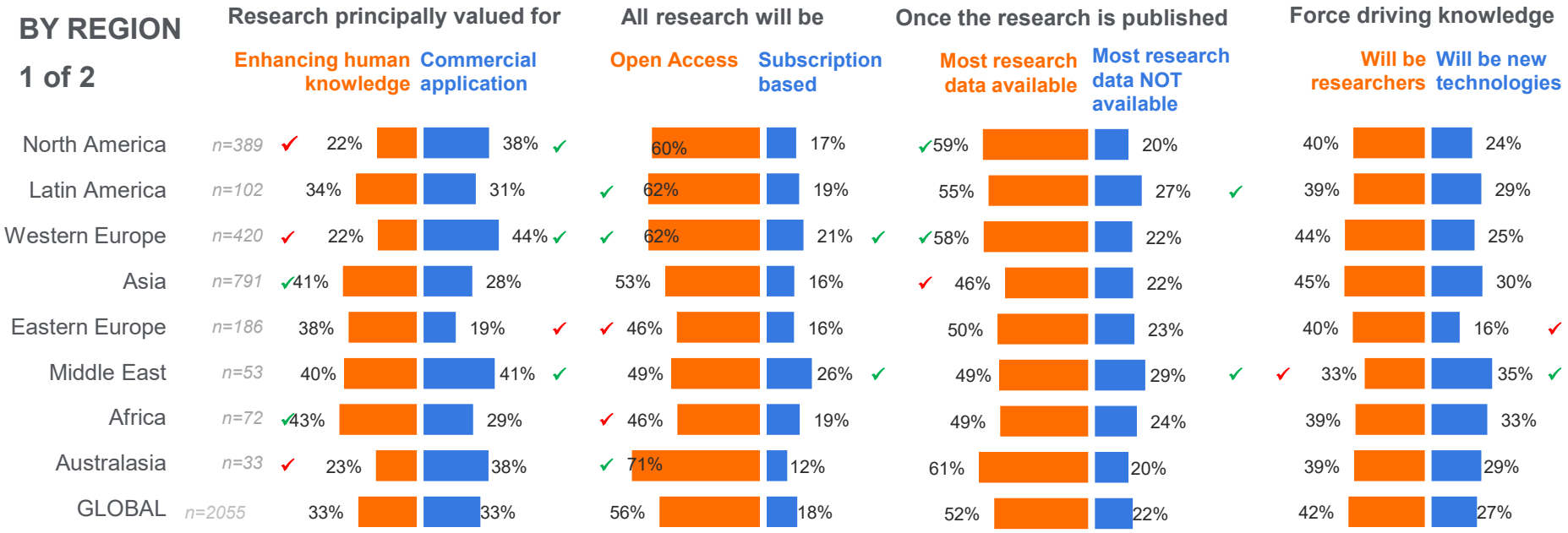
✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY REGION

1 of 2



FUTURE SCENARIOS: Researchers in West. Europe and Australasia more likely to expect researchers to be on temp. contracts. North Americans most wedded to the article.

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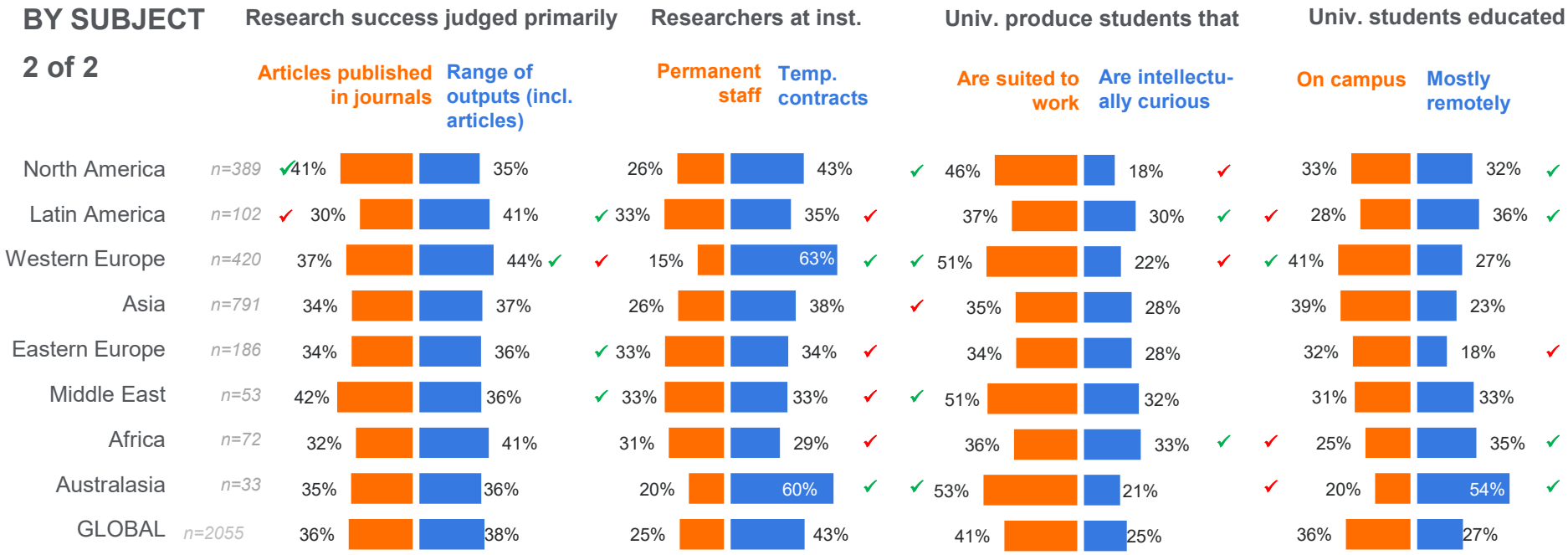
✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY SUBJECT

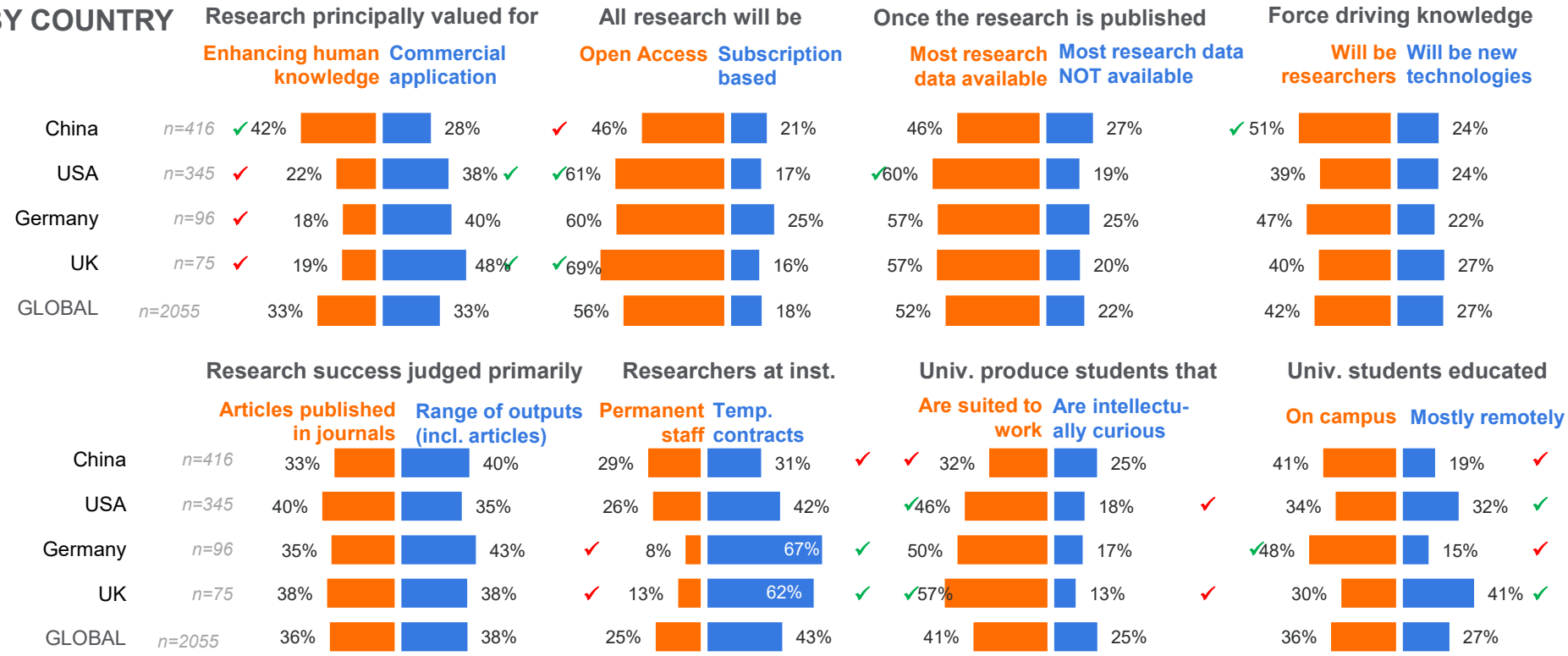
2 of 2



FUTURE SCENARIOS: Researchers in the USA and UK more likely to value research for its commercial application, believe students should be educated for work and educated mostly remotely. Chinese researchers see research being valued for enhancing human knowledge.

