Understanding Research Culture: What researchers think about the culture they work in [version 1; peer review: 1 approved, 1 approved with reservations]

Helene Moran¹, Lena Karlin¹, Elsie Lauchlan¹, Sarah J. Rappaport², Ben Bleasdale², Lucy Wild¹, Josh Dorr¹

¹Shift Insight, London, N1 1LA, UK
²Policy and Advocacy Team, Wellcome Trust, London, UK

Abstract

Background: The current performance of UK research can be presented as highly successful, but evidence has emerged about issues with working culture in research and the impact this may have on people and their work. Wellcome commissioned market research agency Shift Learning to investigate current perceptions and experiences of research culture among the research community.

Methods: This article presents key findings from two phases of this project: 94 qualitative interviews and a quantitative e-survey with 4267 usable responses. Interview invitations were sent out to UK-based research staff at various career stages. The survey was open to international respondents, but the majority of responses came from the UK. Respondents came predominantly from academia and the sample was intentionally skewed towards biological and biomedical sciences.

Results: While participants considered the quality of research outputs to have generally remained high, many felt that issues impacting research culture were becoming more apparent and there was real concern about the future of research professions and the high personal cost for individuals.

Factors identified as disruptive to research culture included chasing impact, increased competition, proliferation of metrics, job insecurity and rigid career pathways. Poor research culture manifested in workplace behaviours and practices, including problems with management and leadership and unhealthy power dynamics, such as patronage, bullying and harassment, discrimination and exploitation. These conditions were linked to a range of negative impacts on the researchers and the research outputs.

Conclusions: The research ecosystem is characterised by increased levels of competition, lack of job security and insufficient career flexibility. A key takeaway is that the conditions in which research...
takes place are not inclusive and lack sufficient support mechanisms, which is negatively affecting researchers' wellbeing, and work-life balance. Such research culture was perceived as unsustainable.

Keywords
research culture, UK, academia, researchers
**Introduction**

Evidence has emerged about the issues with working culture in research and the impact it may have on researchers and the research itself (for example: Nature, 2018a; Nature 2018b; The Nuffield Council on Bioethics, 2014; The Royal Society, 2017). There have been concerns voiced by researchers and research organisations that the current focus on narrow measures of performance and productivity potentially poses challenges to individuals, research quality and the relationship of research with society (Jones & Wilsdon, 2018; The Nuffield Council on Bioethics, 2014; The Royal Society, 2017).

Recent literature has discussed factors that negatively impact the quality of research outputs, careers and workplaces. These studies have explored how the discourse around research performance contributes to an environment in which researchers feel intense pressure to publish, as well as creating working cultures that place more value on what is achieved and less on how it is achieved and the human costs associated with it (Chubb & Watermeyer, 2017; Moore et al., 2017; Nature, 2018a, Nature 2018b, Nature 2019; Farr, 2015; The Nuffield Council on Bioethics, 2014; The Royal Society, 2017; Wilsdon, 2016).

This research was motivated by an assumption that more needs to be known about the perceptions, attitudes towards and experiences of research culture to provide an evidence base for initiatives aimed at improving research environments. Key research objectives were to:

- Explore the research community’s experiences, opinions and perceptions about the current culture of research.
- Identify key drivers of the current culture.
- Understand what a vision for a great research culture looks like.
- Identify any differences in perceptions, attitudes and vision.

To answer these objectives, in June 2019 Wellcome commissioned Shift Learning, an independent specialist social and market research agency, to conduct in-depth qualitative and quantitative research. The fieldwork, analysis and reporting were conducted between June and December 2019.

This paper presents high-level findings from the study, aiming to open up this research to a wider community for deeper interrogation and further study. It is a descriptive overview of the research conducted, rather than a deeper analysis of what the findings mean and what can be inferred from the data.

**Defining research culture**

There are multiple ways in which research culture can be defined and explored. For clarity in interviews and the survey, we shared with respondents The Royal Society’s (2017) definition of research culture.

> “Research culture encompasses the behaviours, values, expectations, attitudes and norms of our research communities. It influences researchers’ career paths and determines the way that research is conducted and communicated.”

This definition stressed our interest in respondents’ experiences and perceptions of how research culture manifested itself in values, expectations, attitudes and norms, and the impact it had on research processes and careers.

**Methods**

**Study design**

This research project used an inductive approach, by which theoretical concepts were grounded in, and shaped by, the data. The study design was inspired by a structured grounded theory approach, such as reaching higher levels of abstraction though comparative and open-ended interpretation of the cases rather than by following a predetermined framework for analysis. This project started with very broad research objectives and involved constant comparison of indicators of concepts to generate theoretical concepts and categories. Once concepts were defined, we explored relationships between them to generate contested and revised layers of understanding (see Bryman, 2008; Charmaz, 2006).

**In-depth interviews.** This research sought to understand in-depth experiences of research culture among diverse members of the research community. To achieve that, 94 telephone interviews of around 45 minutes each were conducted (Table 1). A mixture of sampling methods was used to recruit the respondents. A total of 257 people filled in the expression of interest form, which was made available online and emailed to 6149 relevant contacts from a research opt-in database owned by Shift Learning.

Respondents who expressed interest in taking part, and met the selection criteria (identified in the qualitative sampling framework available within the supplementary material), were then contacted by phone. Some individuals were also recruited using snowballing and purposive sampling, and approached using their publicly available contact details, to ensure sample diversity and inclusivity. Semi-structured interviews were carried out using a script written by Shift Learning in collaboration with Wellcome, including prompts where necessary and projective techniques. The script is provided with this article as *Extended data (Moran et al., 2020b).*

Interview scripts followed predetermined questions and categorised prompts. However, they served as a guide only and an open discussion was encouraged to promote interviewees’ guided reflections. These interviews focused on subjective experiences and perceptions of current research culture and its main drivers. Interviews were conducted by six interviewers in total. All researchers had completed interviewer training, accredited by the Market Research Society, and had previous experience of conducting various social and market research studies.

**Online survey.** The online survey was conducted to corroborate findings from interviews, in addition to understanding differences in perceptions, attitudes and visions for research culture in relation to different groups and factors. A total of 4267 survey responses were analysed for this study. The survey included up to 70 questions, with an estimated completion time of 25 minutes, but this varied depending on respondent route.
The survey consisted of 74 questions in thematic blocks:

1) Employment information
2) Working environment
3) Careers
4) Career development
5) Perceptions
6) Experiences
7) Visions
8) Demographic Information.

Some groups were screened out of the survey, including students below PhD level and those not part of the research community. The majority of questioning was not relevant for those who had left the research community more than 5 years ago.

The survey guide is provided with this article as Extended data (Moran et al., 2020b). The built survey was then tested by various members of the research team for any errors, confusions, omissions and problems with the flow.

The survey was emailed by Shift Learning to 6070 relevant contacts from their own opt-in database, as well as promoted by Wellcome via their website, partner referrals and social media campaigns. The population of interest included individuals from a mixture of institution types, research disciplines, research spaces, career stages1, global regions and demographic backgrounds (Table 2). The survey was live for 5 weeks (10th September to 13th October 2019).

Individual-level responses to the survey are available as Underlying data (Moran et al., 2020a).

Data analysis

Qualitative analysis. The interviews were recorded then transcribed verbatim. Qualitative data analysis software Atlas.ti v8 was used to ‘code’ transcripts using thematic analysis to draw out key themes in experiences of research culture. The coding tree was developed around nine major categories: description and sentiments around the current research ecosystem; examples of positive culture; examples of negative culture; drivers of culture; goals and trends of culture (including expectations, threats, priorities); contexts of culture (e.g. institution, discipline, department, sector); roles of Wellcome and other funders; career path; and miscellaneous.

Most themes were derived from the data, but categories relating to the role of Wellcome and the goals for research culture were identified as areas of analytical interest from the start. Respondent quotations were presented to illustrate the main themes in reporting, as well as to illustrate diverse cases that are clarified in the surrounding commentary. A team of six researchers coded the data. Each transcript was also tagged with key demographic information to help identify further patterns in experiences based on characteristics such as institution type, career stage, gender, disability, race and ethnicity. The interviewing team met regularly during the fieldwork phase to discuss data saturation, data and findings consistency, and the clarity of minor and major themes, using the fieldnotes taken during interviews. However, the project’s scope and the sample diversity did not allow for the extension of fieldwork to reach data saturation in all areas of findings. More interviews would likely continue to add to the findings, but there are diminishing returns for collecting additional data, as saturation is generally achieved at a relatively low level in qualitative research (Charmaz, 2006; Guest et al., 2006).

Participants were asked if they wanted to see their transcripts for correction, comment or redacting, but were not offered a way to provide feedback on the findings from this stage of the project.

