Research Integrity – Needs and provision of training in Australian Institutions

Springer Nature &
Australian Academy of Science

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Executive summary

Key figures

34

The number of universities with at least one respondent in the survey, equating to approximately 85% of the universities in Australia.

26%

The proportion of respondents who felt that there was a problem with a lack of research integrity within their field.

68%

The proportion of respondents who indicated that their institution provided training on research integrity.

73%

The proportion of respondents who support mandatory training on research integrity for all those holding a research position.

Situation

In October 2019, *Nature* held an inaugural symposium on research integrity and good research practices to drive the conversation about improvements to the way research is conducted, reported, and rewarded.

Opportunity

In line with one of the calls to action from the symposium, the challenge was to conduct research to review perceived access to training in research integrity and good research practices.

Questions

1. How many researchers feel that training on research integrity is available to them?
2. What does this training entail?
3. Does it meet the perceived needs of the research industry in Australia?

Answers

1. The large majority of those surveyed feel that training is provided to them when required, but that uptake and level of provision is widely variable.
2. Training appears to have greater focus on policy and guidance than practical skills associated with research design.
3. The majority of those whose institution provides training on research integrity feel like the training is sufficiently effective to support their research needs - but there are topic gaps and consistency of provision is patchy.

Benefits

The data provided herein provides a unique snapshot of the practices and beliefs of a wide range of individuals involved within the Australian research sector. The hope is that this data will help continue to drive the conversation about how research is conducted, reported and rewarded, towards firm commitments to change.

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Introduction

Introduction

In October 2019, *Nature* held an inaugural symposium on research integrity and good research practices in Melbourne, Australia. The symposium consisted of keynote speeches, panel discussions and workshops with a variety of experienced leaders from publishing, business, government bodies, university and research institutes, and funding organisations.

The aim was to drive the conversation about improvements to the way research is conducted, reported, and rewarded. The conversation was focussed around three themes: training and accreditation, reward and recognition and data sharing and accessibility. In turn, the hope was to develop firm commitments to change in one or more of these areas, from attendees and institutions across Australia.

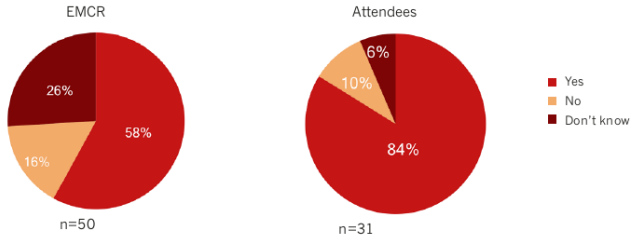
With approximately 80 attendees, including early-career to senior researchers and industry leaders, a broad and detailed set or outcomes and calls to action were developed. These were grouped according to theme and tailored for institutions, funding agencies and publishers and academies separately.

In addition to the day's events, attendees and Early and Mid-Career (EMCR) researchers of the Australian Academy of Science (AAS) were also asked to participate in a short survey about research integrity and good practice training in their institution (some data provided opposite).

Springer Nature, in partnership with AAS, took forward an extension of this survey, in line with one of the call to actions from the symposium, detailing a need to conduct (paraphrased):

> *a baseline audit of research institutions of their current training in research integrity and good research practices, including training in statistics, data management, data sharing and mentorship.*

2. DOES YOUR INSTITUTION PROVIDE TRAINING IN RESEARCH INTEGRITY?



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Research aims and methodology

Key objective:
Detail the perceived provision and quality of training in research integrity and good research practices across research institutions within Australia.

Research aims

1. Determine the scale of training on research integrity and good research practices perceived to be provided to researchers from across the broad spectrum of institutes within Australia. This includes understanding how it is provided, who provides it, and with what frequency.
2. Understand the perceived need and quality of training in research integrity.
3. Detail what topics are covered by the training and whether these align with the areas researchers themselves feel are important to research integrity and good research practices.

Methodology

A survey was developed to be sent to both institutional administrators as well as researchers with questions adapted for both audiences. The questions were tested for coherence in a small pilot study from which minor amendments were made (35 of the pilot responses are included in final analysis). Wider distribution was undertaken using convenience sampling in two phases via email lists (provided by AAS and Springer Nature) as well as direct sharing with institutional executives who distributed to their own faculty. A full breakdown and of completed responses can be found below:

- Phase 1 – distribution between 4th Dec 2020 until 7th Feb 2021 – 321 completes and 47 incompletes
- Phase 2 – distribution between 21st Sep 2021 until 4th Nov 2021 – 557 completes and 68 incompletes

Total – 993 useable responses

Note: references to statistical significance are based upon *p-value* less than or equal to 0.05.

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What is understood by “research integrity”

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Honest and ethical behaviours are seen as key to research integrity

Unprompted understanding of research integrity meaning

Of the 993 open text responses detailing what research integrity meant to researchers, 94% were coded into key overlapping themes provided opposite.

Most comments focused on particular positive research traits:

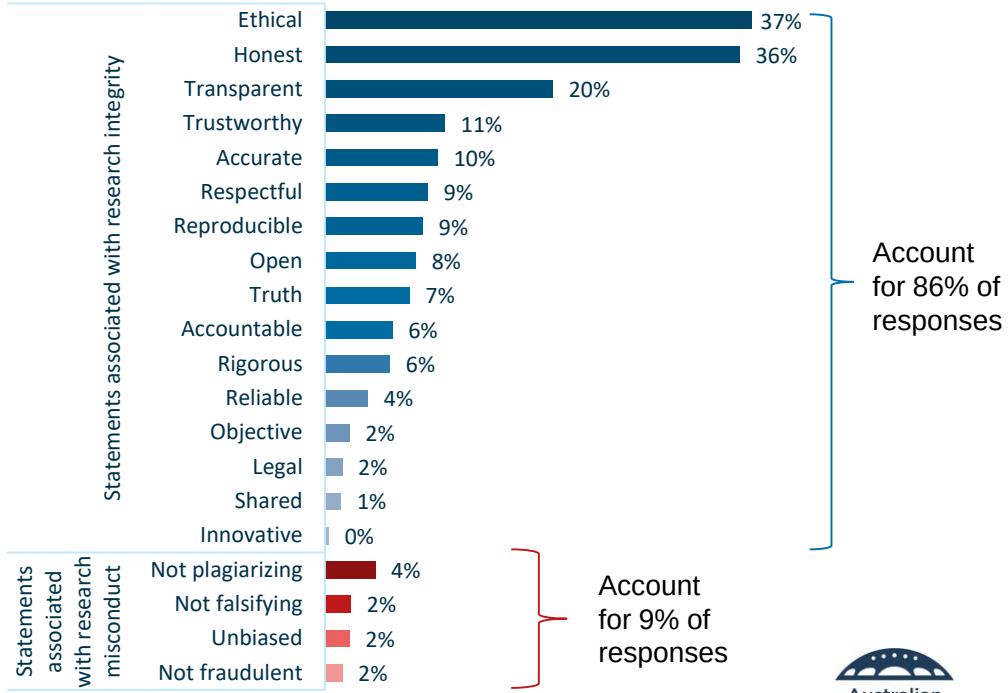
"Research is carried out and reported ethically, transparently and honestly. People are dealt with fairly. Research money is spent in an accountable way. Legislation and agreements are followed."

"The use of honest and verifiable methods in proposing, performing, and evaluating research."

A small proportion however were more associated with research misconduct:

"Ensuring that all work can stand up to scrutiny, including not falsifying data, not publishing bad science (e.g. making sure suitable controls and replicates included), crediting all contribution and authors, not plagiarizing, treating peers with respect."