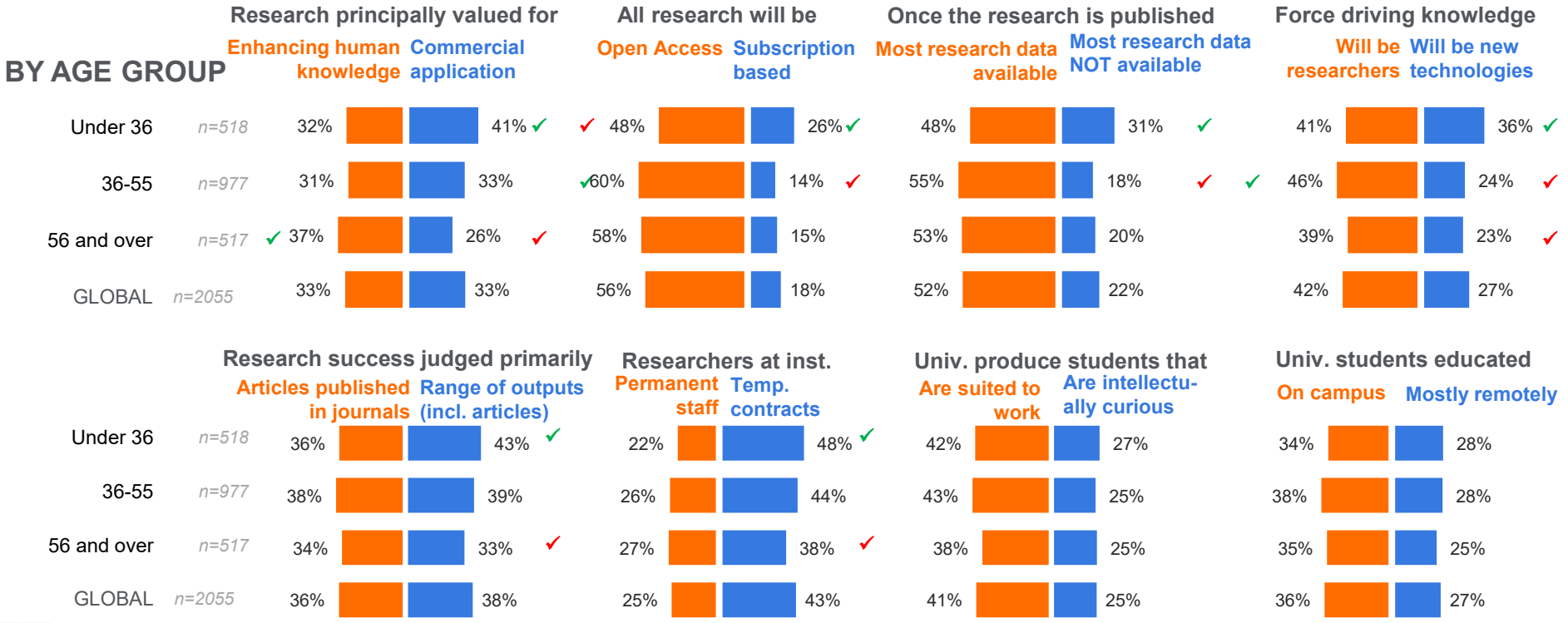
✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY COUNTRY



FUTURE SCENARIOS: Early career researchers more likely to believe research will be valued for its commercial application, technology will be the driving force behind new knowledge and researchers will be on temp. contracts. They are less likely to think all research will be open access.

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)



Reproducibility

Results by geographic region, country, broad subject area and age group

FOCUS ON REPRODUCIBILITY: Most common in mathematics. The majority attempt to reproduce another researcher's study. The vast majority of these are at least partly successful

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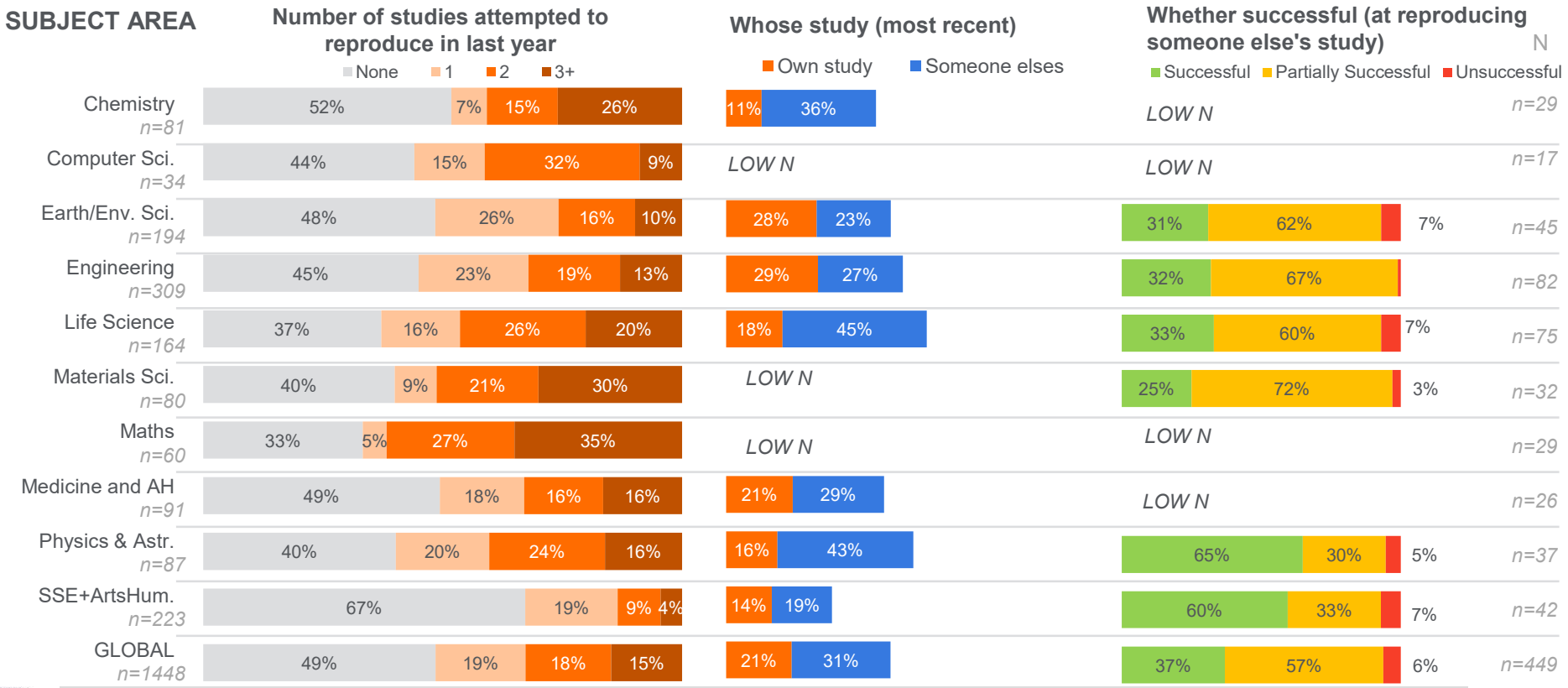

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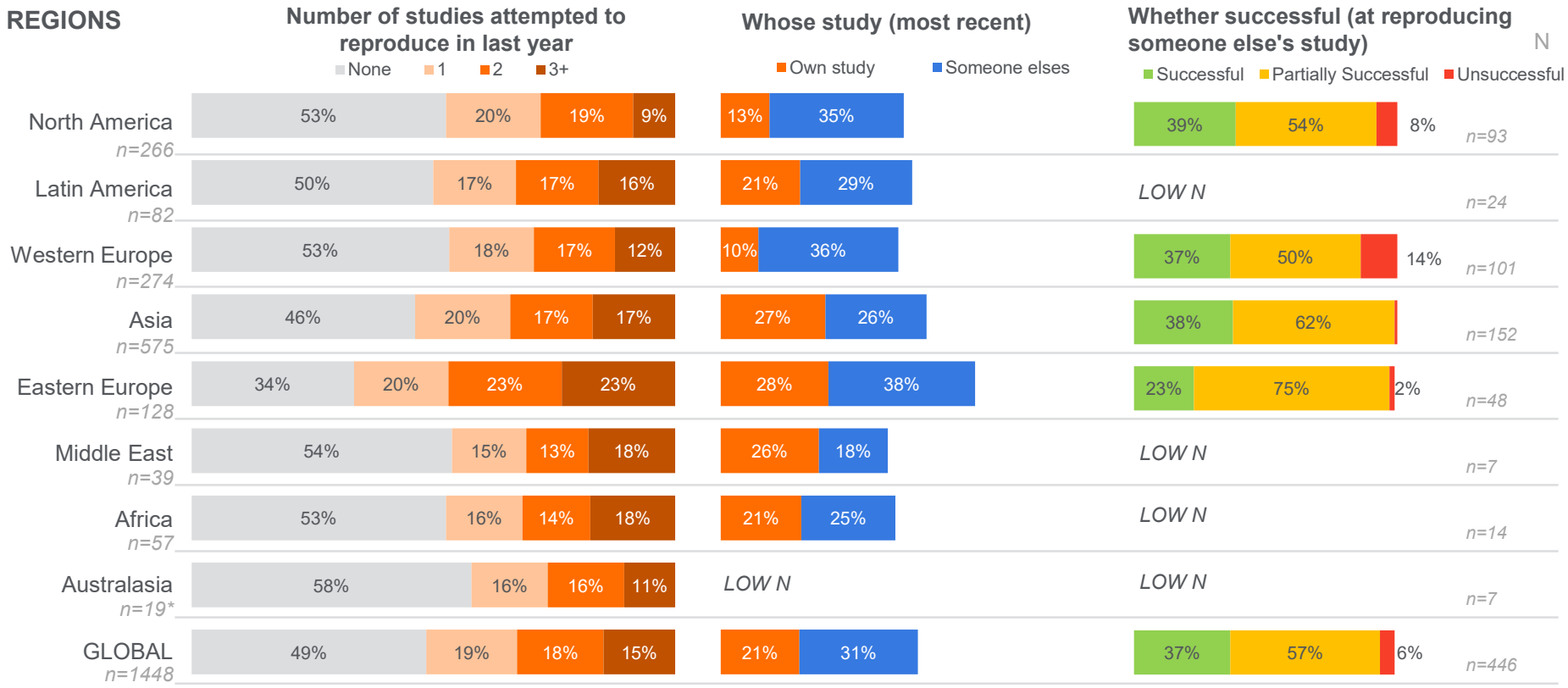
FOCUS ON REPRODUCIBILITY: Researchers in Asia and Eastern Europe most likely to reproduce studies. Researchers in North America and Western Europe least likely to reproduce own study



*weighted n=40

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FOCUS ON REPRODUCIBILITY: Researchers in the UK were less likely to have tried to reproduce a prior study in the last year. A fifth of Chinese researchers have undertaken 3 or more.