Quantitative analysis. A total of 7646 survey responses were recorded during the survey live period. Following survey closure, the data was cleaned in Excel to remove any poor-quality, duplicate, or incomplete entries. A final usable sample of 4267 was then analysed. Open responses were coded into frames based on insight from the qualitative phase. Additional derived variables were then created to support analysis. No weighting was applied during analysis and only complete cases were used in final analysis to minimise the risk of unidenti

ified duplicates. Q Research software version 5.5.4.0 was used to support data analysis. By default, Q conducts various tests of statistical significance on tables. We relied on; independent t-tests, z-tests and Chi-square tests, where applicable. Multiple-comparisons correction was applied where appropriate. A p-value of 0.05 was used for significance testing.

Ethics

This research was designed in accordance with ethical guidelines outlined by the Market Research Society and ESOMAR2, while following General Data Protection Regulation guidelines from the Information Commissioner’s Office. It was developed under the supervision of the Wellcome project team, but did not go through a formal ethical approval process, as the commissioning of this research followed a tender process that differed from a standard academic process.

This research operated using an ongoing model of informed consent, whereby respondents could revoke their participation and ask to remove their data from the project at any time. All participants were informed from first contact that the project was run on behalf of Wellcome, who would have access to

1 Career stages were defined using the question: “How many years have you been working within the research community? Please note, this should include time spent undertaking a PhD”. The responses were grouped into 4 categories: Entry-level, less than 2 years; Early-career, 3–10 years; Mid-career, 11–30 years; Late-career, more than 30 years.

2 European Society for Opinion and Marketing Research.
all anonymised findings, but the data collection and analysis was carried out by independent research agency, Shift Learning.

In line with these guidelines, and due to potentially difficult personal experiences that might have been discussed, interviewees were assured of their confidentiality and informed that findings would be anonymised by removing any clear identifiers. Phone interviews were audio recorded for transcription purposes.

Respondents were able to receive their transcript and redact or comment on their responses. They were also offered an option to remove sensitive sections from the transcript so they were decontextualised from the rest of the interview. Transcripts will not be made available under open-access rules, due to confidentiality concerns. Survey respondents were guaranteed anonymity, therefore published quantitative data will not include open responses, nor possibly identifying demographic information. Further information regarding ethical considerations is available as Extended data (Moran et al., 2020b).

Results
Respondent demographics

In-depth interviews.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Respondents, n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector</td>
<td>Higher education 81</td>
</tr>
<tr>
<td></td>
<td>Industry        8</td>
</tr>
<tr>
<td></td>
<td>Research institutes 5</td>
</tr>
<tr>
<td>Career stage</td>
<td>PhDs / entry level 18</td>
</tr>
<tr>
<td></td>
<td>Post-doc (1st/2nd year) 11</td>
</tr>
<tr>
<td></td>
<td>Early career    15</td>
</tr>
<tr>
<td></td>
<td>Mid-career      31</td>
</tr>
<tr>
<td></td>
<td>Late-career     19</td>
</tr>
<tr>
<td>Location</td>
<td>South East of England 17</td>
</tr>
<tr>
<td></td>
<td>London          16</td>
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<td></td>
<td>North West of England 9</td>
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<td>East of England  8</td>
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<td>North East of England 6</td>
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<td>Yorkshire and the Humber 6</td>
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<tr>
<td></td>
<td>West Midlands   5</td>
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<td>East Midlands   4</td>
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<td>South West of England 4</td>
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<td>Scotland        13</td>
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<td></td>
<td>Wales           4</td>
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<td>Northern Ireland &amp; The Republic of Ireland 2</td>
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<table>
<thead>
<tr>
<th>Variable</th>
<th>Respondents, n</th>
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<tbody>
<tr>
<td>Discipline</td>
<td>Biomedical and Biology 51</td>
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<td></td>
<td>Social Sciences     15</td>
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<td></td>
<td>Humanities         8</td>
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<td>Other fields       20</td>
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<tr>
<td>Ethnicity</td>
<td>White             68</td>
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<td>Asian             15</td>
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<td></td>
<td>Black             6</td>
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<td></td>
<td>Other ethnic minority 5</td>
</tr>
<tr>
<td>Gender</td>
<td>Male              53</td>
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<tr>
<td></td>
<td>Female            38</td>
</tr>
<tr>
<td></td>
<td>Non-binary        3</td>
</tr>
<tr>
<td>Disability</td>
<td>Physical disability 5</td>
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<td></td>
<td>Mental disability  4</td>
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<td></td>
<td>Details not provided 1</td>
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Online survey.

<table>
<thead>
<tr>
<th>Table 2. E-survey respondents.</th>
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<td>Location</td>
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Sentiments around the current research culture

Overall, the research community tended to be concerned about the current research culture (Table 3).

A total of 48% (1881) of survey respondents thought their institution or workplace was better compared to others in regards to encouraging good research culture, while 30% (1161) thought it was about the same and 20% (775) thought it was worse. Figure 1 outlines the most common words provided by survey respondents to describe the current research culture within their institution3; 55% (2156) of which were classed by respondents as negative (Figure 2).

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1In-depth interviews showed that it may be difficult for researchers to reflect on the state of research culture more broadly. After testing the method in the interviews, we used unprompted word association with survey respondents to explore subjective characteristics of research culture and sentiments around them.

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### Table 3. Online survey.

<table>
<thead>
<tr>
<th>Q: How far do you agree or disagree with the following statements relating to research culture?</th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current research culture is healthy</td>
<td>66%</td>
<td>18%</td>
</tr>
<tr>
<td>Current research culture is unsustainable long-term</td>
<td>18%</td>
<td>65%</td>
</tr>
</tbody>
</table>


This corroborates sentiments expressed within interviews, which captured experiences of a range of difficulties associated with working within the current research culture and concerns about this culture’s sustainability:

“Well I have seen increasing stress levels particularly of the younger staff and I think that when I came into academia I don’t think there were the pressures on me to produce 10 papers a year. But I think now there are, we now have to submit an updated CV, we have a personal development review, we have symposiums we have to give to the rest of school, all these different ways in which we’re judged and I think I was pretty much left to my own devices when I was a young academic, so I think that new staff are under a lot of pressure. So to my mind we need ways of creating space where these new academics have time to think and develop their science rather than feeling that they’re always 10 steps behind everybody else, which probably they’re not.”

Late-career researcher, Russell Group institution

**Supportive environment.** In the survey, “supportive” was the most frequently mentioned quality of an ideal research culture (brought up by 20%, 677 respondents). In terms of current experiences, 57% (2324) of survey respondents agreed that the research culture in their working environment supported their ability to do good-quality research. 39% (1595) agreed that their working environment hindered research (Table 4). Those in academia were significantly more likely to agree with this statement (45%, 1208; df = 1, Chi-Square = 36.584, \( p = <0.000001 \)) than those working in industry (29%, 113; df = 1, Chi-Square = 33.455, \( p = <0.000001 \)).

Both the interviews and online survey indicated some areas where the support might be lacking. In total, 45% (1825) of survey respondents indicated that they felt able to effectively balance the competing roles required as part of their employment. Some interviewees working in academia raised frustrations that their research was increasingly sidelined, with teaching and administration duties taking priority:

“Everyone in their job has to multi-task, but this is a bit different. This is a bit absurd, where you go from lecturer; you need to be a teacher, you need to be a scientist, you need to be an accountant, you need to be a politician, you need to be a very skilled writer, an excellent communicator and all of those...”

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Figure 1. E-survey respondents were asked to provide 3 words to describe their experience of current research culture. They were then asked to specify the sentiment of the descriptions provided. Base n = 2839.

Figure 2. E-survey respondents were asked to describe the sentiment of the words they used to describe current research culture. Sentiment analysis. 3-point scale. Base n = 3768–3913 – research community, UK and international.
Table 4. Online survey.

<table>
<thead>
<tr>
<th>Q: How far do you agree or disagree with the following statements relating to your current working environment?</th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My working environment hinders researchers getting on with their research</td>
<td>40%</td>
<td>39%</td>
</tr>
<tr>
<td>The culture around research in my working environment supports my ability to do good quality research</td>
<td>25%</td>
<td>57%</td>
</tr>
<tr>
<td>I am able to effectively balance the competing roles required as part of my employment</td>
<td>32%</td>
<td>45%</td>
</tr>
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</table>


different things take up a bit of time, so that’s possibly in second place why I will eventually leave the job. It’s pulling you in too many directions...That makes doing research tricky, because to really do the very best research, you need clear blocks of time. Having 40 minutes free, or an hour, just doesn’t cut the mustard. ... I haven’t even mentioned management. As a university professor, you have to be a manager of people and projects.”

Mid-career researcher, Russell Group institution

Interviewees suggested that some grants did offer researchers buy-outs from these other commitments, but these could create their own internal challenges and were sometimes not implemented effectively.