Q. How would you describe Research Integrity, including the practices it relates to? (n=931)



Prompted questioning consistent with unprompted understanding

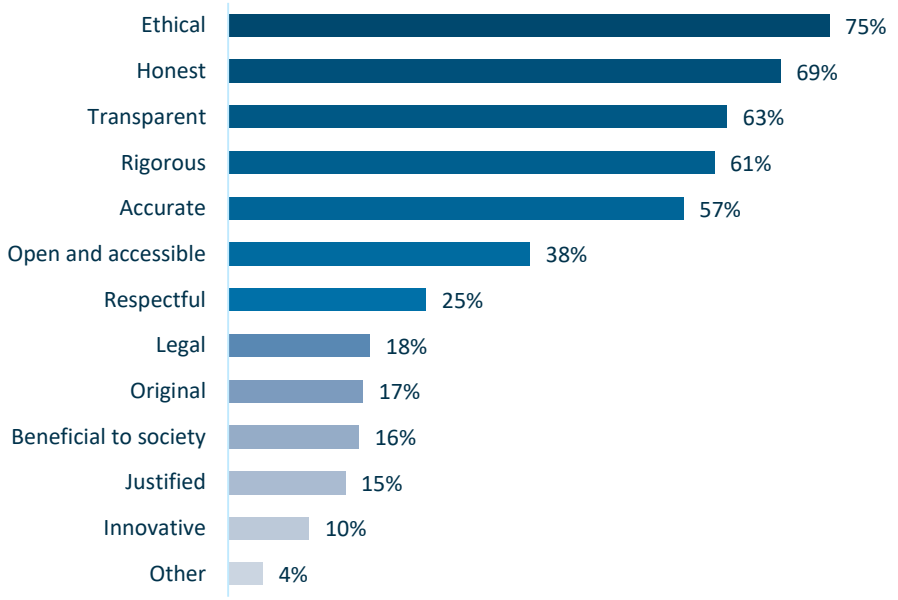
Prompted understanding of research integrity meaning

92% of the audience felt that integrity in research reflects at least three of the following 5 elements: ethical, honest, transparent, rigorous and accurate activity.

- Transparency in research was selected significantly more frequently by ECRs (in direct opposition to institutional managers), while honesty was more likely to be selected by senior academic staff*.
- Respondents from the Group of 8 universities were more likely to select 'accuracy' as important for research integrity.

In a benchmark survey conducted on NHMRC-funded institutions (2020†) which asked respondents to select up to 5 words from a list that they believed were important to 'high-quality research', the five most frequently selected words were: rigorous (73%), ethical (69%), beneficial to society (57%), accurate (53%) and innovative (42%). That beneficial to society and innovative were infrequently selected by respondents to the current survey may reflect a slight dichotomy of beliefs in the elements that make research high-quality but also ensure integrity.

Q. Which of the following characteristics do you believe are most important for ensuring integrity in research? That the activity is… (up to 5 responses accepted; n=993)



*all demographic and data breakdowns/comparisons for this report can be found in the links in the appendix

†https://www.nhmrc.gov.au/research-policy/research-quality

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Activities linked to reporting of research perceived most important for ensuring integrity

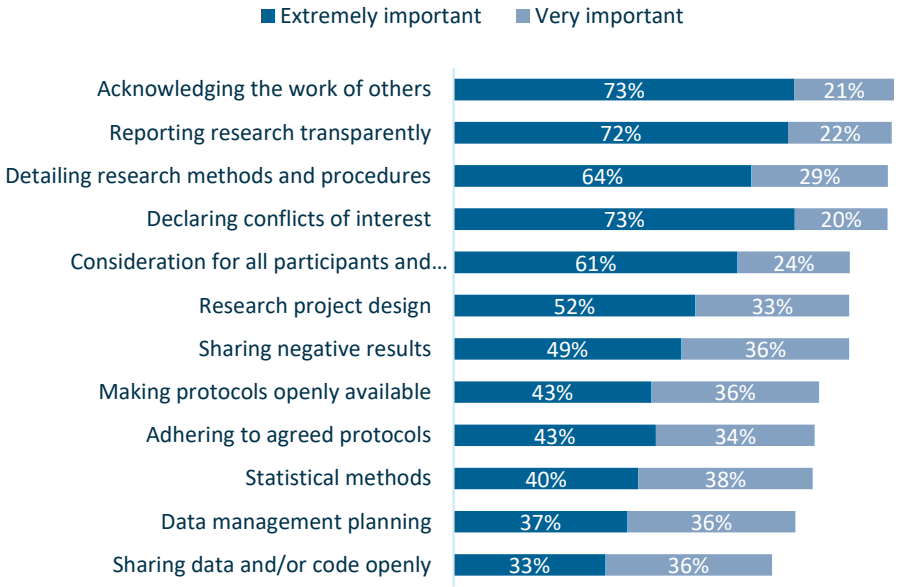
Important aspects for maintaining integrity in research

After initial questions (see slide 3 & 4) respondents were provided with a definition of research integrity to provide context and consistency for further questioning:

"The use of honest and verifiable methods in proposing, performing, and evaluating research and reporting research results with particular attention to adherence to rules, regulations, guidelines, and commonly accepted professional codes and norms."

- Data management planning was of particular importance to those within the clinical, translational and health sciences.
- Respondents from the computer sciences and engineering were a lot less likely to indicate the importance of activities associated with open science including of particular interest sharing data and/or code openly.

Q. How would you rate the importance of each of the below with reference to research integrity? (n=966)



NIH definition of Research Integrity (https://grants.nih.gov/policy/research_integrity/what-is.htm)

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Current research integrity training provision

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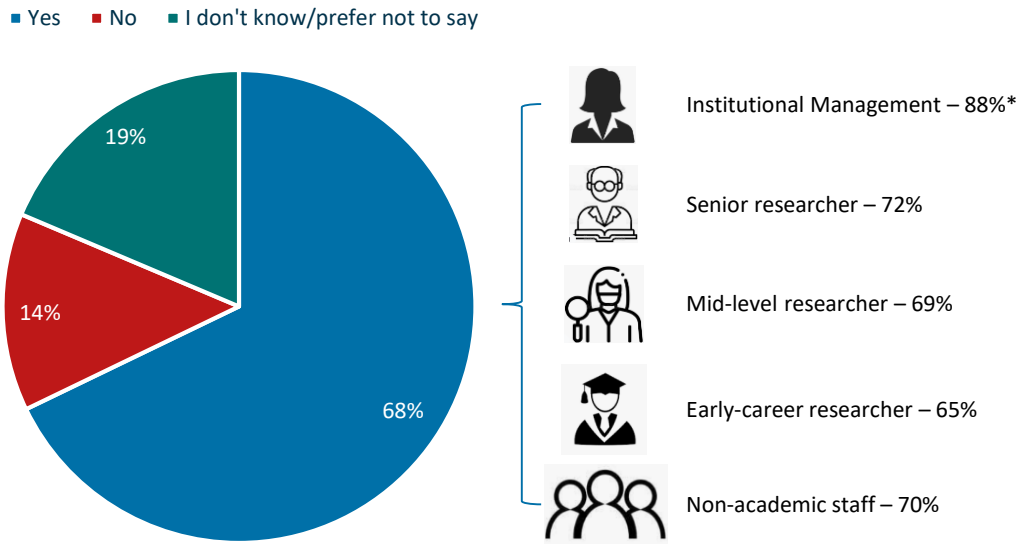
Awareness of research integrity training varies dependent on career seniority

Availability of training in research integrity

Q. Does your institution provide training in research integrity? (n=961)



- Provision of training varied somewhat by size of institution. Those from the Group of 8 or other large universities[Ŧ] were 9% more likely to indicate provision compared to those from medium and small institutions.
- Reported provision of training varied between respondents within the same institution. For example, of the 97 responses detailed from one university, 65% indicated that their institution provided training for research integrity, while 14% stated that it did not and another 21% were unsure or preferred not to say.