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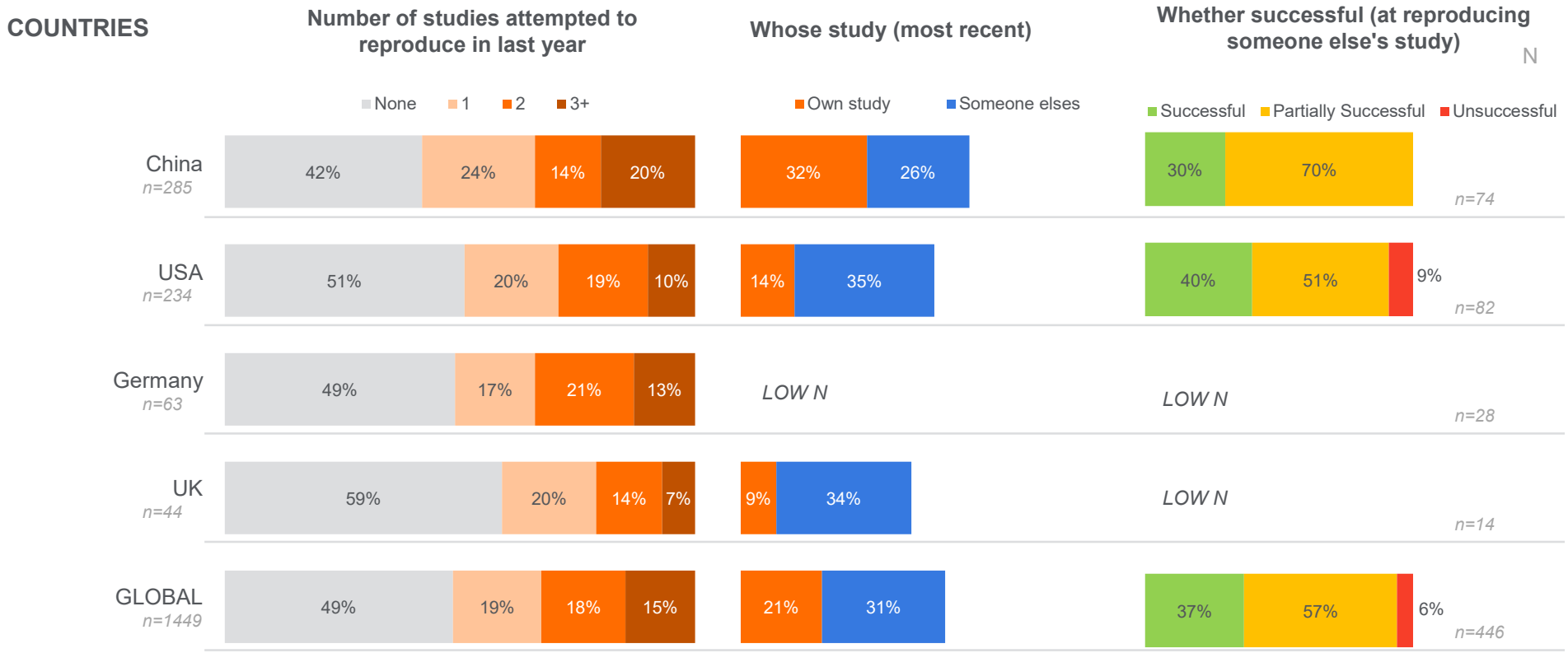
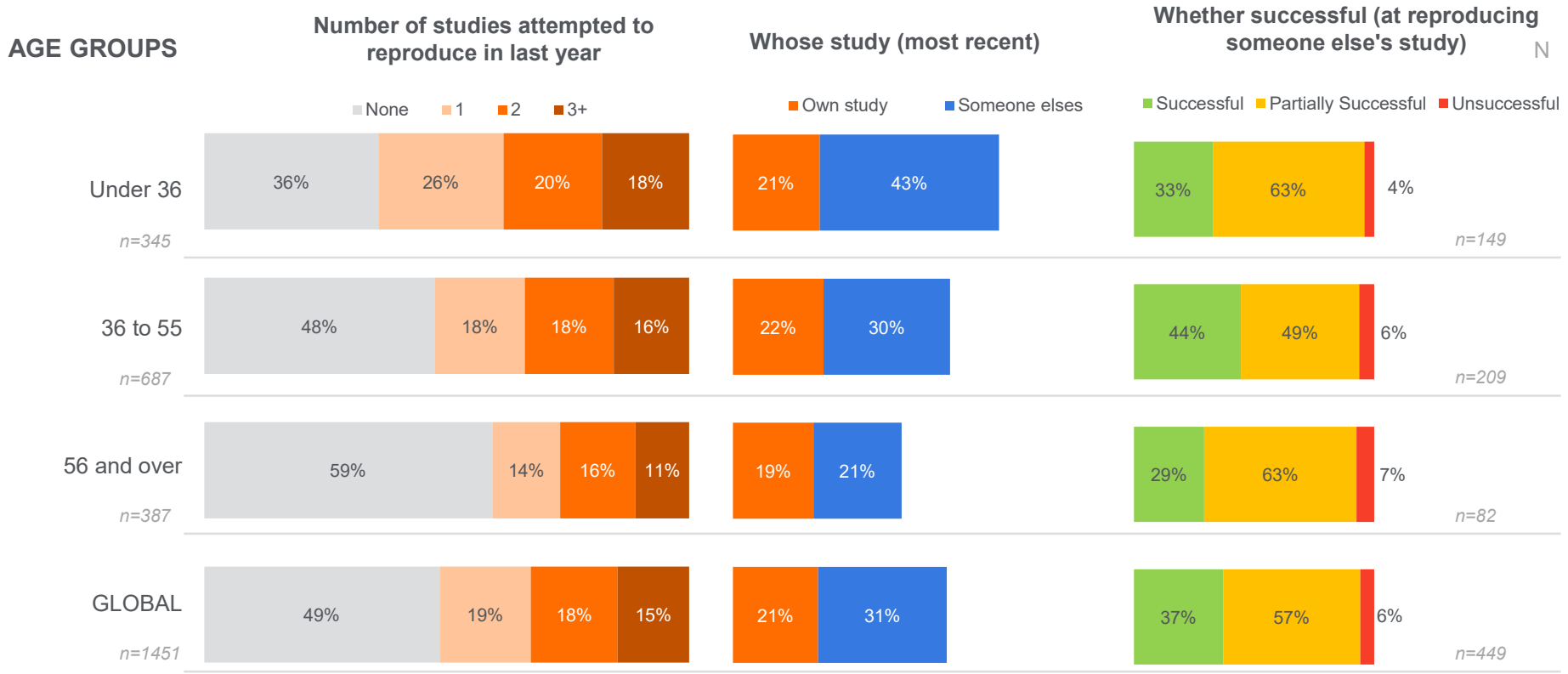


FOCUS ON REPRODUCIBILITY: The likelihood of undertaking studies attempting to reproduce another researcher's work decreases with age



Pressure to publish

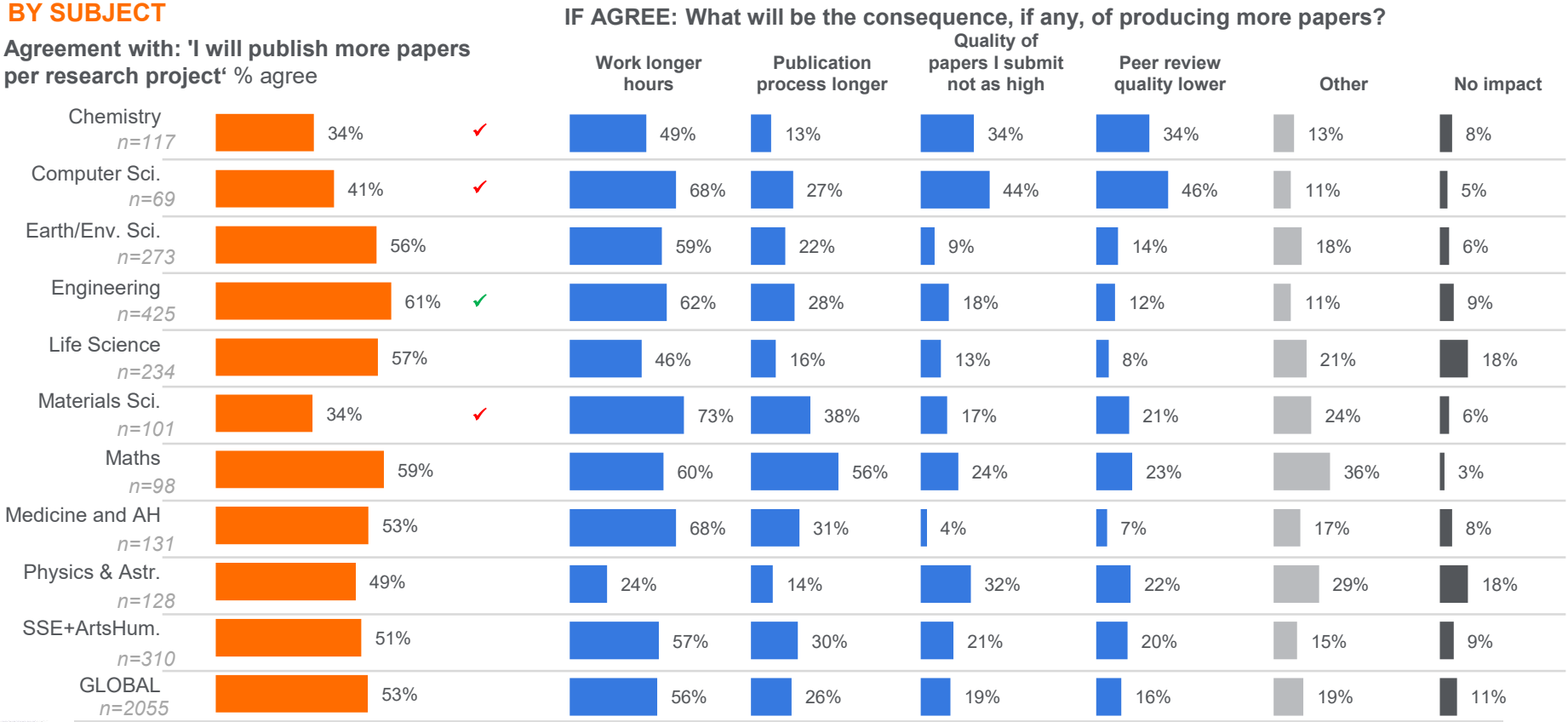
Results by geographic region, country, broad subject area and age group