“Of course, if you get more time to do research, you become better and then you become more and more successful in grant applications, so you buy yourself out from teaching with that, which is great, but the university doesn’t like that, because other people would complain that, ‘If I had time, I would also apply for this’. It’s a chicken and egg problem.”

Mid-career researcher, Russell Group institution

For many, research was core to career fulfillment and so often carried out in personal time, contributing to heavy workloads and long hours.

“So even if you’ve got certain hours on your workload, we’re supposed to be on 37.5 hours per week. Most of us do about probably 50 hours a week. So it means even if I’ve got a third of my time notionally to be spent on research, it’s only notional because I have to spend most of my days on my day job as well teaching, supervising PhDs, doing admin things for students ... [The research] that’s actually done in my own time over the weekend outside my normal working hours.”

Late-career researcher, MillionPlus institution

Some interviewees raised concerns that, in the current culture, the ability to collaborate was increasingly threatened: “I think that the culture here has been reduced in terms of that there is a reduction in collegiality and multi-disciplinarity and it comes back to how people are hunkering down in bunkers. I think that has tended to make people individually pull up the barriers that go between different things... I think that that has got worse.”

Late-career researcher, Russell Group institution

Creativity. Creativity also ranked highly as a descriptor of an ideal research culture. It was the third most frequently mentioned word used by survey respondents to describe what an ideal research culture would look like (6%, 209). While many believed that creativity was welcomed and recognised within their working environment, there were concerns that the focus on a narrow measurement of “impact” stifled creativity (Table 6).

Factors shaping current research culture

We identified four themes perceived to drive research culture:

- Metricisation
- Increased competition
- Lack of job security
- Insufficient career flexibility.

Metricisation. A total of 14% (573) of survey respondents agreed that current metrics have had a positive impact on research culture, while 43% (1748) thought their workplace placed more value on meeting metrics than it did on research quality (Table 7). Over half of survey respondents (54%, 2184) reported they had felt pressured to meet Key Performance Indicators / metrics. This increased to 63% (1670) when focusing on results for those working in academia.

These findings were echoed in interviews, in which the culture was described as expecting more evidence, more accountability and more productivity and metric-based competition. None of these were seen as inherently problematic, but increasing metricisation and performance measurement were often cited as giving rise to a range of unintended consequences, such as gaming the system and insufficient support for practices (e.g. training or supervision) that don’t immediately translate...
Table 5. Online survey.

<table>
<thead>
<tr>
<th>Q: How far do you agree or disagree with the following statements relating to your current working environment?</th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My working environment promotes a collaborative culture</td>
<td>27%</td>
<td>61%</td>
</tr>
</tbody>
</table>


Table 6. Online survey.

<table>
<thead>
<tr>
<th>Q: How far do you agree or disagree with the following statements relating to your current working environment?</th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creativity is welcomed within my working environment in all its forms</td>
<td>23%</td>
<td>60%</td>
</tr>
<tr>
<td>Creativity is stifled due to research being driven by an impact agenda / emphasis on impact</td>
<td>12%</td>
<td>75%</td>
</tr>
</tbody>
</table>


Table 7. Online survey.

<table>
<thead>
<tr>
<th>Q: How far do you agree or disagree with the following statements relating to research culture?</th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I think current metrics have had a positive impact on research culture</td>
<td>58%</td>
<td>14%</td>
</tr>
<tr>
<td>My institution/workplace places more value on meeting metrics than it does on research quality</td>
<td>33%</td>
<td>43%</td>
</tr>
<tr>
<td>I feel pressured to meet Key Performance Indicators / metrics, e.g. REF, grant funding</td>
<td>22%</td>
<td>54%</td>
</tr>
</tbody>
</table>


into measurable outputs. Furthermore, some interviewees reflected that some incentives could pressure researchers to sacrifice scholarly integrity to make their research appear more appealing.

“It’s part of the game and it does work for some people, it’s about numbers instead of quality. If you present to three conferences a similar paper that is tweaked, chances are, you’ll break through. Once you break through, other things begin to happen. You’ve got to have the mindset to do that sort of thing. If you don’t then you can’t… It happens in the quiet, nobody talks about it, but everyone knows about it.”

Mid-career researcher, University Alliance

Some criticised metrics for being created by policy-makers too far removed from real-life practices, which was thought to set unrealistic expectations and lead to unintended consequences.

“The decision-makers in institutions have little understanding of the actual scientific challenges the scientists are facing, they try to come up with metrics that are useless, that are inaccurate. They have a different timescale. The timescale of the metric is three years. Every three to five years, large numbers of academics in our university get sacked.”

Mid-career researcher, Russell Group institution

Others held metricisation, particularly the way in which the Research Excellence Framework (REF) has been implemented on a day-to-day level, accountable for the deterioration of culture:

“The REF system in the UK requires academics to have X papers of X quality by X time and as soon as you put that barrier on someone and the university starts snarling at you, you’re inviting people to cut corners to meet those criteria.”

Late-career researcher, Russell Group institution

Interviewees also focused on problems with how these frameworks had been implemented; institutions that pushed metrics and Key Performance Indicators directly onto individual researchers were generally those where research culture was perceived as more problematic.

“They are all doing REF exercises continuously, which some things have to be planned with some other things. It’s a bit over-the-top. … there’s essentially a pressure that people need to get four-star papers, rather than just doing interesting research and the best possible research. There is a pressure that the paper should not just be interesting and of high quality, but it also should score very high in a REF exercise. So this is an additional pressure which did not exist ten years ago, say. On top of that, of course there are people, academics in the department who are
managed REF or planning REF, and so I’m one of them and so it’s another time thing, basically.”

_Late-career researcher_

_Competition_. As shown in Figure 1, “competitive” was the most frequently mentioned descriptor of the current research culture. The findings were split in terms of the perception of this term. Of the 735 respondent who used the word “competitive”, 22% (161) rated it positively and 50% (368) negatively. This term was absent from respondents’ descriptions of an ideal research culture.

Many reported in qualitative interviews that competition has always been a significant and necessary part of research culture, and survey respondents also saw it as inherent. While a substantial proportion thought of competition as a neutral or positive quality (Figure 1), a greater proportion were concerned that increasingly high levels of competition negatively affected the research ecosystem and researchers (Table 8).

“They sometimes feel stressed out and have a wobble because of the pressures that I’m under. Some of those pressures are pressures that I put on myself. There is no doubt that the changing nature of the research world is going to be more competitive, more internationalised, more aggressive, and I’m not sure that we are building the research infrastructure that allows people to cope”

_Mid-career researcher, Russell Group institution_

Researchers reported increasingly high levels of competition for grants, funds and jobs. This was thought to be creating conditions ripe for aggressive, unkind behaviour and generating high levels of pressure, as researchers tried to succeed in environments less conducive to collegiality and collaboration.

_Job security_. Findings identified that job insecurity was a key issue for the research community and a factor contributing to the current research culture. Nearly half of survey respondents who had left the research community (45%, 79) reported that one of the reasons for their departure was the difficulty in finding a job and facing an insecure career path. Consistent with this, only 29% (1203) of respondents agreed they felt secure pursuing a research career and 38% (1551) believed there was longevity in a research career.

Survey results suggested that early- and mid-career researchers were less likely to feel secure than senior researchers (Figure 3). Feelings of security appeared to grow with increasing seniority, but entry-level researchers were the exception to this pattern. This group was made up of those who were 1–2 years into their career, including current PhD students.

_Career options_. Many respondents reported issues around career flexibility and progression (Table 9). While researchers were generally aware of a range of alternative careers outside of research that could use their skills (65%, 2687), fewer agreed that they had similar options within research (53%, 2186) (Table 9). Meanwhile, 35% (1407) of survey respondents highlighted a lack of advice and guidance as a barrier to achieving a successful career in the research community.

Behaviours and practices

_Management and leadership_. Interviews highlighted how managers and leaders throughout the system appeared to play an important role in setting the tone of the culture to staff. Where working environments were described as positive and inclusive, this tended to be linked to the actions of management and leadership.

The survey found a significant difference in satisfaction with senior management between researchers working in academia, compared to those in industry. A total of 47% (180; DF = 1, Chi-Square = 25.127, p = <0.000001) of those from industry agreed that senior management makes wise decisions compared to 34% (893; df = 1, Chi-Square = 25.305, p = <0.000001) in academia.

While there were some examples in qualitative interviews of poor behaviour by principal investigators (PIs) and other supervisors, these were in the minority. Most respondents saw their supervisor as decent and trying their best, but constrained by a system that rewarded outputs and money over individuals.

“Our head of department is extremely supportive, in terms of helping us to achieve our research goals, where possible, and not putting huge amounts of pressure on us as PIs, to get the next grant, the next paper. We all have those pressures, which we place on ourselves, but we’re not getting that additional pressure from above.”