*Significantly higher than average. Full breakdowns provided in the links in appendix.
[Ŧ] Institutional size is based on three metrics: number of students/staff, institutional budget and article output

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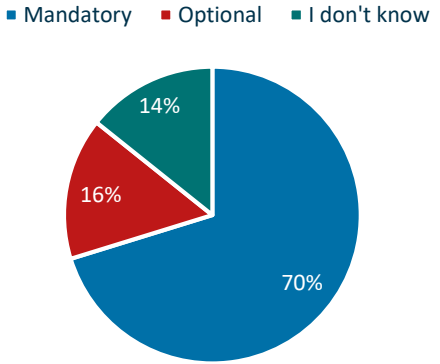
Most training is mandatory but varies in delivery style

How is research integrity training provided?

Q. Is training on research integrity mandatory or optional? (n=220)



- Respondents from the life sciences (biological, biomedical and clinical sciences) were more likely to state that their institution provided mandatory training than those in either the physical or computer sciences*.

Q. How is this training provided? (n=651)

Online – 46%

In person – 4%

Blended – 46%

Don't know– 3%

- Institutional managers were significantly more likely to indicate that they offered both online and in person training.
- Respondents from the Group of 8 universities were significantly more likely to indicate that their institution provided online only training.

*Full breakdowns provided in appendix.

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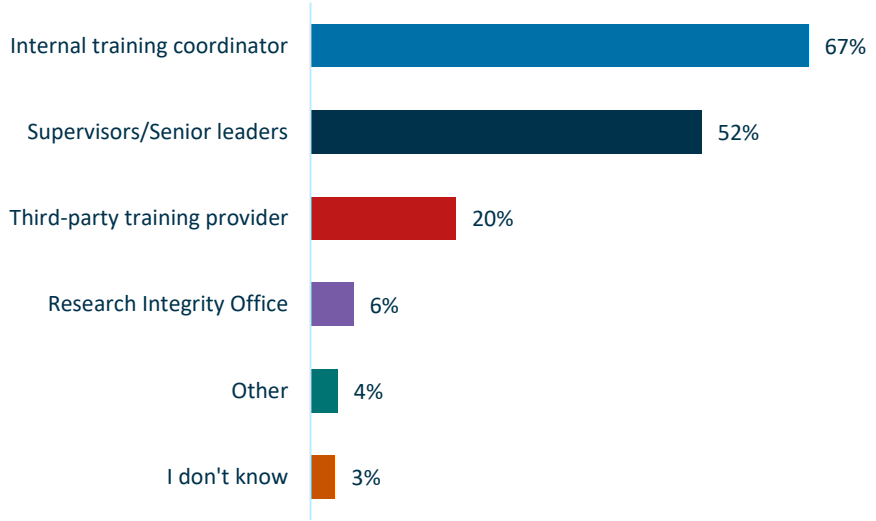
Dual responsibility for training lies with internal coordinators and senior leaders

Who is responsible for conducting training?

- A significantly larger proportion of institutional management and senior researchers indicated that they felt supervisors and senior leaders themselves were responsible for delivering training on research integrity*. The disparity in response should cause reflection for senior leaders whose efforts are either not recognised by their junior peers or not seen as sufficient for their perceived needs.
- No respondent from the Group of 8 institutions indicated that training was provided to them from a specialised research integrity office (although it is worth noting that this was not an option prompted in the survey, but a consistent response picked up in the open text “Other” option and disambiguated during analysis).

Q. Who is responsible for conducting the training within your institution? (n=328)



*Full breakdowns provided in appendix.

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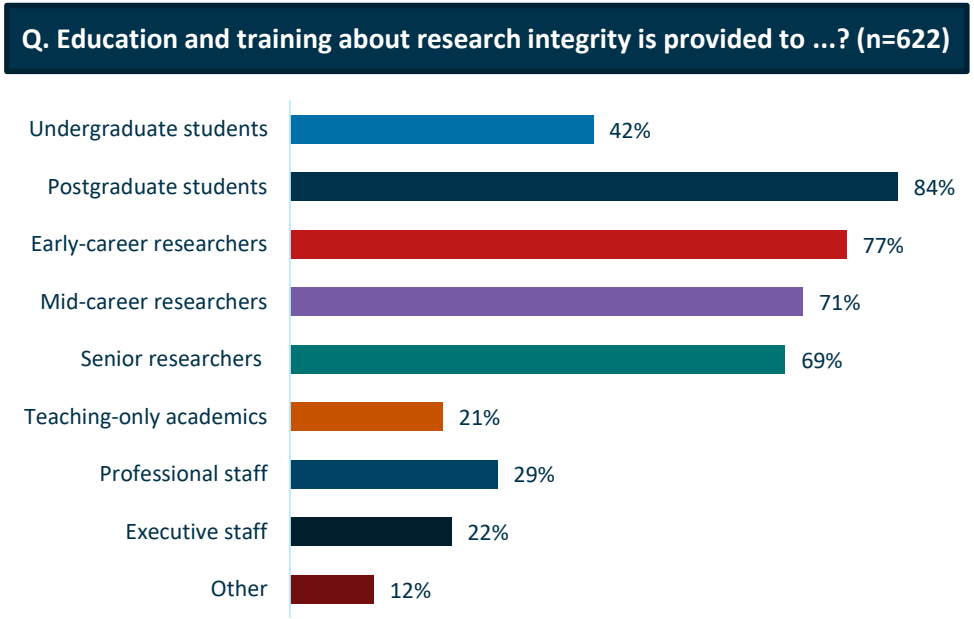
Levels of training in research integrity peak at postgraduate status

Who has access to the training in research integrity?

- Respondents from medical, biomedical and translational research institutions were significantly more likely to indicate that their place of work offered training to students, postgrads and non-research staff*.

- Researchers from the biomedical sciences are more likely to receive training in research integrity earlier in the career, while those in the humanities and social sciences were significantly less likely to indicate that they received training at an undergraduate level.

40% of respondents indicated that their institution provided education and training in research integrity to their non-research active staff (i.e. teaching-only academics, professional staff and executive staff). Given how regularly involved these groups are in managing and supporting researchers in their projects, it seems an oversight that training is not provided at larger proportions to this group.



*Full breakdowns provided in appendix.

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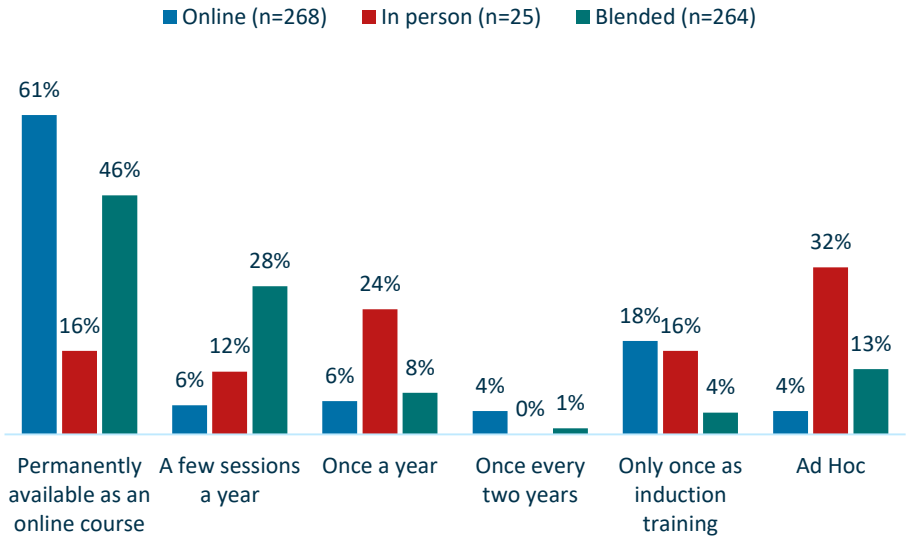
52% of institutions make training in research integrity permanently available

How frequently is training in research integrity provided?