PRESSURE TO PUBLISH: Engineers are most likely to believe they will be publishing more papers in 10 years' time

✓ Higher
✓ Lower

Significant difference between subset and total (p=90%)

BY SUBJECT



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PRESSURE TO PUBLISH: But those is Life Science, medicine/ health and social sciences are most likely to expect the pressure to be greater than now

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✓ Higher
✓ Lower

Significant difference between subset and total (p=90%)

BY SUBJECT

Likelihood that in 10 years: 'The pressure to publish will be greater than it is now in my field'

IF RATED LIKELY: From which of the following sources do you think this pressure will come?*

	n=	% likely	Funding orgs.	Research Admin.	Potential employers	Colleagues/ peers	Lline manager /sr res.	Myself	Publishers	Editorial boards	Other	Unsure
Chemistry	117	71%	69%	77%	36%	24%	67%	11%	8%	1%	3%	1%
Computer Sci.	69	73%	52%	74%	36%	21%	59%	16%	22%	8%	3%	4%
Earth/Env. Sci.	273	70%	70%	47%	39%	36%	21%	18%	16%	9%	7%	6%
Engineering	425	64% ✓	63%	55%	31%	37%	38%	18%	14%	10%	3%	1%
Life Science	234	80% ✓	66%	46%	50%	40%	37%	24%	14%	10%	7%	3%
Materials Sci.	101	72%	65%	62%	27%	22%	23%	17%	16%	4%	7%	0%
Maths	98	57% ✓	54%	73%	39%	44%	46%	39%	3%	3%	2%	1%
Medicine and AH	131	84% ✓	45%	54%	48%	37%	35%	20%	14%	8%	5%	2%
Physics & Astr.	128	80%	62%	48%	49%	36%	27%	33%	14%	8%	14%	0%
SSE+ArtsHum.	310	84% ✓	48%	43%	51%	47%	36%	21%	9%	13%	12%	2%
GLOBAL	2055	73%	59%	54%	42%	38%	36%	21%	14%	9%	8%	2%

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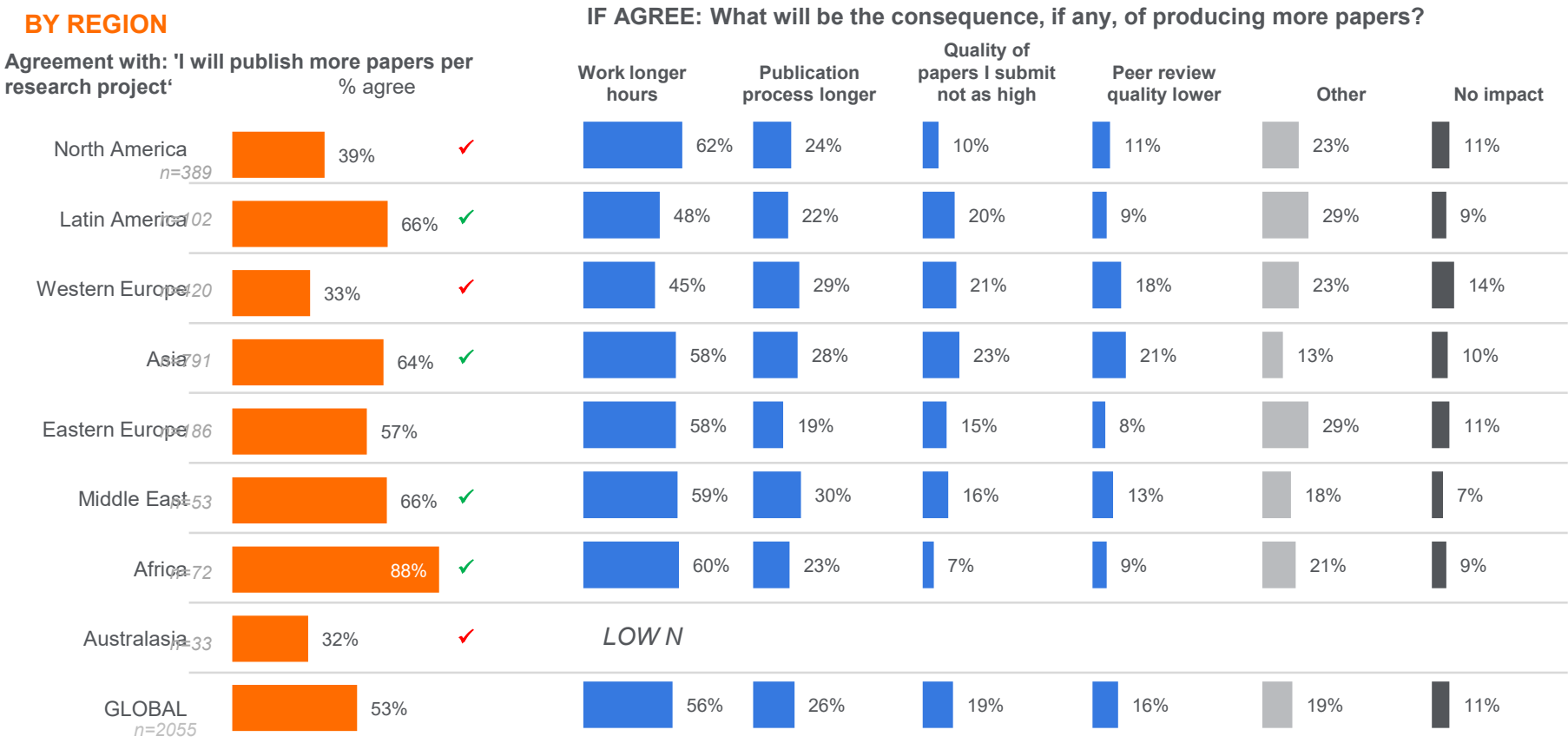
PRESSURE TO PUBLISH: Expectation of publishing more papers in 10 years' time higher in Asia, Latin America, Middle East and Africa

BY REGION

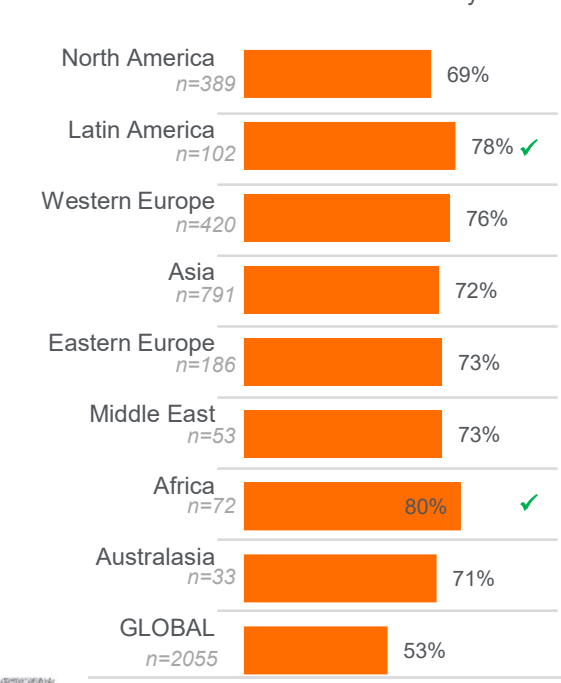


PRESSURE TO PUBLISH: Developing regions more likely to expect greater pressure to publish in the future. Greatest pressure from funders in Western Europe

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY REGION

Likelihood that in 10 years: 'The pressure to publish will be greater than it is now in my field'



IF RATED LIKELY: From which of the following sources do you think this pressure will come?