_Mid-career researcher, Russell Group institution_

<table>
<thead>
<tr>
<th>Table 8. Online survey.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q: How far do you agree or disagree with the following statements relating to your current working environment and research culture?</strong></td>
</tr>
<tr>
<td>Unhealthy competition is present within my working environment</td>
</tr>
<tr>
<td>Healthy competition is encouraged within my working environment</td>
</tr>
<tr>
<td>High levels of competition have created unkind and aggressive research conditions</td>
</tr>
</tbody>
</table>

Generally, researchers appeared to be more positive about their manager or direct supervisor than about their institutional leadership team (Figure 4 and Figure 5). Many respondents were critical of the decisions made by senior leadership in institutions, as well as the way in which these decisions were made and communicated (Figure 4).

Opinions were divided almost evenly as to whether leaders were clear about the working culture and conduct they expected. Results were similar for junior researchers (41%, 592 thought yes; 41%, 591 thought no) and senior researchers (43%, 686 thought yes; 40%, 640 thought no).

While the majority of early career researchers reported positive behaviours from their supervisors around how they monitored their work (Figure 5), on average respondents seemed to have experienced a narrow range of behaviours associated with effective management (average 4 out of 14, Figure 6). In the last 12 months, around half of respondents had received feedback on their performance (55%, 2152) or had a formal appraisal (49%, 1893), and a quarter of junior researchers and students disagreed that their supervisors regularly reviewed their work (24%, 455). In interviews, some junior researchers explored the drawbacks of supervision:

“It comes from the supervisor and the sort of relationship he holds with us, and I think partly that is he is relatively old and his style has not changed, and he’s really only interested in the publications. He’s not interested in … well, for us he’ll only read the parts of the thesis that might be published and so it’s feeling that he’s not engaged with the research, but more just the publications, which leads to a lack of feeling of support. From there, you end up in the space where you’re a bit isolated and a bit, sort of, working hard but not feeling supported, and that creates the tension.”

PhD student, Russell Group institution

Respondents in managerial roles also reported issues in the area of management and leadership (Figure 7). Less than half (48%, 936) of those responsible for managing researchers received training on managing people, and 44% (845) indicated that management and leadership is recognised within their workplace.

Few survey participants identified promotion to managerial (5%, 212), leadership (29%, 1197) or mentoring (31%, 1286) roles as a marker of a successful career. In particular, academic mid-to-late-career researchers suggested in interviews that they felt that reward and support structures in

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**Figure 3. Online survey.** Entry base n = 167. Early base n = 1185. Mid base n = 1577. Late base n = 281. % Agreement 7-point scale. Agree = 5–7.

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**Table 9. Online survey.**

<table>
<thead>
<tr>
<th>Q: How far do you agree or disagree with the following statements relating to your career?</th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am aware of alternative career options outside of research that could utilise my skills</td>
<td>24%</td>
<td>65%</td>
</tr>
<tr>
<td>I am aware of a range of different career options within research</td>
<td>32%</td>
<td>53%</td>
</tr>
<tr>
<td>I have flexible career options available to me</td>
<td>38%</td>
<td>40%</td>
</tr>
<tr>
<td>I am satisfied with my career prospects within research</td>
<td>45%</td>
<td>38%</td>
</tr>
</tbody>
</table>


Figure 5. Online survey. Early career researchers and students. Agreement statement 7-point scale. Disagree = 1–3, Neutral = 4, Agree = 5–7. Base n = 1832.

Figure 6. Online survey, employed and student respondents. Base n = 3885.
management were lacking and there were no clear markers for accurately determining their success.

When it came to expectations around leadership, the majority of survey respondents rated each leadership characteristic as important – particularly around setting and upholding research conduct standards (97%, 4040) (see Figure 8). Respondents tended to think that their own teams were far more successful in demonstrating these leadership characteristics than their institution or workplace as a whole. This was particularly the case for those working in academia. However, overall, the proportion of respondents who rated their teams as successful in this area was lower than the proportion of those who thought that these characteristics were important. For example, half of the respondents (50%, 1960) felt that their workplace team was effectively creating development and career opportunities, while 95% (3972) stated that it was important.

**Power dynamics.** There were various ways in which deficiencies in people management and support appeared to manifest themselves within workplaces in terms of power imbalance.

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4 Respondents were presented with four leadership qualities and asked to rate their importance on a 5-point scale. They were then asked to rate how successful their workplace team and their institution were in demonstrating these leadership characteristics.
A system of patronage and power was directly and indirectly described by many of those interviewed. Those attracting high levels of funding were often perceived as getting away with poor workplace behaviour. While this was by no means the norm, some felt they would be unable to report such behaviour, or that little would be done to reprimand the perpetrator.

“I think it’s difficult when people who are high up in the culture who have a large number of the grants have less good practice. The way that practice is dealt with is quite soft because they’re valuable.”

Late-career researcher, Russell Group institution

Respondents in interviews also spoke of the power that senior staff had over the future career of junior researchers, such as being needed for references. Some PhDs and early-career researcher reported feeling that there was pressure to behave subserviently in order to protect their career for the future. A few interviewees reported instances when they felt research funding was directed towards established researchers, and that those associated with these researchers benefitted by proxy.

“Who gets funded, why did they get funded? Is it their project that is so significant or are they super-talented or is it because they’ve worked in the lab of Professor X, or is it because they are working on a research project that aligns with the views of Professor Y?”

Mid-career researcher, University Alliance institution

Bullying and harassment. Within interviews, a sense of power imbalance was thought to contribute to bullying and harassment, which some suggested was systemic and an area in which leaders were thought to turn a blind eye. Some interviewees stressed that behaviour was often hard to accurately identify and there was considered to be a grey area between a management style that was necessarily challenging to meet outputs and deliver quality results, and one that was bullying:

“The problem with all of those things is that one person’s bullying is another person’s heavy-handed and constructive management.”

Mid-career researcher, Russell Group institution

Others suggested that this argument (that bullying was difficult to diagnose) only gave legitimacy to inaction from individuals and institutions when concerns around bullying and harassment were raised.

“One of the big things was that she was very controlling over her projects. I think, because she was quite a new PI, it meant the researchers didn’t have the big picture of what they were doing, they were basically just doing the experiments for her and she was telling them what to do. And, on the same note, she was quite unpredictable and quite volatile, I guess. If she was in a bad mood, they all knew it. In any other situation, if your boss is like that, then that is a big issue, but there is no-one they could talk to about that, because that is just kind of accepted.”

Post-doctoral researcher, industry

Survey findings indicated that 43% (1807) had experienced bullying or harassment, while 61% (2527) had witnessed it (Figure 9).

Such experiences were more likely to be experienced by those who self-identified as disabled: 62% (159) of disabled respondents reported experiencing bullying or harassment, while 73% (186) had witnessed it. Women were also significantly more likely to have experienced bullying or harassment (49%, 1211; df = 1, Chi-Square = 76.446, p = <0.000001) than men (34%, 535; df = 1, Chi-Square = 85.58, p = <0.000001).

In interviews, when asked about experiences of such behaviour, respondents described dealing with conduct that they perceived as humiliating or intimidating. In the survey, the majority of bullying was reported to be perpetrated by those in positions of power, although around a third indicated experiencing or witnessing bullying from peers (Figure 10).

A total of 37% (1547) of respondents said they would feel comfortable speaking out about bullying or harassment (Figure 11), with a quarter (25%, 1042) thinking it would be acted on appropriately. This differed across some demographics. Female respondents were significantly less likely to feel comfortable (32%, 790; df = 1, Chi-Square = 70.669, 70.669).
p = <0.000001) compared to male respondents (46%, 715; df = 1, Chi-Square = 79.029, p = <0.000001). Respondents in junior roles were significantly more likely to be unsure (37%, 549; df = 1, Chi-Square = 15.184, p = 0.0001) and disabled respondents were significantly more likely to feel uncomfortable about speaking out (39%, 100; df = 1, Chi-Square = 17.969, p = 0.00002) compared to those who didn’t consider themselves disabled (27%, 1026; df = 1, Chi-Square = 15.353, p = 0.00009). White UK respondents were more likely to feel comfortable speaking out (38%, 1010) compared with UK BAME respondents (32%, 110); however, this difference is not statistically significant.

In interviews, some respondents commented on these negative consequences, such as fear of being marked as a trouble-maker, which might result in reprisals affecting their career, or feeling they lacked the mental strength and ability to enter into lengthy reporting processes:

“No, I was bullied for about five years when I first started and it was very bad, and I had to see therapy because I was having asthma attacks going to work, and that person has now returned to the department. I don’t want to be in the same room as that person, but at the time I made a decision not to file a grievance, having researched it a lot, because I knew it wouldn’t go well, and I think that was still the right decision. … A serious bully is very well versed in how to escape accusations of bullying and they’ll often reverse them. I researched this a lot. … If that person is senior, you’re screwed. A lot of people advised me at the time to take another job. I think not reporting it was a very good decision because it could have cost me professionally big time.”