Q. How frequently is training on research integrity provided/made available by your institution?



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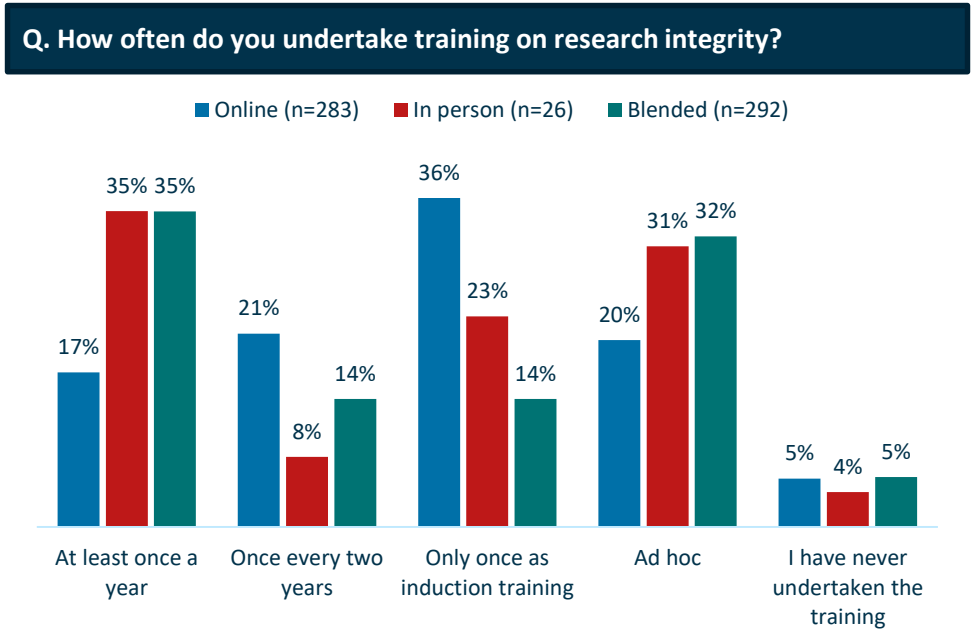
Online only institutions are less likely to have annual ‘refresher’ trainings

How often is training in research integrity taken?



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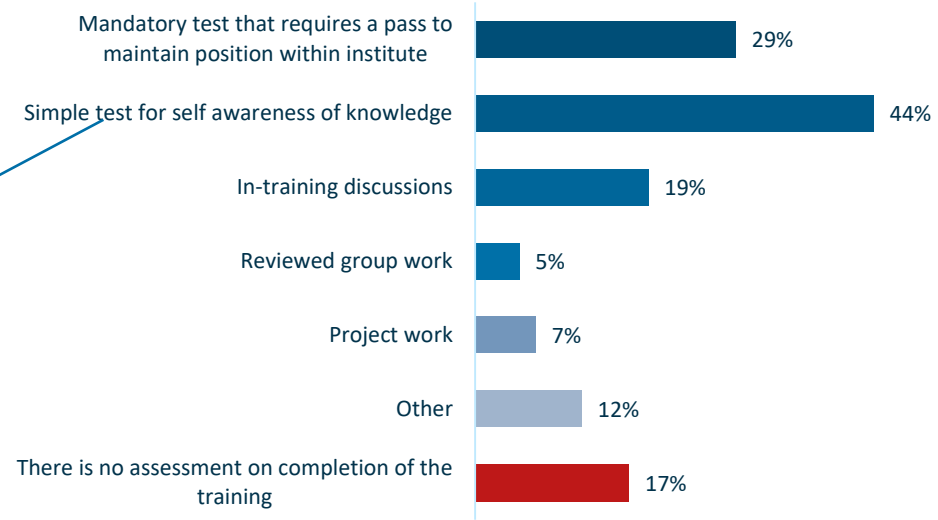
Less than a third are required to show understanding to maintain their role

How is training in research integrity assessed?

The largest reported mode of assessment was simple testing for self-awareness (44%). From open text comments this likely takes the form of end of module multiple choice answers and/or verbal refreshing of learnings in in-person courses.

Q. How, if at all, is learning from the training on research integrity assessed? (n=612)



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Half of institutions have established policies to encourage integrity in research

How else do institutions encourage research integrity?

Q. Aside from formal training opportunities, how else does your institution encourage and develop research integrity? (n=886)

Institutional execs and non-academic staff were significantly more likely to indicate that they had a 'speak out' system for reporting bad practices and behaviours.

Stricter enforcement measures (e.g. audits and signed declarations) were less likely to be used within institutions in general in comparison to more subtle guidelines. Although they were significantly more prevalent in medical, biomedical and translational research institutes*.

*Full breakdowns provided in the links in appendix.

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Topic inclusion within training

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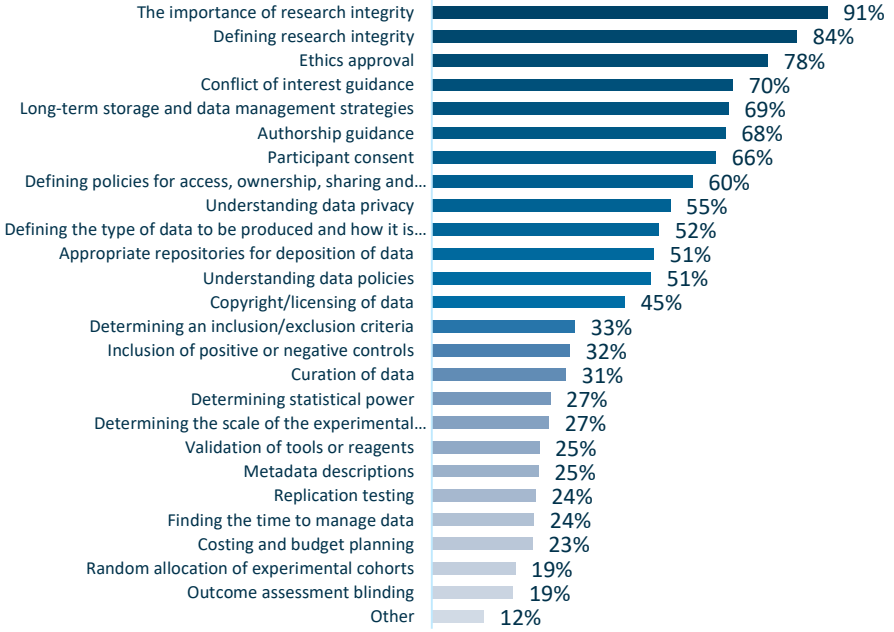
Current training has a greater focus on policy and guidance than practical skills

Topics covered in institutional research integrity training

Q. Which aspects associated with research integrity are included in your institution's training? (n=579)



Topics that cover the basic principles, as well as those which might result in legal ramifications were they not to be adhered to (e.g. ethics approval, conflict of interest guidance and participant consent), appear to currently be of greater importance to research institutions than more in depth practical skills courses. This is not always appreciated by researchers:

"In my experience training around research integrity seems to come from a risk management, cover-your-arse place, especially as it relates to research ethics. While some degree of bureaucratic compliance is necessary, it tends to leave unexplored many of the actual questions and issues of research integrity I struggle with in my own work. The ways in which I am held accountable for the integrity of my research and my ethical conduct by the communities I do research with are quite different from (and sometimes inconsistent with) how the institution imagines and practices research integrity and ethics. The training provided to me tends to be fairly generic and procedural, which is only helpful to a point."

