Royal Academy of Engineering

Royal Academy of Engineering: Cultural inclusivity in engineering

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Background

DJS Research has been commissioned by the Royal Academy of Engineering (the Academy) to conduct research into the experiences of those working in the engineering profession and specifically the culture of inclusion. In 2017 the Academy commissioned research into whether engineers with multiple characteristics felt included in the profession, culminating in the first *Creating cultures where all engineers thrive* report. Much has changed in this field since 2017 and the Academy wanted to revisit this topic and to assess where the industry is currently at in terms of creating a more diverse and inclusive culture for all.

This report outlines and summarises the key themes and findings to have emerged from the research. It combines feedback from secondary industry sources in the desk research element of the work conducted, and the primary research findings from the quantitative and qualitative research work conducted by DJS Research.

Objectives

The central pursuit of this research was to answer two key questions:

1. To what extent do engineers with multiple characteristics feel included within the profession?
2. Do engineers feel that the industry has changed or progressed in the past five years in terms of how diverse and inclusive it is?

In addition to these objectives was the need to understand views about the increasing drive to diversity, and pay particular attention to the experiences of people from underrepresented backgrounds to see if the level to which they feel included has impacted on their access, retention, and success in engineering.

Overview of methodology and fieldwork

Methodology

The research undertaken for this study has consisted of three phases:

Phase 1 – Literature review:

We initially completed 10 days of exploratory desk research, reviewing literature on recent (since 2017) industry-wide initiatives designed to increase inclusion and their reported impact, as well as key issues being reported in the industry about diversity and inclusion.

Phase 2 – Qualitative research:

We then undertook a comprehensive programme of qualitative research, speaking to both engineers and engineering employers to uncover and explore the key drivers for entering into the industry, the main barriers to entry and progression, and to look in detail at the personal stories and experiences of inclusion and organisational cultures.

Phase 3 – Quantitative research:

Building upon the themes and findings from the qualitative work, we then conducted a large-scale quantitative study. We wanted to measure the scale of the industry experiences of engineers and establish the overarching view in terms of diversity and inclusivity in engineering while gauging any progress made over the past five years.

Executive summary

Background and methodology

In 2022, the Academy commissioned DJS Research to investigate the culture of inclusion in the engineering profession and to assess whether engineers with certain diversity characteristics feel included in the profession. The study used a literature review, qualitative research, and a large-scale quantitative study. A total of 150 participants took part in 26 focus groups and 50 in-depth interviews for the qualitative research, and 1,507 engineers completed online surveys for the quantitative research. Similar research was conducted in 2017 (for more information, see the Academy's Creating cultures report).

The literature review found that the engineering profession acknowledges the need to improve equality, diversity, and inclusion due to three reasons: to decrease the industry-wide skill shortage, the business case for higher diversity, and as a moral imperative. While limited literature exists on the impact of #MeToo and Black Lives Matter on engineering, they have initiated conversation and debate and encouraged a commitment to improvement. The literature review findings also highlighted that whilst industry-wide initiatives have been taken to increase inclusivity, more work needs to be done to achieve cultural change.

Key themes from the research

Entering the profession

The appeal of the engineering profession was explored by looking at factors that influence or detract from pursuing a career in engineering. A significant source of inspiration was having a close family member who worked in the engineering profession, which was almost exclusively limited to male family members, typically fathers. A significant finding was the importance of family connections in preparing engineers for the industry and offering exposure to the engineering work culture. Family connections played to the advantage of some engineers due to the opportunities presented to those from white British, middle-class backgrounds. However, engineering was often a second choice for those from South Asian

or Black African backgrounds (whose families may pressure them into more ‘prestigious’ professions e.g. Doctor.) Some families may also discourage their children from engineering due to perceived negative aspects of the culture, such as a lack of work/life balance and preconceptions about how engineers from minority backgrounds might be treated, deterring some from entering the profession. Despite these barriers, engineering was appealing for its tangible impact, opportunities for self-development and a desire to be “hands-on”.

The culture of engineering

The engineering culture is often described as "creative," "collaborative," and "solutions-oriented," which are indicative of an inclusive environment. However, some engineers perceive the industry as "slow to adapt," "siloed," and "hierarchical," with women more likely to use these descriptors than men.