Mid-career researcher, Russell Group institution

Other reasons for hesitating to report bullying and harassment included the perception that bullying can be difficult to diagnose,
as it’s a highly individualised experience with no single definition (for victims and witnesses alike):

“If I was sure that there was bullying going on, then absolutely, but I think bullying is very, very tricky to define. Yeah. I know there is bullying going on, but sometimes the people who say they’re being bullied are also bullies themselves in different ways. I think it’s a very sticky, very tricky concept.”

Mid-career researcher, Russell Group institution

The findings showed varying degrees of faith that superiors, the workplace or the institution more widely would respond appropriately to raising concerns (Table 10).

These sentiments were explored further in interviews. While some did have confidence that their institution would take action, some would still be reticent about starting a formal complaint, worrying that they would be identified by seniors (within their department and institution) as a trouble-maker. They feared this would not only make their day-to-day work more challenging, but could also lead to career repercussions.

“There are procedures in place to deal with this. Whether they always work is not the case, but this is not something for which you can ever give a generic answer. They’re not always working because there are complicated power plays in play.”

Mid-career researcher, Russell Group institution

Others mentioned that it would take extreme behaviour for individuals to stand up and report cases of poor conduct and that current policies were not conducive to this. Standing up against such behaviours was considered risky by some (Table 10). This feeling of not wanting to upset the status quo was pervasive in interviewees’ accounts.

Gender-related poor behaviour was most prevalent. A total of 52% (1185) of those who had experienced bullying, harassment or discrimination reported it was related to gender. There were significant differences between male and female respondents here, with 67% (1038; df = 1, Chi-Square = 417.877, p = <0.000001) of women who had experienced inappropriate behaviour reporting it was related to gender, compared to 18% of men (115; df = 1, Chi-Square = 431.723, p = <0.000001). However, respondents tended to be quite willing to openly discuss gender-related issues; 72% of both women (1776) and men (1112) agreed they would be comfortable openly discussing biases and discrimination in their work environment related to gender.

Discrimination. In total, 60% (2432) of survey respondents agreed that their working environment was biased in favour of certain groups of people, while 37% (1509) of respondents agreed that their working environment reflected the diversity within society. Over a third of survey respondents (35%, 1473) reported experiencing discrimination during their research career, while 46% (1919) had witnessed it. These results were higher among women – with 44% (1089) having experienced discrimination and 51% (1260) witnessing it. Furthermore, women (22%, 548) were less likely than men (30%, 467) to believe their concerns relating to these issues would be acted on appropriately.

Gender, race or ethnicity and age were the most common characteristics associated with bullying, harassment or discrimination (Figure 12).

Interviews showed that discrimination experienced by women was perceived to be linked to practices that potentially made having a successful research career more challenging, such as long working hours and high levels of output required often taking place alongside personal decisions about starting a family. While attitudes towards the effectiveness of gender equality initiatives – such as Athena SWAN – were mixed, some female interviewees indicated that this had led to an increased number of small but welcome changes to the working environment. In the online survey, 40% (946) of women compared to 45% (678) of men agreed that they had witnessed diversity and inclusion initiatives successfully in action within their working environment.

Gender was not the only category perceived as making researchers more susceptible to discrimination. Many UK-based BAME respondents felt their experience of research culture (and ability to succeed within it) was intrinsically worse than that of white researchers. In the survey, 46% (157) of UK-based BAME respondents had experienced discrimination, compared to 34% (1316, DF=1, chi-square=19.737, p<0.000009) of the rest of UK-based respondents. Of UK-based BAME respondents who reported experiencing bullying, harassment or discrimination, 51% (101) said these behaviours were related to race or ethnicity, 29% (58) to nationality and 8%
In the interviews, the BAME respondents often raised concerns that their complaints would be taken less seriously than those made by white colleagues in the UK.

“So especially again going back to my identity as somebody that is not white, we tend to think that anything we say is not really considered on the same level of merit as if someone who is from here says the same thing.”

Late-career researcher, University Alliance institution

Discrimination for these respondents was often felt to be covert—taking the form of being overlooked for promotions, not being properly credited for work or mentored by senior academics. It was felt that this made it more difficult for researchers to call out and report such behaviour. Additionally, 28% (96) of UK-based BAME respondents disagreed that they would be comfortable openly discussing race issues (e.g. bias and discrimination) in their work environment.

A total of 62% (159) of survey respondents who considered themselves disabled reported experiencing discrimination compared to 33% (1273) of those without a disability. In total, 47% (90) of disabled respondents who had reported experiencing bullying, harassment or discrimination reported that these instances were related to disability. In qualitative interviews, those with disabilities suggested that research culture was one of ableism. It was thought to be significantly harder for disabled researchers to succeed in a research career, for such reasons as a general lack of adaptations in working conditions, the requirements in early careers to win multiple short contracts (often in multiple locations), a perception that disabilities would make researchers more difficult to manage and less productive, and barriers in the current funding processes.

Survey results shed further light on that, with 13% (523) of respondents overall agreeing that grant funding was sufficiently flexible to support career breaks, or health and disability related leave. Significantly fewer respondents who self-identified as disabled agreed with this statement 6% (16; df = 1, Chi-Square = 9.806, p = 0.002).

Despite employers being required to make reasonable adjustments for those with disabilities, the disabled researchers we interviewed reported instances when they felt that these had been overlooked.

“Yes, but if the staff feel that the disability officer is not going to do anything, then... There are people over 30 years after, well it’s 24 years since they had disability legislation to make reasonable adjustments, and there’s a surprisingly large number who feel that that particular legislation is one they don’t have to keep to.”

Mid-career researcher, MillionPlus institution

Exploitation. Many linked the current systems of reward and recognition to exploitation. A total of 62% (2529) of survey respondents said that the system exploited their interest in the work they do—leading to a heavy workload. This was more pronounced among more senior researchers (58%, 932) compared to those in junior roles (53%, 776), but in interviews early-career researchers were generally considered likely to put in long hours and work on tasks that didn’t lead to recognition.
“Creating a culture that kind of shows that we shouldn’t have to martyr ourselves just because we like what we’re doing. We should be able to be passionate and do something we love, but also not have to struggle, kill ourselves pretty much, over work, and also just get acknowledgement.”

Early-career researcher, 1994 Group institution

During interviews, early-career respondents who reported exploitation said that it was usually carried out by PIs and supervisors—although many also remarked on how their PIs often led by example and worked long hours too. Exploitative behaviours reported by PhD students and early-career researchers included:

- Being required to work long hours.
- Being required to do difficult or dull tasks.
- Having their ideas or work credited to a more senior researcher within the team.
- Being required to do non-research-related tasks for supervisors.

Some of those on short or fixed-term contracts reported feeling particularly vulnerable to these issues:

“I think that people can be very exploitative of people who are on fixed-term contracts and that’s a real problem and it’s very difficult for people who are on fixed-term contracts to say actually, you’re giving me too much work and I don’t want to do this… They can just replace you if they want to.”

Early-career Researcher, Russell Group institution

Survey respondents also reported issues around authorship and recognition. A total of 40% (1627) of all respondents said that they had experienced issues with others taking credit for their work (see Figure 13). There were no significant differences between those in junior and senior roles.

Impact of current research culture

Survey respondents rated the impact of current research culture on the quality of research, on individuals and on society. While the impact was more likely to be considered positive (42%, 1763) than negative (25%, 1039) on quality of research, and on society (53%, 2200 positive; 14%, 593 negative), the impact on individuals was more often seen as negative (40%, 1667) than positive (30%, 1232) (Figure 14).

Impact on researchers: work-life balance. Respondents tended to articulate the impact of current research culture by focusing on how it affected their wellbeing and maintaining a reasonable work-life balance.

When exploring working hours, we found that 40% (1095) of full-time employed survey respondents (in either permanent or fixed-term roles) reported working an average of 41–50 hours per week, while 33% (896) reported working more than 50 hours per week (Figure 15). Similar results were found for students– 20% (168) reported working 51–60 hours per week and 12% (106) over 60 hours.

A total of 57% (2301) of respondents agreed that there was a long-hours working culture at their workplace, whilst 48% (1936) agreed that they had felt pressured to work long hours. In interviews, this was thought to be particularly problematic for individuals with care commitments. Interviewees acknowledged this as a concern across genders, but perceived it to have the greatest impact on women, with whom the majority of primary caregiving was still felt to lie.

“So in terms of diversity, in particular, women really suffer if they take a break to have a family and they can really struggle to get back into academic careers if they take that break within their postdoc years.”

Mid-career researcher, 1994 Group institution

In interviews, the issues around work-life balance were linked to conflicts between work and personal relationships—for example, the pressure to prioritise research over partners and family, or taking short-term contracts that required researchers to live and travel across the UK and abroad.

“You have to be ready to relocate, to go to a completely different country. You might need to leave behind friends or your partner, you need to change houses and everything.”