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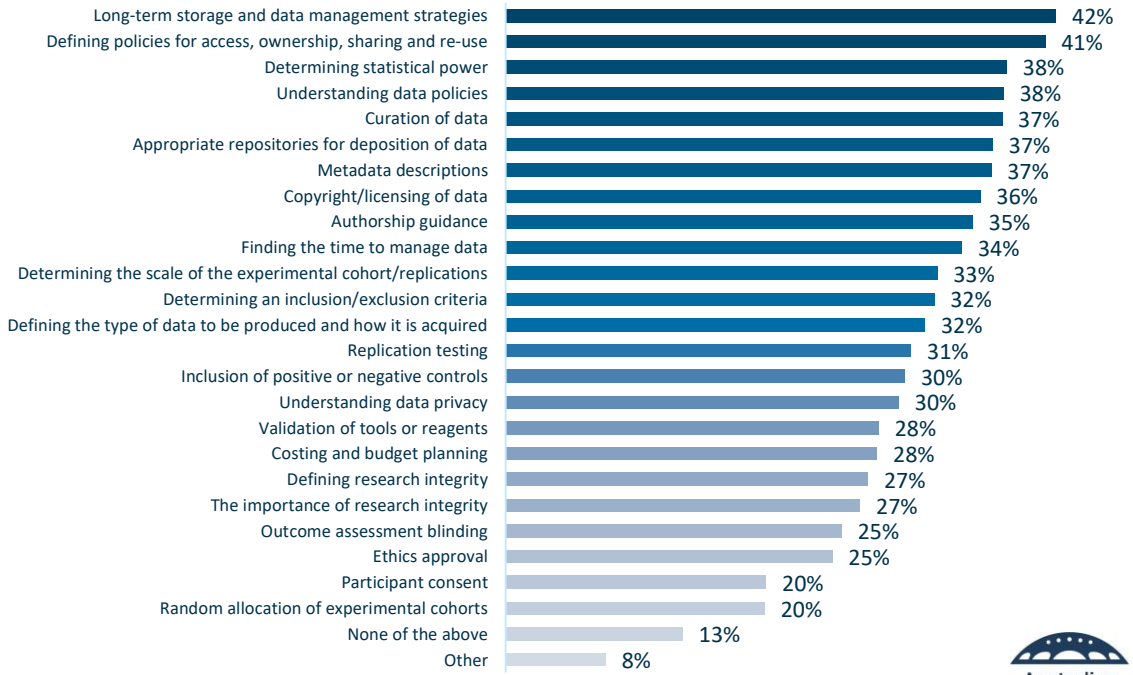
Support with data handling, management and sharing most desired for training

Topics desired from research integrity training

Topics associated with data made up 8 of the top 10 most frequently selected which respondents felt that they would benefit from further training in. This included, but was not limited to, storage, curation, deposition, management and understanding policies.

Q. Which, if any, of the following topics regarding research integrity do you feel you would benefit from further training in? (n=821)



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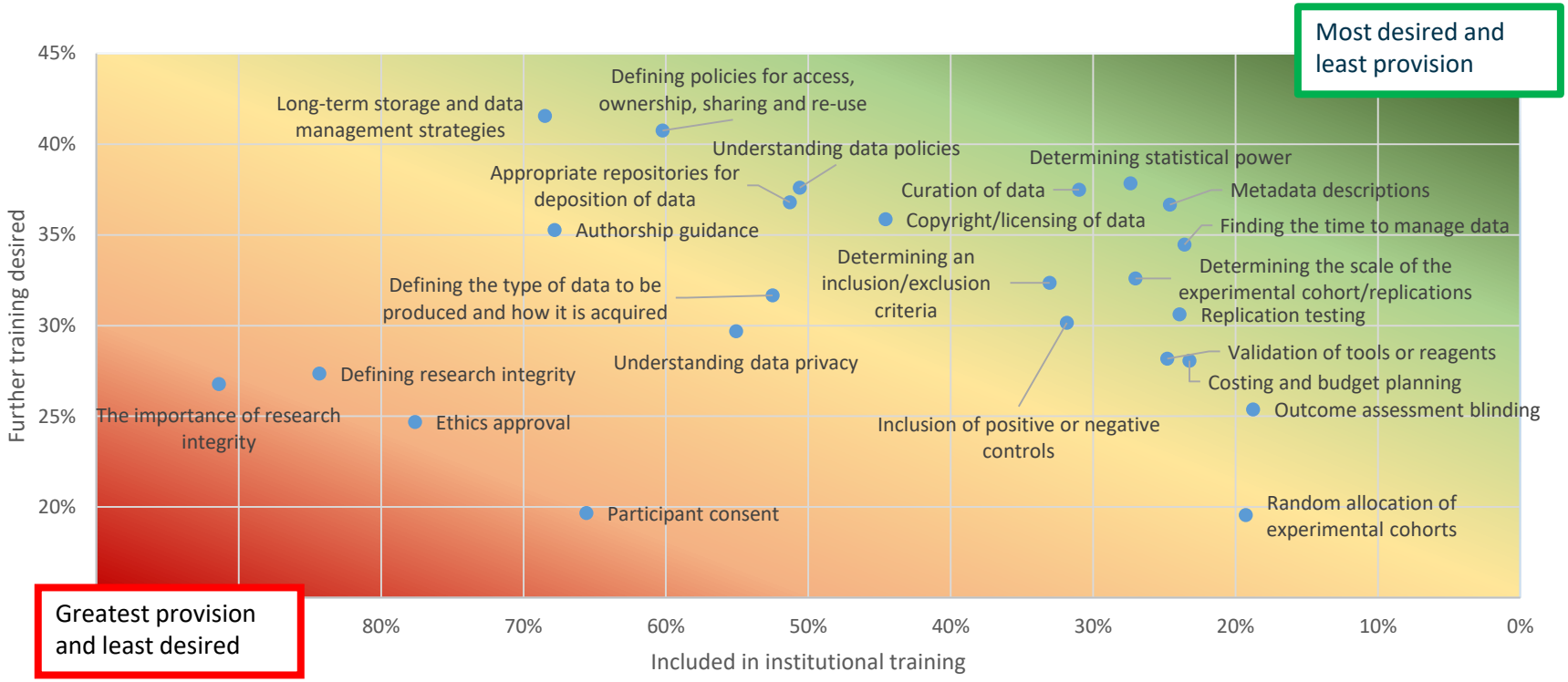
Cross-plot of training topics provided and training needs identify key institutional training development areas



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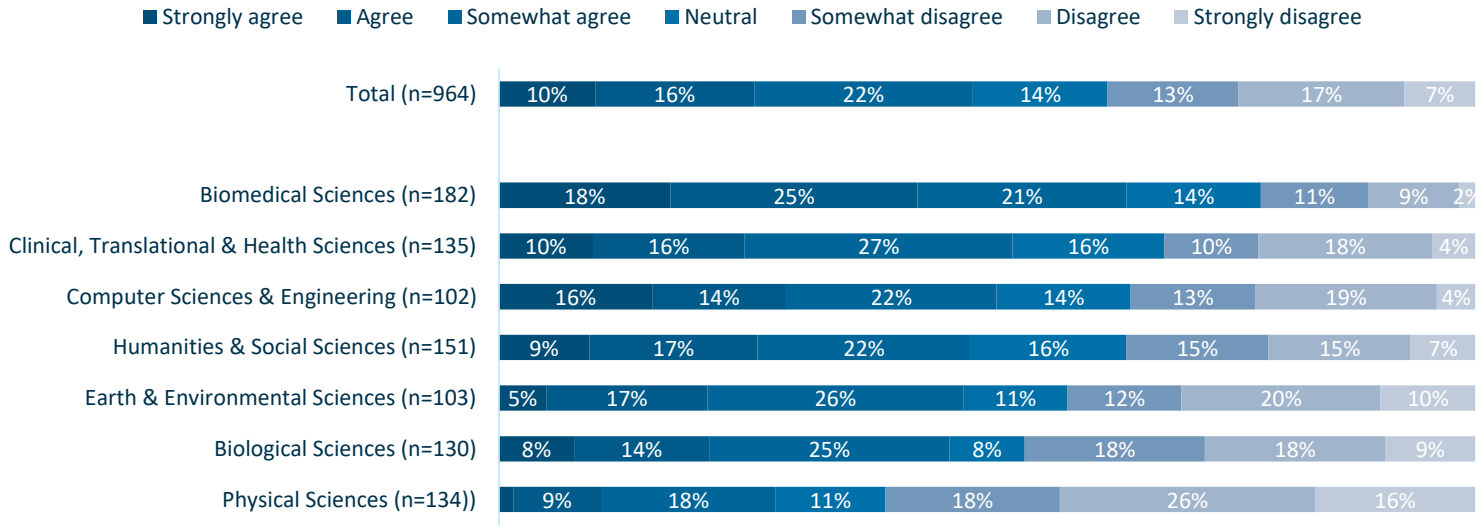
Current training efficacy