Funding orgs.	Research Admin.	Potential employers	Colleagues/ peers	Line manager /sr res.	Myself	Publishers	Editorial boards	Other	Unsure
58%	51%	54%	56%	30%	24%	14%	11%	14%	2%
57%	52%	34%	32%	32%	23%	14%	11%	11%	1%
71%	61%	49%	34%	43%	15%	17%	10%	9%	1%
53%	51%	36%	35%	37%	22%	14%	9%	3%	2%
65%	57%	35%	32%	24%	23%	6%	2%	13%	6%
43%	54%	36%	29%	26%	14%	14%	12%	3%	3%
55%	42%	37%	32%	34%	32%	26%	14%	9%	4%
64%	63%	59%	32%	63%	18%	11%	9%	2%	0%
59%	54%	42%	38%	36%	21%	14%	9%	8%	2%

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PRESSURE TO PUBLISH: Expectation of publishing more papers in 10 years' time lower in USA, Germany and UK

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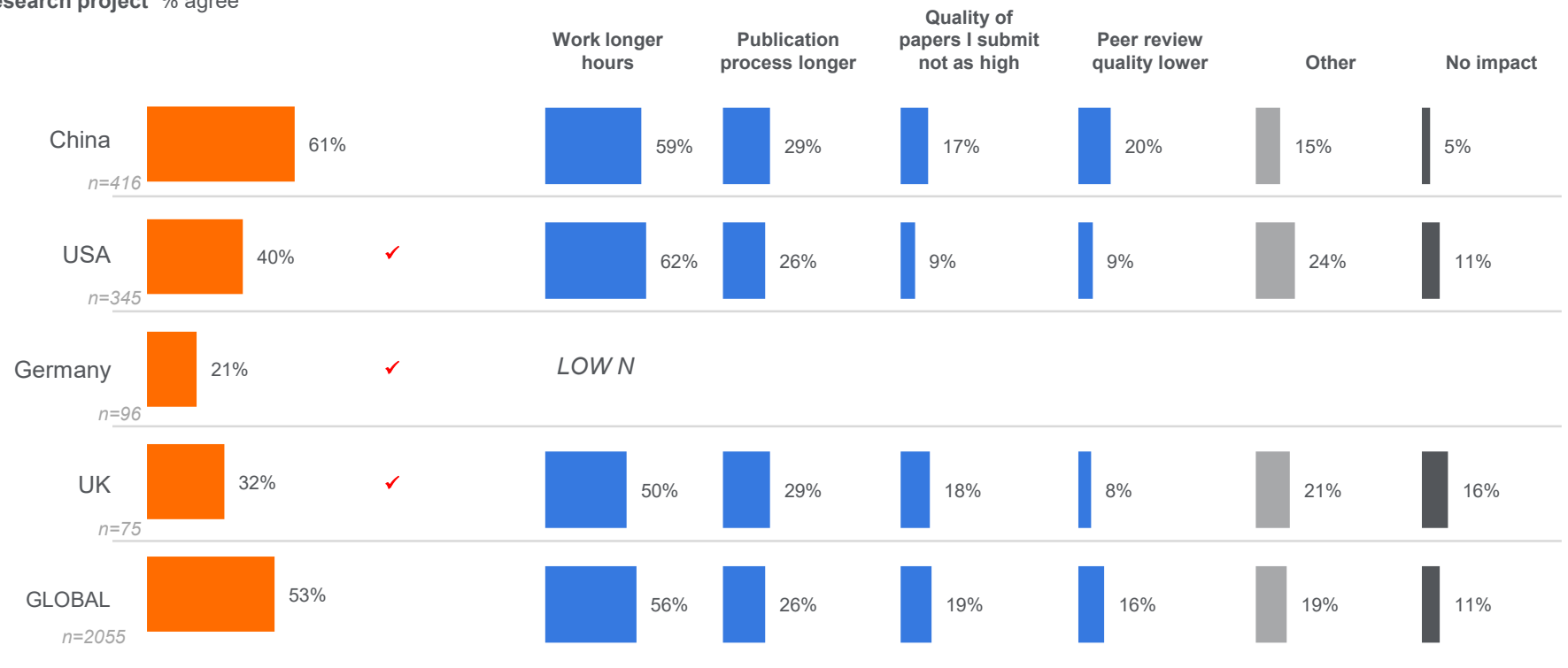
✓ Higher ✓ Lower Significant difference between subset and total (p=90%)

BY COUNTRY

Agreement with: 'I will publish more papers per research project' % agree

IF AGREE: What will be the consequence, if any, of producing more papers?



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PRESSURE TO PUBLISH: Pressure in USA more likely to come from colleagues and potential employers. In the UK it comes from potential employers and line managers

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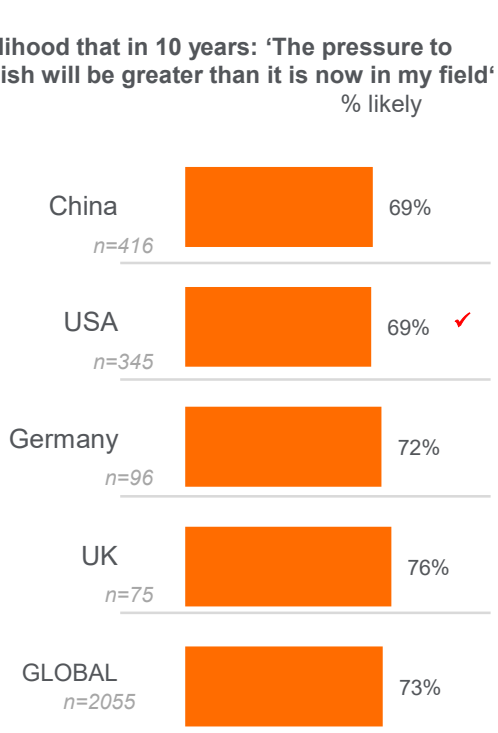
✓ Higher
✓ Lower

Significant difference between subset and total (p=90%)

BY COUNTRY

Likelihood that in 10 years: 'The pressure to publish will be greater than it is now in my field'



IF RATED LIKELY: From which of the following sources do you think this pressure will come?*

	Funding orgs.	Research Admin.	Potential employers	Colleagues/ peers	Line manager /sr res.	Myself	Publishers	Editorial boards	Other	Unsure
China n=416	51%	41%	32%	43%	33%	30%	19%	11%	5%	3%
USA n=345	56%	50%	55%	57%	33%	24%	14%	11%	14%	2%
Germany n=96	67%	64%	52%	40%	36%	14%	14%	7%	5%	2%
UK n=75	62%	48%	60%	30%	61%	22%	10%	5%	13%	2%
GLOBAL n=2055	59%	54%	42%	38%	36%	21%	14%	9%	8%	2%

PRESSURE TO PUBLISH: Researchers aged 36 to 55 more likely to think they will publish more papers per project in ten years' time

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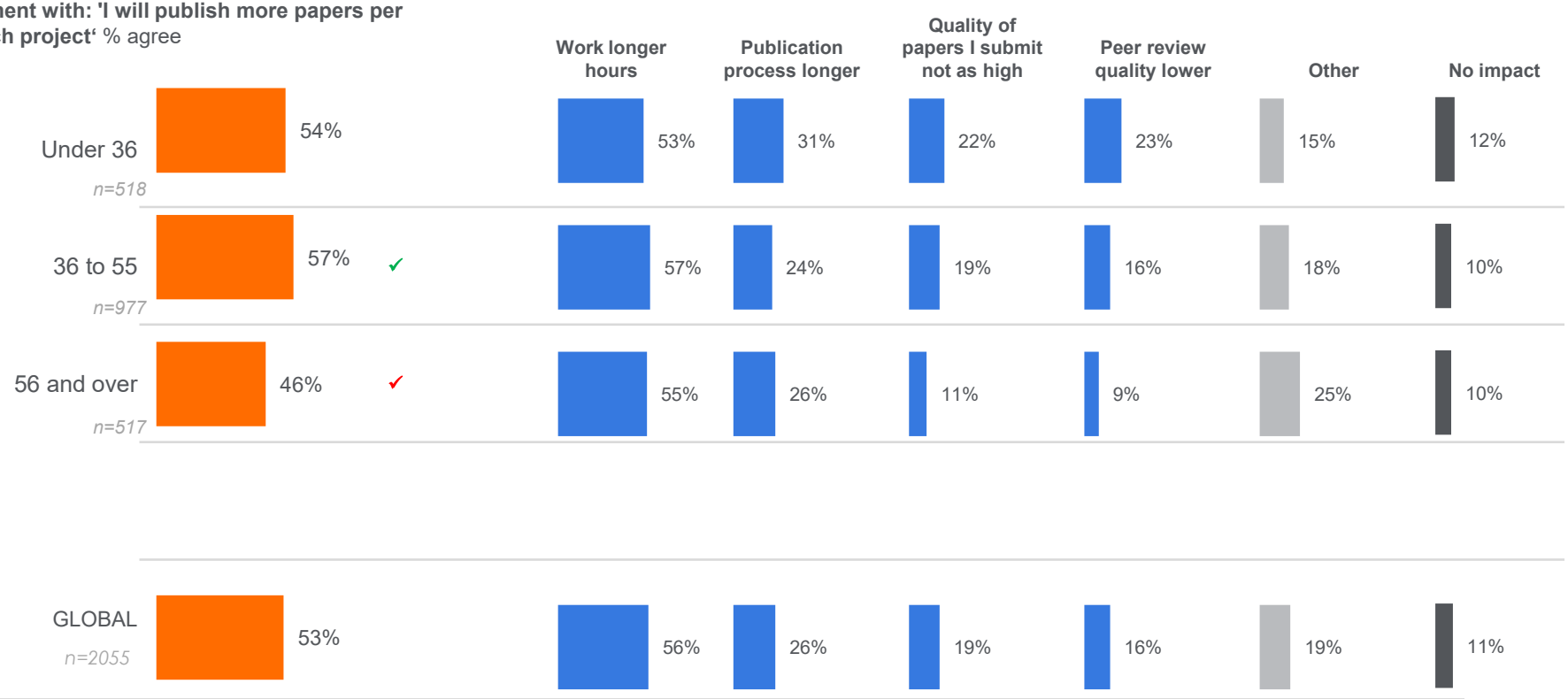
✓ Higher
✓ Lower

Significant difference between subset and total (p=90%)

BY AGE GROUP

Agreement with: 'I will publish more papers per research project' % agree

IF AGREE: What will be the consequence, if any, of producing more papers?