PhD student, Russell Group institution

![Figure 13. Online survey. Agreement statement 7-point scale. Disagree = 1–3, Neutral = 4, Agree = 5–7. Base n = 4065.](image-url)
Some spoke of the sacrifices they were required to make in terms of family life to advance their careers, while others shared examples of when having care commitments (e.g. children, elderly relatives, family with disabilities) effectively stalled their careers.

“Yes, it puts a lot of stress on you, and really interferes with family... it just puts a lot of pressure on your personal life.”

Mid-career researcher, Russell Group institution

Those who felt they had mastered the balance between work and family commented that this had taken years to achieve and required supportive leadership within the department and a certain level of agency to be able to say no to requests and demands.

Impact on researchers: stress. Overall, 70% (2729) of employed and student survey respondents indicated they felt stressed on a typical working day, with an average rating of 4.9 out of 7 (where 7 = extremely stressed).

A total of 49% (2045) agreed they had “difficulty dealing with work-related stresses”. Respondents who had either sought help for depression or anxiety, or who wanted to, were significantly likely to agree with this statement (68%, 1490; df = 1, Chi-Square = 666.883, p = <0.000001). Overall, 34% (1396) of survey respondents reported that they had sought professional help for depression or anxiety during their research career. A further 19% (790) wanted to seek help, but had not done so (Figure 16). Women were significantly more likely to have sought help (38%, 950; df = 1, Chi-Square = 65.275, p = <0.000001) than men (25%, 398; df = 1, Chi-Square = 73.636, p = <0.000001).

“I think about probably 5 or 6 years ago the local GPs actually put in a formal complaint to the Health and Safety Executive that too many of our staff were going to them for stress. They actually complained about it. That’s a serious issue. They offered counselling and all this kind of thing but that doesn’t change any of the job or the pressures or the expectations or the demands. All they’re saying is now you can talk about it and then hopefully that will make you feel better.”

Late-career researcher, MillionPlus Group Institution
**Impact on researchers: career prospects.** A desire for a better work-life balance (37%, 65) and a negative impact on wellbeing and mental health (34%, 60) were among the top 3 drivers for those who had left the research community\(^5\).

Overall, 37% (1523) of respondents agreed that they were considering moving to another part of the research sector within the next 3 years, and 36% (1473) agreed they were considering leaving the research community within the next 3 years to start a non-research role (Table 11). Those likely to leave generally had poorer perceptions of research culture overall.

In qualitative interviews, loss of talent from the sector was raised by many as a key concern, with researchers already being lost due to increased pressures, insecurity and lack of flexibility within career pathways and promotion criteria.

“The top doesn’t have to talk to people at the bottom, and casualisation is a real issue. It’s exploitation, people being exploited for a long time. This is not sustainable. Some of them are the best researchers and they leave. They break down mentally. Why are we doing that to people who are so talented?”

**Mid-career Researcher, Russell Group Institution**

Some interviewed had concerns about the indirect negative impact that this gradual loss of talent from the sector will have on society.

“I’ve been around a long time and I think the research environment and the academic way in which institutions work is absolutely critical to society. And I am worried that we are moving away from the best course. And that will be detrimental to society in the future.

**Late-career Researcher, Russell Group Institution**

**Impact on researchers: isolation.** The factors reported above were sometimes cited in interviews as creating a sense of isolation and loneliness. While interviews identified that this could feel particularly acute for those at an early stage in their career, survey results showed that a large proportion of both junior (70%, 1029) and senior researchers (64%, 1026) believed a career in research can be isolating and lonely.

Interviews explored the nuances around isolation. While many accepted that much of research (particularly scientific lab work) was often inherently solitary, this was considered to be different from isolation, which was seen as more damaging, both to the quality of outputs but also to the mental health and wellbeing of researchers. Isolation was reported to present itself in many forms and could change depending on the

\[^5\] ‘Too difficult to find a job / insecure path’ was identified as the top driver (45%, 79).
researcher’s circumstances. Isolation described by interviewees tended to refer to:

- **Labour isolation**: Work streams designed for individual task completion, which suits some personalities more than others.
- **Social isolation**: Increased internal competition and reward structures preventing a sense of collegiality.
- **Personal isolation**: Difficulties in raising issues when things go wrong, or when wellbeing is being compromised.

Social and personal isolation were both considered to be damaging. For example, when researchers hit difficult patches, either personally or professionally, it could be difficult to share their issues and receive support.

“I think a lot of people can get really bogged down in research, and especially I can see a lot of people are shutdown in their rooms and trying to generate results, and publish but might not be overly social sometimes. I think that can be quite dispiriting. I mean I have actually never suffered from any sort of mental health problems, but I have felt the most isolated I ever have in my life in this PhD.”

**PhD Student, Non-aligned Institution**

In interviews, these feelings of isolation and loneliness tended to be articulated by those earlier in their career and particularly during PhD. Even some of those with supportive supervisors suggested feeling isolated during their PhD, unable to raise concerns with peers or supervisors and spending a lot of time working on their own with long working hours and little time for socialising or other interests.

In the survey, different statements around wellbeing and support in the workplace suggested that higher numbers of respondents felt supported by peers compared to experiencing support from their superiors. 21% (332, df=1, chi-square=35.861, p<0.000001) of those in senior roles and 30% (437, df=1, chi-square=34.636, p<0.000001) of those in junior roles reported that their supervisor, PI or manager supported them with personal issues, while 24% (378, df=1, chi-square=73.339, p<0.000001) of senior researchers compared to 38% (549, df=1, chi-square=70.746, p<0.000001) of junior researchers reported that their superiors supported their wellbeing. When it came to feeling supported by colleagues more widely, 65% reported feeling supported by peers in times of personal difficulties; there were no significant differences dependent on career stage or seniority.

For others, isolation meant they felt lonely and separated from the community and collaborative environment:

“I’ve become cut off from the best work in my field. That is partly for personal reasons that I’ve been less able to travel than I had been. If you don’t have a lot of people who are working with you in your department in similar things then you need an external community. If for family or other reasons, travel is difficult, then it can be quite easy to be cut off from that research community.”

**Mid-career researcher, Russell Group institution**

**Impact on diversity.** In total, 40% (1620) of survey respondents agreed that action was taken in their workplace to remove barriers and provide support for underrepresented groups. Overall, 37% (1509) agreed that their working environment reflected the diversity within society, with 66% (2679) agreeing that their workplace was committed to promoting diversity and equality (Table 12).

Interviews described how those barriers were embedded at systemic, organisational and individual levels:

“One thing that Wellcome could do is help people like me at my age group, white middle-aged men, who are the vast majority of my colleagues, to really understand the benefits of diversity and what diversity brings. I tend to be quite liberal and that kind of social, sexual, racial… I couldn’t care less, but what I’m not terribly good at is being sensitive enough to the needs of those individuals who may need somewhere for prayers at a certain time of day for example. Diversity is hugely important and I think that we miss out a lot.”

**Late-career researcher, Russell Group institution**

**Impact on research.** A total of 47% (1966) of survey respondents agreed that current research culture promoted high-quality research. While 69% (2786) of respondents agreed that rigour of results was considered an important research outcome by their workplace, 23% (417) of junior researchers and students revealed that they had felt pressured by their supervisor to produce a particular result. In total, 60% (1099) believed their supervisor valued negative results that didn’t meet an expected hypothesis and 66% (1213) would feel comfortable approaching their supervisor if they couldn’t reproduce lab results (Figure 17).

A total of 71% (2983) of survey respondents agreed that research culture promoted quantity over quality and 32% (1319) agreed that their workplace valued speed of results over quality. In interviews, many researchers reported they felt pressure to publish high volumes of research. The current focus on high-impact journals was perceived to lead to misplaced priorities, with university metrics and funding bodies seen to value where research was published, more than its quality.

Less than half (46%, 1852) of survey respondents agreed they had a clear understanding of what their workplace considered compromised research to be. In total, 46% (1885) also agreed that their institution could do more to ensure research practices did not cut corners. The same proportion (46%, 1864) knew how to report instances of research misconduct. Interestingly, a larger proportion (65%, 2702) believed high standards and integrity were valued within the research community.

Less than half (47%, 1916) of respondents agreed that they would feel comfortable reporting instances of compromised
research standards without fear of personal consequences. Interviewees suggested why this might be, including:

- Lack of support from institutions for whistleblowers.
- Concern about being labelled a trouble-maker.
- Pressure to adhere to the team’s position.
- Misconduct, particularly in very technical areas of some specialisms, can be hard to identify and judge.

Interviewees conveyed a strong sense that the current system is not prioritising the right attributes when assessing research quality. In part, it was felt that this was motivated by the focus on things that were easier to measure, such as numbers of publications rather than management and leadership. The current culture was thought to create conditions for sub-optimal research processes that could directly impact research quality, such as: corner-cutting; superficial outputs; replicability/reproducibility issues; retrofitting research to funding criteria; focusing on application rather than theory; not supporting interdisciplinary work; and null results going unpublished.