The biomedical sciences feel the greatest problem with research integrity

Field specific perceptions of problems associated with research integrity

Level of agreement by respondents that there is a problem in their field with a lack of integrity in planning, conducting and reporting research to ensure reliable and reproducible research



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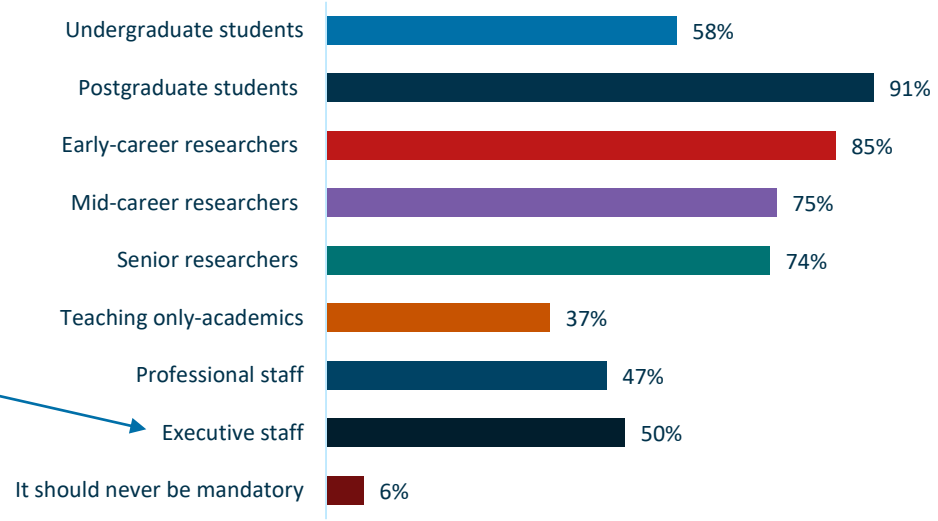
6% of respondents indicated that they do not feel training in RI should be mandatory

Who should training in research integrity be mandatory for?

- Considering that those within the physical sciences were least likely to state that there was a problem with integrity in research in their field, it is unsurprising that this group were also significantly more likely to indicate that training in research integrity should never be mandatory (13%).

All proportions on the figure opposite exceed those showing current training provision levels (see here). In particular, there is a 28% difference in the current provision of training to executive staff (22%) compared to the level felt should be mandatory (50%). This may reflect a level of dissatisfaction of staff with their senior executives understanding of the needs for improved research integrity standards within their institution.

Q. For whom should training in research integrity be mandatory? (n=864)



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61% of respondents felt that training provided by their institution is effective

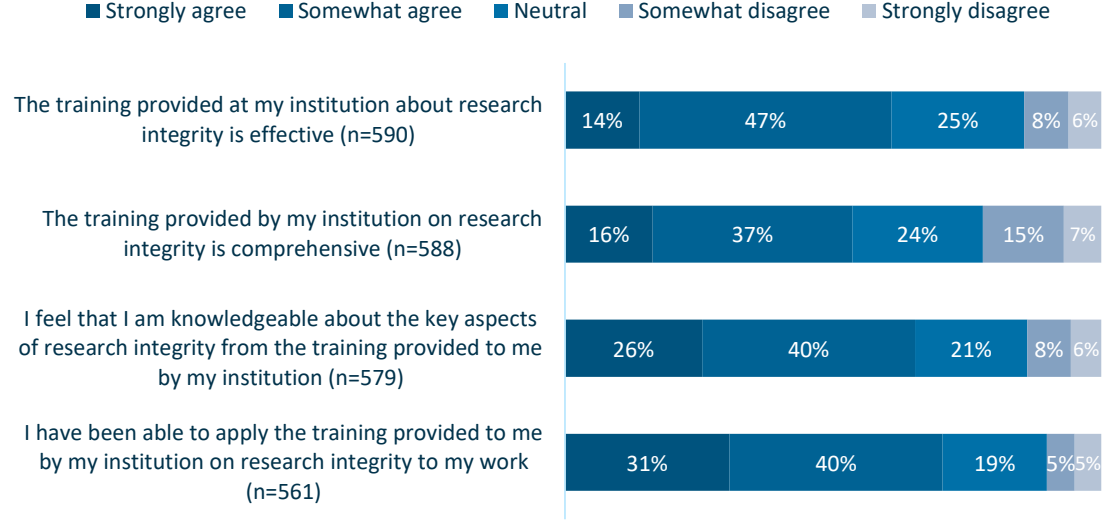
Perceived quality of current research integrity training provision

66% of respondents whose institution provided research integrity training felt knowledgeable about the key aspects with 71% indicating that they were able to apply it to their work (this equates to approximately 40% of the overall survey sample)

In the spirit of full transparency it is of note that this question was shown after that asking respondents which topics were covered in their institution's training. It is therefore likely that some responses could have influenced by this:

*"Well, you just provided a very long list of things that *could* be included and I only ticked a few of them."*

Level of agreement with statements relating to the provision of training in research integrity



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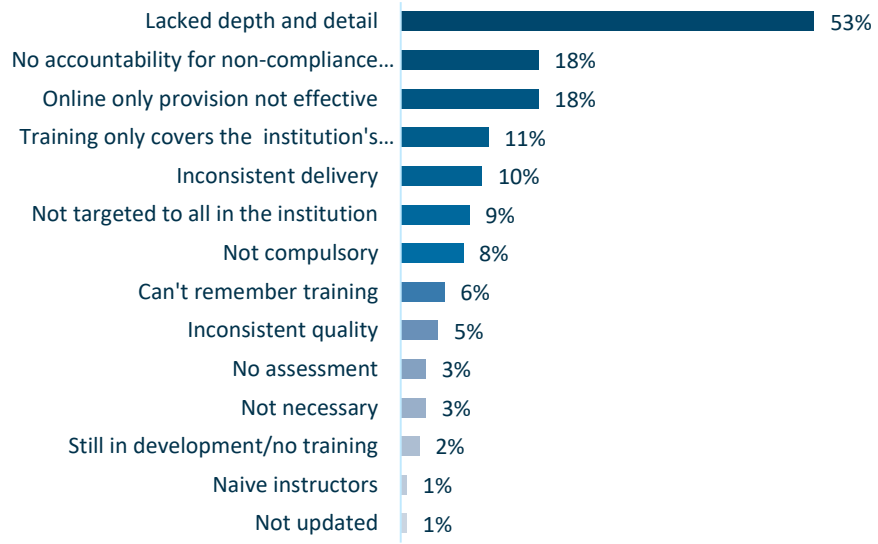
Most concerns with institutional research integrity training is linked to lack of detail

What is the cause of ineffective training?

Open text analysis grouping reasons for believing institutional training in research integrity is ineffective (n=125)



"It was brief, general, and more focused on the definition of integrity than how to make decisions."

"Training is in large part via an online course. It is superficial with no face to face and seems more of a box ticking exercise designed to give the perception of training."

"I think the major themes are covered adequately but the nuance is certainly not included in any detail. We (a group of HDR's) asked for training seminars that would cover research integrity and were told there was no money for it. Given the entire "research integrity" portion of the induction is under 15 minutes once in a phd (or masters) and does not cover the university ethics policy, data storage or availability, and does not touch on evolving problems like the nature of authorship, republishing of data, self-plagiarism, contributing to fair data principles, I would generally like more comprehensive and more regular training."