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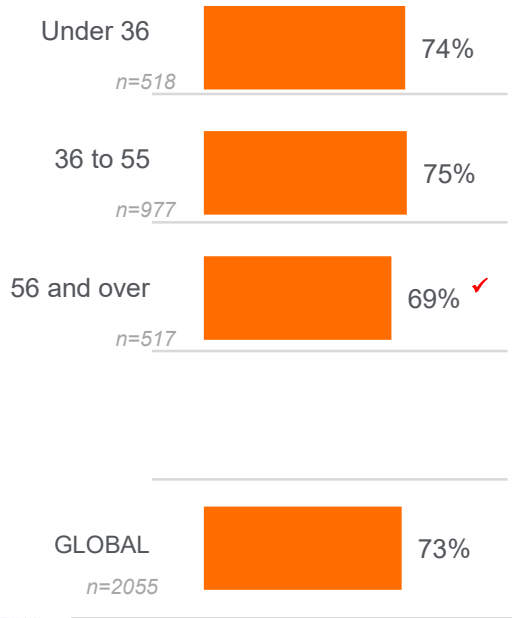
PRESSURE TO PUBLISH: Researchers aged under 36 more likely to feel pressure to publish from line managers and potential employers

✓ Higher
✓ Lower
Significant difference between subset and total (p=90%)

BY AGE GROUP

Likelihood that in 10 years: 'The pressure to publish will be greater than it is now in my field' % likely



IF RATED LIKELY: From which of the following sources do you think this pressure will come?*

	Funding orgs.	Research Admin.	Potential employers	Colleagues/ peers	Lline manager /sr res.	Myself	Publishers	Editorial boards	Other	Unsure
Under 36	59%	51%	52%	39%	45%	28%	17%	14%	6%	2%
36 to 55	56%	55%	41%	38%	38%	19%	13%	8%	7%	2%
56 and over	64%	52%	36%	35%	24%	18%	12%	6%	10%	3%
GLOBAL	59%	54%	42%	38%	36%	21%	14%	9%	8%	2%

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Impact of research

Results by geographic region, country, broad subject area and age group

IMPACT OF RESEARCH:
Materials Scientists, Engineers, Computer Scientists and Chemists most likely think their research has commercial impact

What do you consider to be the impact of your research?

BY SUBJECT AREA	Increased scientific knowledge and understanding	Increased public knowledge and understanding	Improved quality of life	Commercial application (e.g. new products)	Shift future direction of field	Appropriate government policy	Improved clinical or research practice	Increased life expectancy	Better legislation	Other (please specify)	No impact	Don't know	*N*
Chemistry	54%	43%	30%	59%	46%	34%	14%	21%	5%	1%	0%	1%	*117*
Computer Sci.	88%	52%	49%	60%	42%	19%	33%	10%	6%	3%	0%	1%	*69*
Earth & Env. Sci.	82%	72%	35%	25%	27%	50%	11%	11%	21%	5%	0%	0%	*273*
Engineering	64%	37%	52%	62%	24%	26%	24%	18%	12%	1%	0%	3%	*425*
Life Sciences	88%	48%	48%	34%	32%	26%	42%	27%	13%	2%	0%	0%	*234*
Material Sci.	86%	49%	65%	76%	29%	19%	7%	27%	2%	2%	0%	0%	*101*
Maths	86%	51%	21%	23%	62%	16%	8%	8%	5%	6%	1%	1%	*98*
Medicine & AH	73%	54%	71%	11%	28%	24%	72%	45%	18%	2%	0%	1%	*131*
Physics & Astr.	85%	23%	26%	24%	27%	6%	18%	8%	10%	1%	0%	3%	*128*
SSE + Arts Hum	70%	77%	43%	14%	39%	51%	18%	3%	25%	4%	0%	1%	*310*
GLOBAL	74%	54%	45%	38%	34%	33%	25%	17%	16%	4%	0%	1%	*2055*

MEASURES OF IMPACT BY SUBJECT: Life scientists more likely to measure impact on health measures (life exp. and treatment time). Earth/environmental scientists think changes to government policy and legislation/regulation would be the best measures of impact.

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BY SUBJECT AREA (1 OF 2)

Which do you think will be the best measures of the impact of your research?

		Chemistry	Computer Sci.	Earth & Env. Sci.	Engineering	Life Sciences	GLOBAL
Attention	Citations to my journal publications	85%	82%	73%	71%	80%	77%
Outputs	Publication(s) in specialist journals	66%	81%	67%	61%	67%	69%
Attention	Number of times read/downloaded	37%	63%	46%	48%	49%	50%
Outputs	Publication(s) in broad scope journals (e.g. Nature …)	46%	39%	49%	35%	60%	44%
Outputs	Publication(s) in books	28%	43%	32%	24%	35%	34%
Attention	Citations to my book publications	28%	28%	33%	23%	34%	33%
Benefits	Reduced costs	50%	52%	23%	50%	23%	33%
Benefits	More accurate measurement (e.g. equipment)	35%	37%	22%	39%	21%	30%
Outputs	New products	42%	57%	13%	53%	24%	29%
Benefits	Change(s) in government policy	16%	17%	44%	15%	18%	29%
Benefits	Increase in life expectancy	42%	14%	19%	36%	43%	27%
Attention	News articles in popular press	21%	15%	26%	24%	24%	26%
Attention	Number of collaborators	37%	37%	26%	27%	29%	26%
Outputs	Patents	43%	32%	16%	44%	21%	25%
Attention	Citations in public policy documents	14%	7%	28%	23%	20%	23%
Benefits	Change(s) to legislations/regulations	15%	17%	35%	15%	17%	23%
Outputs	Availability of your research data files	21%	46%	21%	15%	34%	21%
Benefits	Change to clinical or research procedures	15%	11%	4%	13%	33%	18%
Benefits	Shortened product development cycle	51%	28%	8%	24%	18%	17%
Benefits	Increased revenue	21%	25%	8%	30%	14%	17%
Benefits	Shortened treatment time	33%	17%	4%	8%	33%	16%
Attention	Number of retweets and/or mentions on blogs	8%	11%	14%	9%	17%	15%
Outputs	Number of preprints	9%	9%	5%	3%	4%	6%
Outputs	New drugs brought to market	14%	0%	3%	2%	21%	6%
	Other (please specify)	4%	7%	14%	4%	13%	12%
	I do not measure impact	5%	3%	10%	5%	7%	6%
	N	*117*	*69*	*273*	*425*	*234*	*2055*

MEASURES OF IMPACT BY REGION: Material scientists tend to focus more on 'commercial' measures (costs, products, patents). Medical/health researchers measure impact on health measures (life exp. and treatment time) as well as procedural changes. SSE consider changes to gov. policy and to legislation/regulations as the best measures of impact

BY SUBJECT AREA (2 OF 2)

Which do you think will be the best measures of the impact of your research?

		Material Sci.	Maths	Medicine & AH	Physics & Astr.	SSE + Arts Hum	GLOBAL
Attention	Citations to my journal publications	84%	75%	91%	73%	72%	77%
Outputs	Publication(s) in specialist journals	81%	79%	70%	75%	68%	69%
Attention	Number of times read/downloaded	50%	63%	50%	42%	53%	50%
Outputs	Publication(s) in broad scope journals (e.g. Nature …)	30%	24%	51%	50%	42%	44%
Outputs	Publication(s) in books	45%	52%	23%	35%	43%	34%
Attention	Citations to my book publications	32%	52%	24%	36%	40%	33%
Benefits	Reduced costs	58%	15%	43%	14%	15%	33%
Benefits	More accurate measurement (e.g. equipment)	27%	45%	35%	50%	15%	30%
Outputs	New products	57%	14%	15%	17%	7%	29%
Benefits	Change(s) in government policy	22%	13%	25%	7%	53%	29%
Benefits	Increase in life expectancy	33%	16%	59%	16%	7%	27%
Attention	News articles in popular press	22%	19%	22%	29%	32%	26%
Attention	Number of collaborators	25%	15%	29%	29%	18%	26%
Outputs	Patents	59%	5%	17%	26%	2%	25%
Attention	Citations in public policy documents	14%	7%	20%	10%	35%	23%
Benefits	Change(s) to legislations/regulations	7%	8%	26%	7%	42%	23%
Outputs	Availability of your research data files	11%	33%	29%	20%	14%	21%
Benefits	Change to clinical or research procedures	1%	3%	63%	5%	20%	18%
Benefits	Shortened product development cycle	40%	8%	12%	13%	4%	17%
Benefits	Increased revenue	13%	23%	8%	14%	8%	17%
Benefits	Shortened treatment time	32%	5%	40%	11%	4%	16%
Attention	Number of retweets and/or mentions on blogs	6%	18%	19%	12%	23%	15%
Outputs	Number of preprints	1%	24%	2%	6%	4%	6%
Outputs	New drugs brought to market	6%	1%	16%	1%	1%	6%
	Other (please specify)	4%	16%	4%	20%	16%	12%
	I do not measure impact	8%	11%	1%	4%	10%	6%
	N	*101*	*98*	*131*	*128*	*310*	*2055*

IMPACT OF RESEARCH: Researchers in Asia more likely to think their research will have commercial application and will increase life expectancy. Researchers in North America more likely to think the impact of their research will be a shift in future policy direction or better legislation

What do you consider to be the impact of your research?