Many reported concerns that working continually at this level of speed and output would ultimately diminish quality in some way. Tired and stressed researchers were not thought to be able to complete their best work.

“This idea that working a 70-hour research work week is in any way sustainable or healthy is, I think, completely insane. And yet a lot of people get drawn into that culture. I think that’s when you really start to see people get stressed, get unhappy, unhealthy, and it also leads to sloppy research being done. And there needs to be some kickback against that, because some PIs will be ‘this is what I did during my career and it’s worked for me, so everyone else will do it’. I think there needs to be a kickback against that, because it’s not sustainable or realistic.”

Early-career researcher, industry

While a small number of interviewees suggested that the results of this culture could be observed in the increasing number of retractions, others felt that generally the quality of outputs did not suffer – largely because researchers themselves were sacrificing their own wellbeing and personal time to ensure that the research remained solid.

Most interviewees were able to cite initiatives in place aimed at improving research quality, but there was often the sense that these did not go far enough and that crucially there was a

<table>
<thead>
<tr>
<th>Table 12. Online survey.</th>
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</thead>
<tbody>
<tr>
<td>Q: How far do you agree or disagree with the following statements relating to your working environment?</td>
</tr>
<tr>
<td>Disagree</td>
</tr>
<tr>
<td>My institution/workplace is committed to promoting diversity and equality</td>
</tr>
<tr>
<td>I have witnessed diversity and inclusion initiatives successfully in action within my working environment</td>
</tr>
<tr>
<td>Action is taken in my workplace to remove barriers and provide support for underrepresented groups</td>
</tr>
<tr>
<td>My working environment reflects the diversity within society</td>
</tr>
</tbody>
</table>


Figure 17. Online survey, junior researchers and students. Agreement statement 7-point scale. Disagree = 1–3, Neutral = 4, Agree = 5–7. Base n = 1832.
lack of accountability in cases of poor behaviour. Additionally, many sensed that it was in institutions’ interests not to go looking for cases of misconduct or, in some cases, to overlook them.

Discussion
This study was motivated by seeking to better understand the working culture in research, and the impact this may have on researchers and research itself. Wellcome funded this research to expand the evidence base and generate a rigorous foundation for a better understanding of the problem and possible interventions.

The research tried to gradually unpack the experiences and perceptions of research culture, starting from collecting in-depth individual accounts, before seeking to understand the extent to which these subjective experiences reflect wider trends and systemic issues.

More research is needed to understand this topic and we hope that our description of the current research culture will encourage and support additional analysis, future studies and new directions of research.

This research found that overall perceptions, sentiments and experiences of current research culture among the research community tended to be negative. Respondents thought an ideal research culture would be supportive, collaborative, creative and inclusive. For many, the research culture they experienced did not foster these qualities – or even hindered creativity, collaboration and the availability of support.

This research explored cited drivers of research culture in the system, most notably: metricisation, increased competition, lack of job security and insufficient career flexibility. Respondents also gave insights to how culture manifested in interpersonal behaviours and everyday practices – including in relation to leadership/management and problematic power dynamics, such as patronage, bullying and harassment, discrimination or exploitation.

This article has highlighted many areas in which research culture may be concerning – ultimately resulting in negative outcomes for individual researchers and the quality of research produced. Research culture was generally considered to have a positive impact on society, and this wasn’t highlighted as a key concern.

While findings around pressure to produce particular results suggested that integrity and conduct standards were not always adhered to, the impact of research culture on research quality and conduct seemed to be less direct, or perhaps delayed, compared to its impact on individuals.

High workloads and long working hours were seen to be negatively impacting researchers’ wellbeing and work-life balance. Limited career prospects and issues around inclusivity were also thought to negatively impact individuals and were associated with a loss of talent. The majority thought current research culture was not sustainable long-term.

Strengths, weaknesses and limitations
This study sought to provide a comprehensive overview of the perceptions of research culture among diverse members of the research community. It was carefully designed so that insights from one project stage were used to build the next. We aimed for language and question areas to reflect the priorities and issues of the target community and tried to make our methods as inclusive and open to gathering in-depth insight as possible, taking into account practical limitations of timelines and scale.

However, while we aimed to capture a range of perspectives, the findings are not easily generalisable due to two main factors.

Firstly, the nuanced, unique and subjective nature of the phenomenon in question. For example, care should be taken when comparing the results to other sectors and professional communities. While the survey showed a variety of critical attitudes toward current research environments, interviews revealed that researchers’ perceptions of research culture were difficult to assess – partly because most recognised that research happened in a very specific environment, in which certain working practices were more likely to be considered acceptable than in other settings. These included norms around working hours, work-life balance, isolation and frank discourse.

Secondly, sampling limitations discourage generalisation. While the sample size was large, we cannot claim to have captured the totality and diversity of experiences among the international research community. The sample was also self-selecting, which creates risks around under and overrepresentation of certain voices or perspectives, most notably:

- Our recruitment methods aimed to capture diverse and minority voices, but did not aim to represent the actual make-up of the sector. Interview respondents answered demographic questions on an expression of interest form that was sent out to Shift Learning’s database of researchers, as well as distributed through a range of snowballing methods to target difficult-to-reach populations. Various recruitment methods were used to widen the survey’s reach, including use of third-party data suppliers, blog posts, social media and the Wellcome website.

- As respondents were self-selecting, it is likely biases were present in terms of those who feel strongly about research culture. While underrepresented groups within the sector were specifically targeted, they were also underrepresented within our sample.
• It is likely that some figures in our sample might be lower than in reality. Whilst disabled respondents were included, the true number of respondents who were disabled or had long-term physical or mental health conditions is likely higher than explicitly stated in this article.
• Some responses that framed solutions around funding mechanisms (e.g. regarding potential solutions for the future) might have been influenced by the fieldwork being openly associated with Wellcome.

Conclusions and next steps
It is clear from interviews particularly that there is a deep sense of pride within the research community. While individual perceptions on the state of research culture can be difficult to fully assess and experiences are likely to be highly individualised, it is also encouraging to see a strong shared vision of what a good culture could look like. Positive change is likely to require a collective effort of all those working within the research ecosystem.

Further research may wish to explore the relationships between direct and indirect drivers of research culture, as well as investigate in more depth the daily experiences of researchers in relation to management and leadership – exploring both high- and low-quality managerial interactions. It may also be valuable to compare research culture against culture in other sectors that share similar attributes in terms of people, pressure and purpose.

Data availability
Underlying data

This project contains the individual-level responses from the quantitative survey.

Due to the ethically sensitive nature of the research, interviewees were not asked to consent to their data being shared.

Explanation of data protection concern:
Given the sensitivities of the qualitative data, the authors felt that it was necessary to restrict access to interview transcripts. Crucially, consent was not granted by respondents for this use of their data. While transcripts have been partially redacted to remove any direct personal identifiers, it is impossible to remove all identifying context. Heavily redacting these texts on the other hand would remove crucial detail, rendering them less useful for subsequent research. For example, details of negative researcher experiences are by their nature bound up with identifiable settings, subjects and details, and removing these would distort the substance of the findings. There is also a case for safeguarding respondents against further ethical issues of the kind highlighted in the research. For this reason, the authors decided it would be inappropriate for the majority of researchers or journalists to be able to have access to the qualitative data.

However, we acknowledge there might be exceptional circumstances providing legal basis for accessing the data, such as:
• Legal obligation: the processing is necessary for compliance with the law
• Vital interests: the processing is necessary to protect someone’s life.

Explanation of restricted access rules:
Requests to access redacted interview transcripts will be assessed on a case by case basis and readers requesting access will need to complete a short application form:
https://research.shift-insight.co.uk/understanding-research-culture-transcripts

The granting of access to redacted transcripts will be decided by the authors in consultation with the Shift Insight Data Protection Officer and in compliance with GDPR guidelines from the ICO, Market Research Society Code of Conduct, and best practice guidelines for sharing data in research).

Readers requesting access to redacted transcripts will be asked to provide the following information:
• The purpose of the secondary use for which they are requesting the access to transcripts.
• Their institutional affiliation and their role in relation to the secondary use.
• What legal basis they are using for requesting access to transcripts.
• Description of any potential impact their request might have on the rights of research participants as a result of the secondary use.
• Description of how they will process and share the data if their request is granted (including any other individuals who will be involved in this process)
• Contact details so that they can be informed about the progress of their request.