"I can't remember my training, mustn't be effective"

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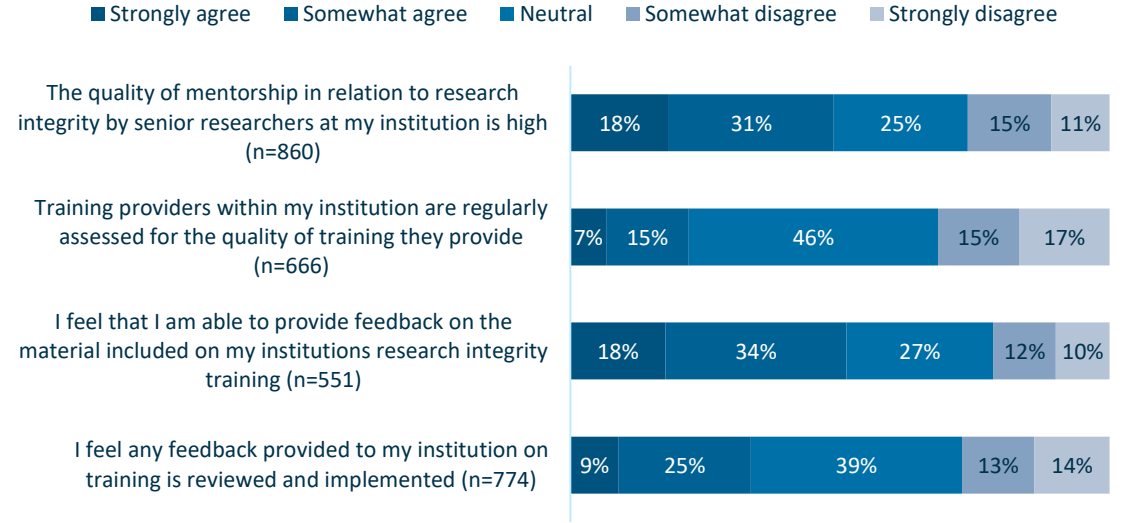
26% of respondents disagree that the quality of mentorship by senior researchers is high

Perceived quality of training providers and feedback mechanisms

Level of agreement with statements relating to the providers of training and feedback routes



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Focus on career stage perspectives

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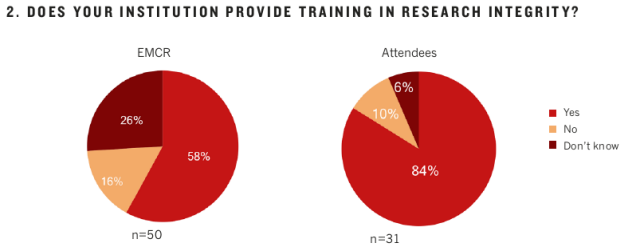
Why a focus on career stage perspectives?

In 2019, AAS and Nature conducted two independent surveys looking into research integrity training in institutions. The AAS survey focussed on early and mid-career researchers (EMCRs); while the Nature survey gauged feedback from symposium attendees, a large portion of whom were experienced leaders from across STM organisations. While not directly comparable, the responses hinted at a potential variance in the opinion of training provision by individuals at differing stages of their career:



Understanding any potential variances in perceived provision and training needs by career stage could help in contextualising actual vs perceived levels of provision, while also help in distinguishing areas for improved engagement matched to perceived training needs.

For the purpose of the analysis within this chapter, we have combined the following job roles*:

Institutional Management and Senior researchers to make the **'Senior Academic group'**

Mid-level academic staff and early-career researchers to make **'EMCRs group'**

*Full breakdowns provided in the links in appendix.

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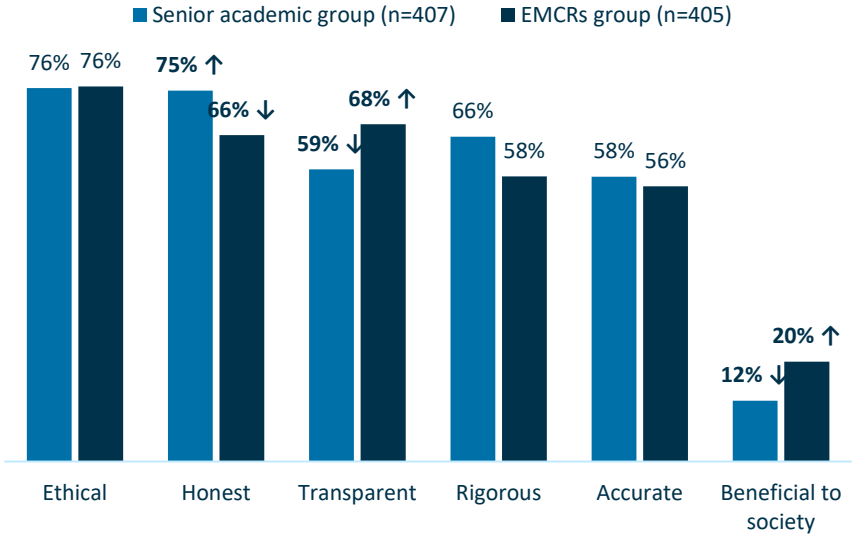
Perceived meaning of research integrity is relatively consistent across career stage

What is understood by research integrity?

Career stage response comparison to which characteristics are perceived to be the most important for ensuring integrity in research (up to 5 responses accepted)



- When unprompted to provide a definition, there was very little distinction in the types of characteristics that respondents at all levels of career stage associated with research integrity.
- If particular characteristics were prompted, those within the EMCRs group were significantly more likely to indicate that transparency was one of the more important aspects, more so than honesty which the senior academic group rated almost as highly as ethical (see figure opposite). Interestingly, when a definition of research integrity was provided, there was no significant difference in the perceived importance of transparency to research integrity (over 90% stating very important).
- Those with the EMCRs group were also significantly more likely to suggest that ensuring research had a societal benefit would ensure integrity in research.

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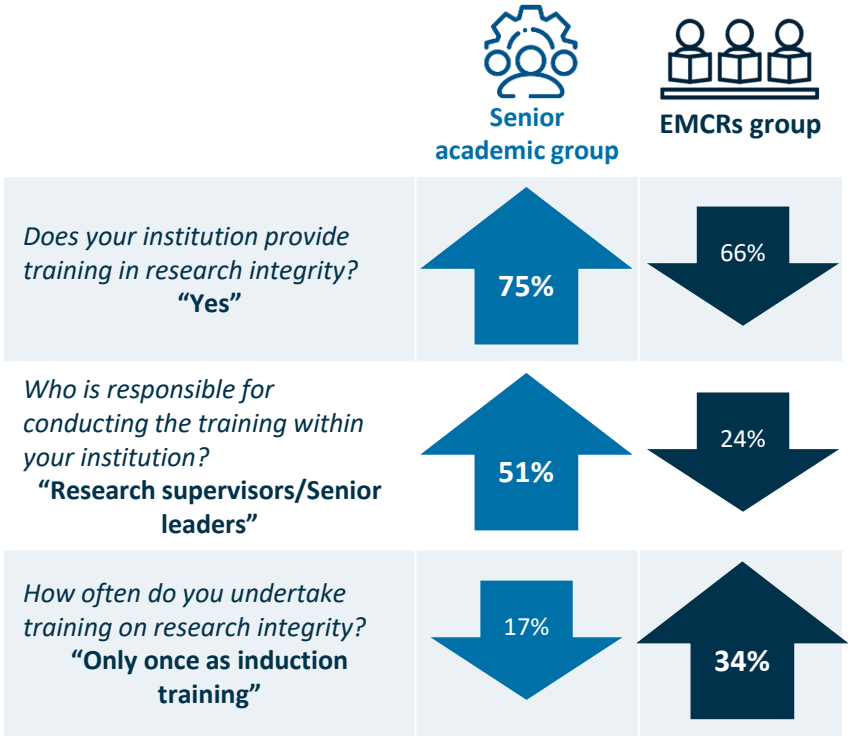
There is significant variation in perceived provision of training between groups

What is the current provision of research integrity training?