Positive elements identified relating to the culture of engineering include a strong culture of teamwork, a creative element to the work, a strong focus on personal development, making a difference and an opportunity to push yourself. However, negative aspects were also identified including a reluctance to embrace new working patterns, long hours and workload, a macho / stereotypically masculine culture, the pressure of getting it wrong, a lack of support or importance on mental health, and a culture of “banter”. The perceived culture of engineering does appear to differ based on location with operational/production-based cultures being more ‘macho’ or ‘laddish’ compared to the experiences in office-based roles. Perceptions and experiences of ‘macho’ cultures were reported to alienate and disclude some engineers, particularly women.

The engineering culture values professional behaviours that prioritize problem-solving, teamwork, and on-time and under-budget delivery, but places less importance on innovation, "speaking up," and "taking a position," which may impact the profession's inclusive culture.

Around eight in ten would recommend engineering as a great career choice and fewer (seven in ten) would recommend their place of work. Half of respondents felt that the culture of engineering has changed over the past five years and this figure is higher for engineers who identify as transgender or those who have a trans history (seven in ten). Eight in ten believe the culture of engineering has improved, however around one in five think it has worsened.

Inclusivity within engineering

The majority of engineers perceive the culture of engineering (profession) to be inclusive (seven in ten), however, women and those who work in large organisations are likely to feel less included.

A higher proportion of engineers feel included within their sector of engineering compared to feelings of inclusion to the profession as a whole. Drivers of inclusion were being treated with respect, being listened to and being confident to speak up if unacceptable behaviour is experienced or witnessed. Organisational factors play a part in feelings of inclusion with qualitative feedback suggesting that ‘being the right fit’ in an organisation is linked to career progression, along with other barriers including establishing senior allies, a ‘glass ceiling’,

family commitments, a lack of self-promotion and preconceptions around disability and neurodiversity.

Despite this, experiences of bullying, harassment and discrimination are still fairly common. Engineers who reported bullying or harassment mostly experienced microaggressions related to gender and race, which often go unchallenged and can have a more detrimental impact on mental health compared to explicit discrimination. Examples of discrimination were shared which include, but are not limited to unfair treatment, inappropriate comments, assumptions made based on certain protected characteristics, and exclusionary practices that limit opportunities and create barriers to full participation in the workplace.

Three quarters of engineers think that inclusion has improved over the past five years with males and those working in medium-sized firms being more likely to say it has. The main improvement is more open discussion around diversity and inclusion. Views on diversity are also key, as a backdrop to inclusion. Three quarters think that diversity has improved with examples given on how this has been achieved including recruitment targets around gender/ethnicity, performing/reporting on pay gap analysis, opening up of some industries to previously excluded groups and efforts to remove the bias of the recruitment process.

Actions to improve inclusivity

The most common benefits of feeling included at work are feeling more motivated, overall performance, and collaboration with colleagues. Four in ten said feeling included benefitted their health and well-being and productivity. Despite employers recognising the benefits of investing in diversity and inclusion, engineers report a lack of significant funding and support from companies.

To promote diversity in engineering, companies should focus on promoting diversity, ensuring diversity in all roles and leadership, addressing cultural issues, challenging the status quo, providing guidance on banter, setting quotas, providing anonymous reporting methods, cracking down on microaggressions, and creating work environments that encourage and celebrate differences.

Employers should focus on reshaping young girls' perceptions before education choices are made, measure and report on diversity at all levels, and create both D&I and ally networks, whilst being more honest with employees about behaviours that make some groups feel excluded. They should also consider alternative routes into the profession, assign good budgets and time to D&I events, avoid relying solely on blind recruitment, have diverse recruitment panels, and invest in D&I personnel.

Some organisations are being proactive to improve diversity, however, employers struggle to find candidates from diverse backgrounds, and the lack of engagement with young girls in engineering at a young enough age is identified as the root cause, along with the influence of family connections reinforcing similar profiles entering the industry. Furthermore, the lack of diversity in senior positions appears to contribute to a continuation of the issue with those in senior positions being reported to often promote and champion employees who are in the ‘image of themselves’ and who represent and protect their own values, beliefs and ways of working. Addressing the cultural issues experienced by engineers from less-represented backgrounds and challenging the prevailing cultural norms is necessary to retain and support their progression in the industry.