BY REGION	Increased scientific knowledge and understanding	Increased public knowledge and understanding	Improved quality of life	Commercial application (e.g. new products)	Shift future direction of field	Appropriate government policy	Improved clinical or research practice	Increased life expectancy	Better legislation	Other (please specify)	No impact	Don't know	N
North America	86%	63%	48%	35%	41%	37%	29%	15%	24%	7%	0%	0%	389
Latin America	75%	53%	47%	27%	22%	29%	22%	13%	19%	7%	1%	1%	102
Asia	63%	47%	48%	47%	33%	29%	30%	24%	12%	1%	0%	2%	420
Western Europe	81%	58%	40%	31%	33%	38%	18%	9%	19%	6%	0%	0%	186
Eastern Europe	87%	48%	37%	33%	36%	25%	16%	17%	5%	1%	0%	0%	53
Middle East	72%	39%	42%	29%	27%	26%	23%	12%	13%	3%	0%	3%	72
Africa	77%	67%	56%	34%	23%	44%	20%	20%	22%	4%	0%	1%	791
Australasia	63%	80%	52%	30%	49%	54%	27%	9%	30%	5%	0%	0%	33
Total	74%	54%	45%	38%	34%	33%	25%	17%	16%	3%	0%	1%	2055

MEASURES OF IMPACT BY REGION: Researchers in Asia more likely to measure impact by number of patents, new products and increase in life expectancy. Those in North America, Western Europe and Australasia more likely to look for changes to legislation/ regulations and articles in popular press.

BY REGION

Which do you think will be the best measures of the impact of your research?

		North America	Latin America	Western Europe	Asia	Eastern Europe	Middle East	Africa	Australasia	Total
Attention	Citations to my journal publications	82%	77%	76%	75%	73%	80%	80%	72%	77%
Outputs	Publication(s) in specialist journals	73%	71%	73%	63%	71%	60%	75%	68%	69%
Attention	Number of times read/downloaded	55%	53%	57%	45%	41%	45%	59%	56%	50%
Outputs	Publication(s) in broad scope journals (e.g. Nature …)	46%	39%	42%	45%	44%	42%	51%	27%	44%
Outputs	Publication(s) in books	34%	36%	35%	32%	37%	28%	43%	29%	34%
Attention	Citations to my book publications	37%	36%	31%	29%	37%	29%	43%	35%	33%
Benefits	Reduced costs	31%	34%	30%	36%	22%	29%	43%	27%	33%
Benefits	More accurate measurement (e.g. equipment)	30%	22%	31%	32%	30%	31%	24%	24%	30%
Outputs	New products	21%	23%	22%	39%	26%	25%	21%	11%	29%
Benefits	Change(s) in government policy	33%	32%	33%	25%	18%	23%	41%	54%	29%
Benefits	Increase in life expectancy	19%	25%	17%	36%	31%	25%	33%	18%	27%
Attention	News articles in popular press	34%	20%	33%	21%	16%	26%	24%	35%	26%
Attention	Number of collaborators	25%	26%	31%	19%	38%	25%	39%	32%	26%
Outputs	Patents	16%	22%	13%	40%	22%	21%	16%	6%	25%
Attention	Citations in public policy documents	29%	25%	26%	20%	12%	17%	39%	39%	23%
Benefits	Change(s) to legislations/regulations	32%	30%	31%	15%	12%	19%	30%	51%	23%
Outputs	Availability of your research data files	24%	25%	27%	14%	32%	18%	20%	27%	21%
Benefits	Change to clinical or research procedures	27%	21%	16%	14%	14%	16%	19%	24%	18%
Benefits	Shortened product development cycle	15%	13%	13%	23%	11%	14%	13%	12%	17%
Benefits	Increased revenue	17%	13%	13%	20%	9%	24%	25%	6%	17%
Benefits	Shortened treatment time	12%	15%	10%	20%	20%	17%	16%	12%	16%
Attention	Number of retweets and/or mentions on blogs	21%	14%	18%	10%	13%	13%	18%	27%	15%
Outputs	Number of preprints	5%	6%	6%	4%	11%	6%	7%	5%	6%
Outputs	New drugs brought to market	7%	4%	5%	6%	5%	4%	5%	6%	6%
	Other (please specify)	20%	12%	19%	5%	8%	8%	8%	20%	12%
	I do not measure impact	6%	8%	5%	7%	6%	7%	6%	5%	6%
	N	389	102	420	186	53	72	791	33	2055

IMPACT OF RESEARCH:
Researchers in China most likely to think their research will have commercial application and increased life expectancy

What do you consider to be the impact of your research?

BY COUNTRY	Increased scientific knowledge and understanding	Increased public knowledge and understanding	Improved quality of life	Commercial application (e.g. new products)	Shift future direction of field	Appropriate government policy	Improved clinical or research practice	Increased life expectancy	Better legislation	Other (please specify)	No impact	Don't know	*N*
China	68%	45%	49%	45%	26%	33%	31%	25%	14%	1%	0%	1%	*416*
USA	87%	61%	48%	35%	42%	37%	30%	16%	24%	7%	0%	0%	*345*
Germany	78%	60%	27%	32%	28%	37%	12%	7%	12%	8%	0%	0%	*96*
UK	71%	59%	50%	34%	41%	45%	37%	14%	20%	7%	0%	0%	*75*
Total	74%	54%	45%	38%	34%	33%	25%	17%	16%	4%	0%	1%	*2055*

MEASURES OF IMPACT BY COUNTRY: Researchers in China more likely to measure impact by number of patents and shortened product development cycle but less likely by number of collaborators. Researchers in US and UK more likely to measure impact by number of articles in popular press and procedural changes. UK also measure by social media activity. German researchers more likely to measure by research data availability.

BY COUNTRY

Which do you think will be the best measures of the impact of your research?

		China	USA	Germany	UK	Total
Attention	Citations to my journal publications	72%	84%	72%	77%	77%
Outputs	Publication(s) in specialist journals	67%	73%	73%	70%	69%
Attention	Number of times read/downloaded	44%	56%	58%	52%	50%
Outputs	Publication(s) in broad scope journals (e.g. Nature …)	44%	46%	40%	37%	44%
Outputs	Publication(s) in books	28%	35%	27%	28%	34%
Attention	Citations to my book publications	29%	38%	23%	27%	33%
Benefits	Reduced costs	38%	33%	33%	23%	33%
Benefits	More accurate measurement (e.g. equipment)	33%	32%	37%	23%	30%
Outputs	New products	33%	22%	22%	20%	29%
Benefits	Change(s) in government policy	26%	33%	23%	39%	29%
Benefits	Increase in life expectancy	33%	20%	12%	17%	27%
Attention	News articles in popular press	20%	35%	32%	39%	26%
Attention	Number of collaborators	14%	25%	35%	24%	26%
Outputs	Patents	38%	18%	15%	11%	25%
Attention	Citations in public policy documents	25%	28%	15%	30%	23%
Benefits	Change(s) to legislations/regulations	17%	31%	28%	32%	23%
Outputs	Availability of your research data files	15%	25%	38%	24%	21%
Benefits	Change to clinical or research procedures	13%	28%	8%	31%	18%
Benefits	Shortened product development cycle	25%	17%	23%	10%	17%
Benefits	Increased revenue	18%	19%	23%	11%	17%
Benefits	Shortened treatment time	21%	13%	10%	15%	16%
Attention	Number of retweets and/or mentions on blogs	9%	22%	13%	26%	15%
Outputs	Number of preprints	4%	4%	2%	4%	6%
Outputs	New drugs brought to market	8%	7%	3%	5%	6%
	Other (please specify)	5%	20%	15%	22%	12%
	I do not measure impact	7%	5%	3%	5%	6%
	N	*416*	*345*	*96*	*75*	*2055*

IMPACT OF RESEARCH:
Younger researchers (under 36) most likely to think their research will have commercial application

What do you consider to be the impact of your research?

BY AGE GROUP	Increased scientific knowledge and understanding	Increased public knowledge and understanding	Improved quality of life	Commercial application (e.g. new products)	Shift future direction of field	Appropriate government policy	Improved clinical or research practice	Increased life expectancy	Better legislation	Other (please specify)	No impact	Don't know	*N*
Under 36	72%	44%	45%	44%	30%	26%	19%	26%	15%	4%	0%	1%	518
36-55	75%	56%	47%	37%	36%	38%	20%	26%	16%	3%	0%	1%	977
56 and over	77%	60%	44%	34%	35%	32%	11%	25%	16%	5%	0%	0%	517
Total	74%	54%	45%	38%	34%	33%	17%	25%	16%	4%	0%	1%	*2055*

MEASURES OF IMPACT BY AGE GROUP

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Researchers aged under 36 are more likely to measure impact via number of collaborators, availability of research data files, new products and number of times read/downloaded

BY AGE GROUP

Which do you think will be the best measures of the impact of your research?