- Significantly less of the EMCRs group were likely to indicate that their institution provided training in research integrity compared to the senior academic group. Instead, the EMCRs group were more likely to indicate that they were unsure about their institutional provision.
- Regarding how training is provided, there was little variation between groups indicating that training was mandatory (approximately 70% for both), however, those within the EMCRs group were more likely to indicate that training was online only (55%) compared to the Senior Academic group (41%).
- Over double the proportion of the senior academic group were likely to indicate that responsibility for conducting training was the responsibility of supervisors and senior leaders (i.e. themselves) compared to the EMCRs group.
- A significantly higher proportion of those within the EMCRs group indicated having taken training on research integrity only once at induction although. Interestingly however, at least half of these did indicate having continued access to training but not using it

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The desire for training is much higher among the EMCRs group

What topics are important for training?

	Senior academic group	EMCRs group
Top 3 desired courses	1. Long-term storage and data management strategies (37%) 2. Curation of data (35%) 3. Defining policies for access, ownership, sharing and re-use (34%)	1. Defining policies for access, ownership, sharing and re-use (49%) 2. Long-term storage and data management strategies (48%) 3. Determining statistical power (47%)
Training topic with greatest variance in desirability: **Costing and budget planning**	20%	37%
Number of topics desired by more than 33% of audience segment (max 24)	4	18

- When asked to identify the topics that were currently included in their institution's training, there was little to no variation in the proportions between the senior academic group and the EMCR group suggesting a relatively consistent approach within institutions to their current provision.
- When looking at desired topics for training, the most frequently selected were those generally relating to data and its management. However, desire for training was higher among the EMCR group with at least 33% selecting 18 of the 24 topics provided, while only 4 topics provided were selected by over 33% of the senior academic group.

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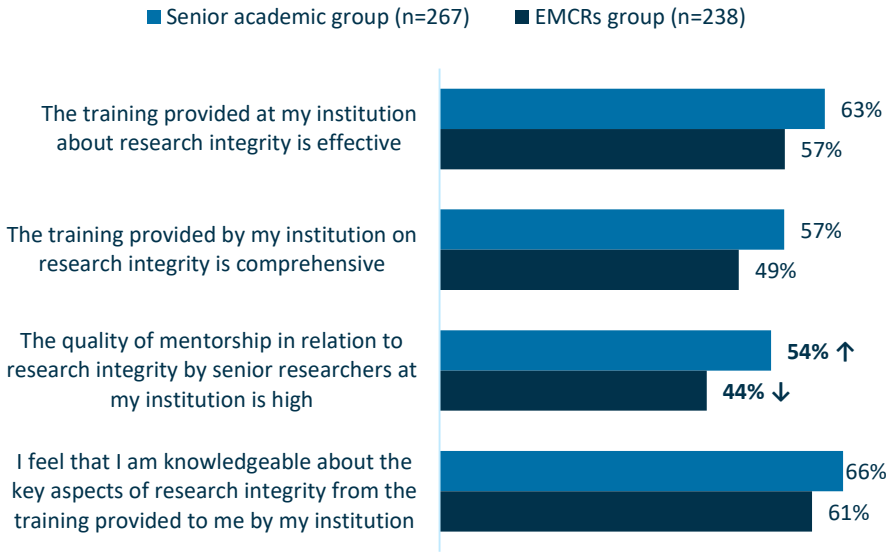
Perceived efficacy of training is generally consistent across career stage

How effective is the training provided?

Career stage comparison of agreement to statements regarding the quality of training and mentorship provide by their institution in relation to research integrity



- The senior academic group were more likely to indicate that they felt the training provided by their institution was effective and comprehensive. Indeed a significantly higher proportion of the EMCR were likely to disagree that their institution's training was comprehensive (not shown).
- There was a 10% variation in the perceived quality of mentorship by senior researchers with those in the senior academic group significantly more likely to agree that the mentorship provided was high quality. Some of the comments expounded on the difference in opinion:

"Many studies that are done at the institute lack transparency and appropriate controls (personal observation). Researchers at senior positions are not good models for research integrity (prevalent of ghost/gift authorships and not enough quality control of junior members - also, personal observation)."

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Appendix

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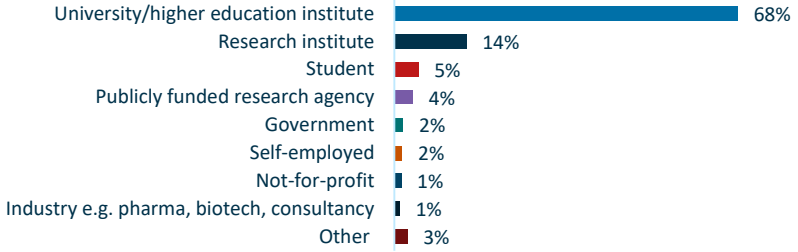
Respondent profile

Demographics

Workplace or student status



Primary field of interest

Job role

Institutional Management	Vice-chancellor / Institute Director / Research Director / Vice-Chancellor	**6%**
Senior researcher	Professor / Lab Director / Senior Lecturer	**35%**
Mid career researcher	Associate professor / Principal Lecturer / Lecturer	**13%**
Early-career researcher	Postdoctoral Fellows / PhD students / Research Scientist / Research Assistant	**28%**
Non-academic staff	e.g. Policy Officer / Programmes Specialist / Librarian / Research Manager	**7%**
Emeritus, Honorary or Sessional Staff		**4%**
Other		**7%**

Training responsibility

Decision-making responsibility: **42%**

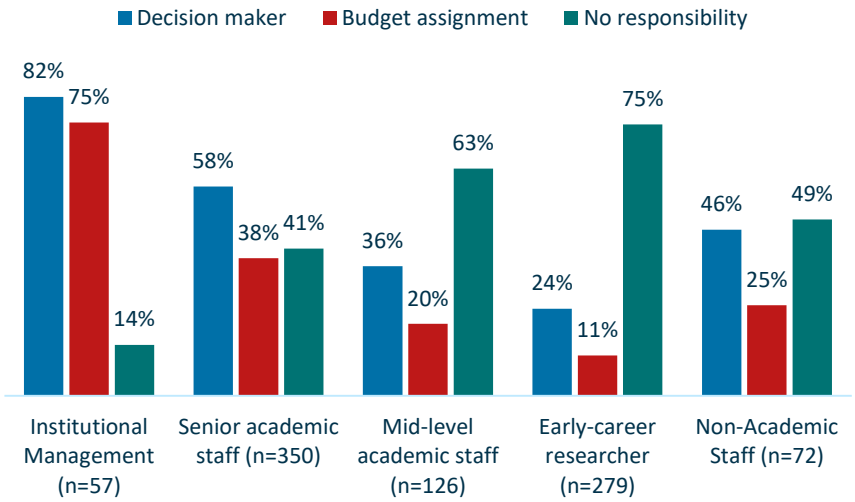
Budget-assigning responsibility: **26%**

No decision responsibility: **56%**

Base n = 993

Respondent profile
Additional information

Responsibility for training by job seniority



Overall, 687 respondents provided a name for the institution they were based at with further breakdown opposite:

Institution type	Institutions with prominent responses	Number of institutions reported Number of responses
University		34 (85% of the approx. 40 universities in Australia)
	Group of 8	191
	Large Universities* (excl. Group of 8)	314
	Medium Universities	31
	Small Universities	7
Medical, biomedical and health		26
	Walter and Eliza Hall Institute (WEHI)	20
Government		3
	CSIRO	34
Corporate		10

*Institutional size is based on three metrics: number of students/staff, institutional budget and article output

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For access to data:

DOI: 10.6084/m9.figshare.19771759

Includes:

- Raw data (some demographic information has been removed to ensure anonymization)
- Full data overview including cross-tabulations with key demographic information
- Career stage comparisons
- Full questionnaire

Thank you

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