Extended data

This project contains the following extended data:
• Understanding Research Culture_Additional notes on Ethics (DOCX). (Additional information about ethical issues encountered in this study.)
• Understanding Research Culture_e-survey flowchart (XLSX). (Flowchart showing question routing for the e-survey.)
• Understanding Research Culture_interview guide (DOCX). (Interview guide used for the qualitative aspect of the study.)
• Understanding Research Culture_Qualitative sample plan (DOCX). (Participant sampling plan for the qualitative aspect of the study.)
• Understanding Research Culture_Some notes about data processing (DOCX). (Notes about the format and processing of the e-survey results.)
• Understanding Research Culture_e-survey guide (DOCX). (The e-survey guide, including all questions asked.)

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).

Acknowledgments
We would like to thank everyone who helped with this research and publication for their input and support. Special thanks to Beth Thompson, Candace Hassall, Jonathan Best, Erica Pufall, Diego Baptista and Thomas Bray from Wellcome, as well as Kate Miah, Jane Powell, William Roberts, Matthew Wood and the rest of the team at Shift Insight.

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Reference Source
This study is best viewed as an exercise in exploratory research. In other words, it can facilitate speculation leading to well-formed hypotheses or models that can then be put to well-designed tests. That kind of confirmatory research eventually requires a specified population with statistical frames, sampling strategies, comparison groups, power calculations, identification strategies, etc.

As is, the methodology precludes drawing causal, policy, or even descriptive conclusions about research culture generally or in the UK in particular. The main reason is because the statistics are not based on a probability sample that, if not representative, could at least be reweighted. Participants were instead recruited through opt-in, proprietary, and snowball sampling. The last of these means having respondents bring the survey to the attention of others they know (and who presumably work in similar research environments or have similar attitudes). Not surprisingly, selection bias is apparent in the respondent demographics.

For example, although the first sentence of the article starts out by talking about the “performance of UK research,” about a quarter of the 4267 respondents said they did not live in the UK. Moreover, 20% are students and another 8% say that are not currently working as researchers at all. That does not include freelancers, who are conflated with those who report being employed. About 22% of respondents place themselves in the social sciences/humanities category. Less than 10% are in the physical sciences, which the survey takes to include mathematics, statistics, computer science, and engineering as well.

The point is that these demographics are not obviously representative of any natural community of researchers, let alone any natural policy target. On the contrary, implementing the very same recruitment procedures again would almost certainly produce quite different sample demographics, and hence quite different survey results. The only way to avoid this concern about reproducibility would be to assume that nearly everyone in the research community, however one might define it, shares similar opinions about its culture. But in that case, of course, it would hardly be necessary for Wellcome to commission such a survey in the first place.
The sample size is large enough so that, when plugged into formulae for computing p-values, the findings can be reported as statistically significant. For a random sample, that is supposed to mean there is little chance that the observed results are idiosyncratic to the particular population subset drawn. Here it is not clear how to interpret statistical significance. Especially since there is no definition or statistical frame mentioned, it is hard to say if the sample size is adequate. Judging from the sizable international response, the intent may have been to study researchers around the world. If so, 4267 is not a very large slice. If the idea was instead to focus on the UK as indicated, the respondents resident there represent about half of one percent of that research community according to estimates of its size put out by the Royal Society.

What is utterly compelling about the study are the quotes selected from the 94 volunteers who agreed to be interviewed in exchange for £60. Again, not a random, representative, or large sample, but it hardly matters. The fact that anyone at all is giving voice to such anguish about research culture demands attention. Their words are consistent with the abstract's assertion that “poor research culture manifested in workplace behaviours and practices, including problems with management and leadership and unhealthy power dynamics, such as patronage, bullying and harassment, discrimination and exploitation. These conditions were linked to a range of negative impacts on the researchers and the research outputs.”

This is an indictment of the scientific enterprise as a social system. Compared with other such systems, science is characterized by especially complicated and unusual incentives, traditions, myths, standards, procedures, financial mechanisms, rewards, labor markets, etc. We can be thankful to this team of physical scientists and consultants for raising an alarm about research culture through their exploratory work. One hopes that, for the next steps, academic social scientists well-trained in the empirical study of social systems will also help design and carry out confirmatory research that can reliably produce descriptive, causal, and policy implications.

**Is the work clearly and accurately presented and does it cite the current literature?**

Yes

**Is the study design appropriate and is the work technically sound?**

Partly

**Are sufficient details of methods and analysis provided to allow replication by others?**

Partly

**If applicable, is the statistical analysis and its interpretation appropriate?**

Partly

**Are all the source data underlying the results available to ensure full reproducibility?**

Yes

**Are the conclusions drawn adequately supported by the results?**

Partly

**Competing Interests:** No competing interests were disclosed.
Reviewer Expertise: Expertise in economics, mathematics, academic administration, science policy, and philanthropy.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.
but then the authors include a statement about achieving saturation at a ‘relatively low level’. I think this would benefit from some clarity. I appreciate that the Guest article states numbers for achievement of saturation, but perhaps the phrase about low level could be rewritten to help those with little knowledge of qualitative research to appreciate the value and depth of the sample. Sometimes I find the work of Malterud about ‘information power’ of value in descriptions of qualitative sample size. This might also be helpful in relation to my comments (below) about generalisation in the strengths and limitations section.

It would be helpful for readers to know whether any of the participants in the qualitative study asked to see their transcripts and if any of them ask for correction, comment or redaction as mentioned on pages 4 and 5? For completeness this would be helpful to add, even briefly because this can change the nature of the data itself.

I paid particular attention to the information about ethics and informed consent. I appreciated that this research had not passed through an institutional research ethics board because of the structures through which it was conducted. I also appreciated the detail that was provided about informed consent in the ‘extended data’ section. I have some suggestions for information that could be added to provide readers with more detail in the article itself. First, I wondered if the consent questions included asking interviewees (qualitative study) for permission to publish anonymised quotations, I could not see this in the extended data where there was a useful interview script. If not explicit it might be worth adding in the article that that the information provided about anonymisation was taken to mean that interviewees understood that interview quotations might be published. Second, I appreciate that participants had been told that they could withdraw their data, but I think this would have only been possible up until a certain timepoint, for instance on deletion (of transcripts) and/or at the point of publication. I'm sorry if I missed this information in the extended data documents and so I would suggest that the specify up until when it would have been/remains possible for such participant withdrawal to happen and how the participants were informed of this.

In relation to data sharing, I wanted to comment that agree that sharing the transcripts would not be appropriate, unless in accordance with the legal basis as specified. I see that I was able to access the survey data through the (‘extended data’) and hyperlink in the reference list.

Results  
I thought that the layout of the results in descriptive themes worked well for the aims of this article. There is a lot of information to convey and the authors have made it easy to digest. The tables, figures and use of illustrative quotations work well. My comments are minor and relate to the presentation of the information for the sake of clarity.

I think it is worth revisiting/editing the use of the terms ‘junior’ and ‘senior’ in some of the narrative sections that directly describe the results it would be better to use the categories that are used in the sample: entry-level, early-, mid’ and late-career.

For an international readership I suggest explaining terms like Russell Group, MillionPlus etc. perhaps as a footnote? Similarly, for ‘REF’, this is nicely spelt out and the quotation from a participant does a good job of explaining what REF is, but perhaps a reference or footnote with more explanation would be important to add for the readers (page 9).
Discussion
This is clear and reads well overall, and like the rest of the article is doing a lot of work in a short space.

I did wonder whether this sentence accurately reflected the findings and whether it needed an edit. I appreciate the sentiment here, and indeed many of the results are concerning but for a research paper I think I would have appreciated a more nuanced sentence that captured the diversity of views and the precise nature of the questions asked in relation to this statement: “This research found that overall perceptions, sentiments and experiences of current research culture among the research community tended to be negative.”

In the strengths and limitations I thought that the description of generalisability would be important for the authors to revisit and consider revising as it is a key piece of information that impacts on the weight and future use of the study. In qualitative research, and as I am sure the authors know, the concept is debated and some think that 'transferability' might be of more relevance. This would mean that good qualitative findings would be seen as applicable beyond the sample. For instance, if the sample is thought to be strong enough and the depth sufficient then the findings can be considered to be relevant/transferable to other individuals, groups, or settings (depending on the research). I also think that it's not necessarily the case that the nuanced and subjective nature of the phenomenon necessarily renders the findings not generalisable and this could be revised. In terms of the sample for the survey, I think that the reflections about whether the representative nature of the sample impact on generalisability are important, I think an important addition would be information about how the sample differed from the research population, i.e. in precisely what way isn't it representative? I thought it looked like a sound sample. It might be that there is need to add this to the start of the results section and then reflect on it in the discussion.

Thank you again for the chance to read this work and I wish the authors well with any minor revisions.

Is the work clearly and accurately presented and does it cite the current literature?
Partly

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes
**Competing Interests:** I am aware of the Wellcome Trust's research and reporting on research culture and will be attending an event about research culture that I will attend after the submission of this review. I do not think that this precludes my fair and objective review but am declaring this for completeness.

**Reviewer Expertise:** Interdisciplinary and qualitative health research.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.