		Under 36	36-55	56 and over	GLOBAL
Attention	Citations to my journal publications	75%	79%	75%	77%
Outputs	Publication(s) in specialist journals	70%	70%	67%	69%
Attention	Number of times read/downloaded	57%	50%	44%	50%
Outputs	Publication(s) in broad scope journals (e.g. Natu	43%	48%	36%	44%
Outputs	Publication(s) in books	32%	36%	34%	34%
Attention	Citations to my book publications	31%	35%	31%	33%
Benefits	Reduced costs	36%	35%	26%	33%
Benefits	More accurate measurement (e.g. equipment)	34%	30%	26%	30%
Outputs	New products	36%	29%	21%	29%
Benefits	Change(s) in government policy	24%	30%	29%	29%
Benefits	Increase in life expectancy	28%	28%	23%	27%
Attention	News articles in popular press	26%	29%	22%	26%
Attention	Number of collaborators	35%	24%	21%	26%
Outputs	Patents	28%	28%	20%	25%
Attention	Citations in public policy documents	22%	26%	20%	23%
Benefits	Change(s) to legislations/regulations	19%	24%	26%	23%
Outputs	Availability of your research data files	28%	20%	19%	21%
Benefits	Change to clinical or research procedures	17%	17%	20%	18%
Benefits	Shortened product development cycle	17%	19%	14%	17%
Benefits	Increased revenue	17%	19%	13%	17%
Benefits	Shortened treatment time	17%	18%	11%	16%
Attention	Number of retweets and/or mentions on blogs	21%	15%	8%	15%
Outputs	Number of preprints	4%	6%	6%	6%
Outputs	New drugs brought to market	8%	5%	4%	6%
	Other (please specify)	8%	11%	16%	12%
	I do not measure impact	4%	6%	9%	6%
	N	*518*	*977*	*517*	*2055*

Demographics

Demographics

N=2055

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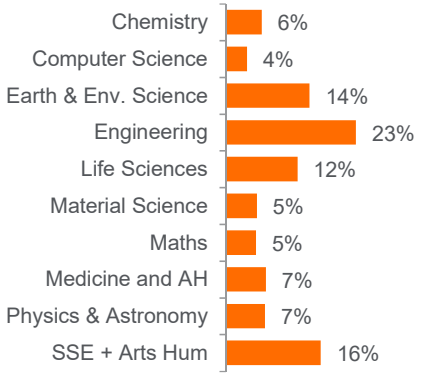
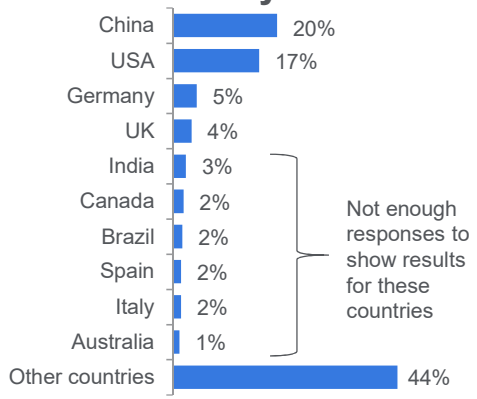
Subject

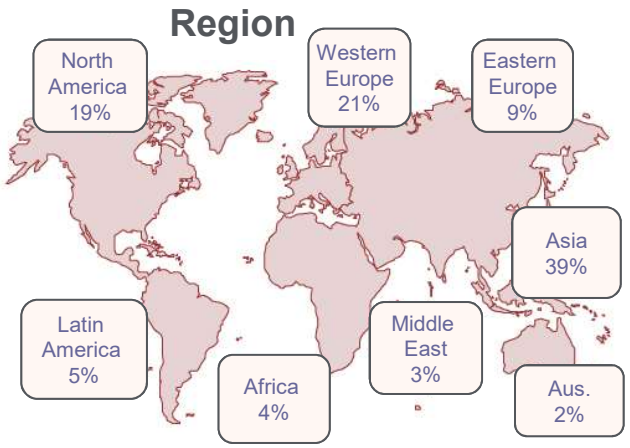


PMG	%
Health Sci.	7%
Life Sci.	12%
Physical Sci.	64%
Social Sci.	16%

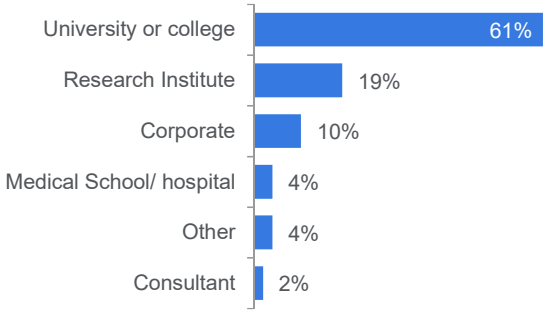
Country



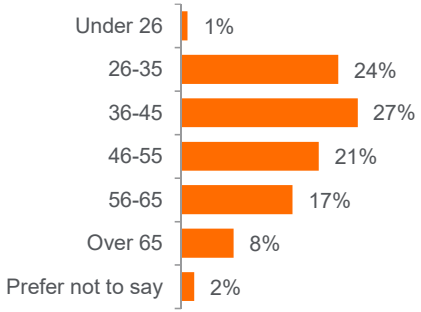
Region



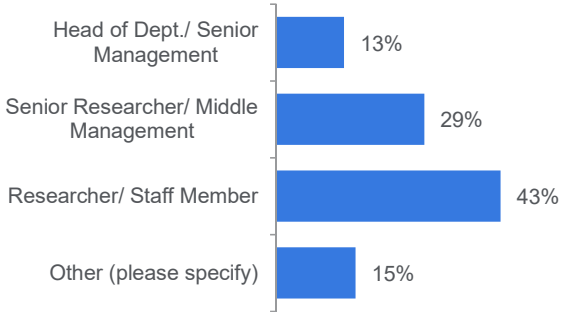
Organization



Age



Position



Demographics

N=2055

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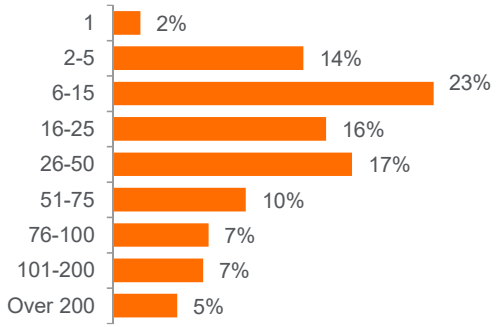
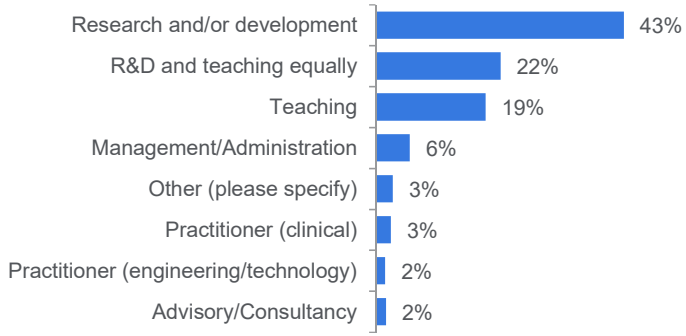
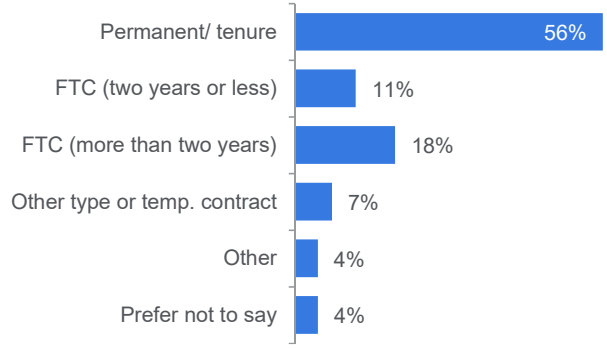
Number of articles published



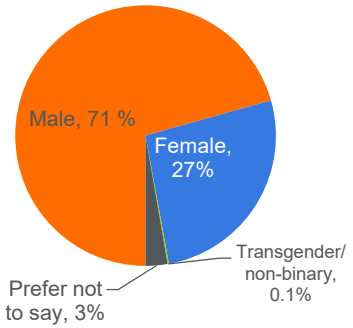
Role



Contract type (main role)



Gender



Appendix

Statement wording
Thinking about the world of/your research over the next 10 years...

How desirable the following are:	How much you agree or disagree with the following statements:	How likely or unlikely you believe it will be that the following occurs:
Research funding in my field (in real terms) is greater than it is now.	I will need more funding for my research (in real terms) than today.	Research funding in my field (in real terms) will be greater than today
Corporations and philanthropic organisations fund a higher proportion of research in my field.	I will always apply to corporations and philanthropic organisations for funding if it is available.	Corporations and philanthropic organisations will fund a higher proportion of the research in my field.
Funders determine how research results are communicated.	I will disseminate research results as recommended by my funder(s).	My funder(s) will stipulate where my research results are published.
Funders determine my study design.	I will always alter my study design to meet funder demands.	The design of most studies in my field will be determined by funders/sponsors.
Being able to replicate other research findings.	I will attempt to replicate other researchers' findings that my work builds on.	Nearly all research in my field will be replicable.
The amount of research produced in my field is increased by technological advances.	I will use technological advances to increase the amount of research I produce.	The amount of research produced in my field will have increased due to technological advances.
Scientific progress in my field is largely dependent upon technological advances (e.g. AI, machine learning).	My research will be dependent upon technological advances (e.g. AI, machine learning).	Scientific progress in my field will largely be dependent upon technological advances (e.g. AI, machine learning).
Artificial Intelligence (AI) is used to determine an article's appropriateness for publication in a journal.	I will read articles in a journal that relies on artificial intelligence (AI) instead of peer review.	Artificial intelligence (AI) will be used to determine which articles appear in a journal.
More research projects are conducted across international boundaries.	I will conduct my research projects with colleagues in other countries.	The majority of research projects in my field will be completed across international boundaries.
Integrated end-to-end research workflow tools are readily available (e.g. tools that identify funding, help me collaborate, share data, show-case my work).	I will rely on integrated end-to-end research workflow tools (e.g. tools that identify funding, help me collaborate, share data, show-case my work).	Most researchers in my field will be using integrated end-to-end research workflow tools (e.g. tools that identify funding, help me collaborate, share data, show-case my work)
Negative results from studies in my field are published.	I will submit negative findings from my experiments for publication.	Negative results from well-designed studies in my field will be published.
Researchers in my field are expert in advanced data modelling techniques and statistics.	I will use advanced data modelling techniques and will be expert in statistics.	Researchers in my field will be experts in advanced data modelling techniques and statistics.
The key communication output from a research study remains the publication of a research article.	The primary method for communicating my results will be journal articles.	Research articles will be the primary mechanism for communicating scientific discovery in my field.
Each researcher publishes more articles than they do now.	I will publish more papers per research project.	The pressure to publish will be greater than it is now in my field
The majority of research has an impact on society.	Research I undertake will impact society.	Nearly all research undertaken in my field will have an impact on society.