Industry bodies like the Royal Academy of Engineering and EngineeringUK could aid diversity efforts by ensuring diversity in their own organizations and leadership teams, providing tools such as a diversity league table, anonymous reporting platforms, and support and guidance for those struggling with D&I issues, work with schools and institutions to provide better careers information and provide information packs for parents of children interested in engineering.

Final thoughts

The research finds that while there are micro-climates of inclusion, underrepresented groups continue to experience higher rates of bullying, harassment, and discrimination. Values and behaviours that can enable an inclusive culture, include innovation, collaboration, and creativity. Barriers to creating an inclusive culture include machoism, siloed working, and reluctance to speak up. Interventions that directly address these barriers can facilitate progress towards inclusive outcomes and cultures in engineering, ultimately improving retention, success, and career progression for all engineers. Inclusion has improved but more needs to be done. From personal stories, many engineers still face disadvantages and feel the need to fit into a specific organizational culture and persona, which for many engineers, particularly women or those from less represented backgrounds, is not always reflective of their own cultural norms, personalities and preferences. Despite diversity and inclusion being popular topics in the engineering industry, many believe that current conversations only pay lip service and recognise that there is still a long way to go in addressing cultural issues, including traditional views around gender roles and suitability, that prevent major improvements to diversity.

1. Literature review

Literature review methodology in detail

The Academy set out the scope of the literature review, with four objectives:

- What are the majority attitudes towards the increasing drive for diversity within engineering?
- What industry-wide initiatives have taken place to increase inclusion since 2017, and what has been their reported impact?
- How have perceptions changed since 2017 and the #MeToo and Black Lives Matter movements?
- How do those from minority-protected characteristic backgrounds and under-represented backgrounds who have left engineering perceive the culture?

The approach to the literature review was agreed that research would be conducted over a course of 10 days using a combination of key-word search terms via internet search engines. A full list of literature reviewed can be found in the endnotes and is referenced throughout this section. The focus of the review was to link articles back to engineering, but where literature on engineering was more limited or unavailable, the research extended to professions more generally.

The findings from the literature review were used in subsequent research, inputting into the discussion guide and questionnaire design.

Key findings

The literature review finds that there is a general consensus across the engineering profession that there is a need to improve equality, diversity and inclusion. The reasons for this are threefold: there is a need to decrease the industry-wide skill shortage; there is a good business case for it (higher diversity links with higher levels of performance); and it is 'a moral imperative'.

There is limited literature on changes in perception following the #MeToo and Black Lives Matter (BLM) movements specifically regarding engineering. However, what is clear is that these movements sparked conversation, highlighted social issues, and encouraged debate and, in some cases, commitment to organisational improvement. Some independent research (non-engineering specific) suggests that those from Black, Asian or minority ethnic backgrounds are more likely to believe that momentum towards improving diversity has since subsided.

Since 2017 there have been many industry-wide initiatives within engineering to increase inclusion. For example, diversity has been written into high-level strategy documents and action plans, updated within standards and there have been new commitments to codes, charters and targets by organisations, governments, and universities. There have also been grants made available and an array of marketing publications, awards, and events to promote role models within the industry.

However, literature documenting change as a result of these actions is limited. The general perception appears to be that the initial steps have been taken to increase inclusivity, but there is still much work to be done and, in order to meet the industry-wide skills shortage, the pace needs to quicken. There are many theories as to why inclusivity remains an issue but essentially, there is no 'silver bullet'; increasing inclusivity is a complex issue that will require collaboration, and a real cultural change.

There is an abundance of insights on the barriers women may experience in the engineering profession, and why they may leave. Yet there is only an emerging presence of insights on diversity of ethnicity. For other protected characteristics, such as LGBTQ+, existing literature is very limited. This reflects the content of the limited evidence that is published: engineers are uncomfortable talking about their sexuality in the workplace. It appears that ethnicity and LGBTQ+ are behind gender in coming onto the agenda.

Majority attitudes towards increasing diversity

The literature review finds there is a general consensus across the industry that "there is a need to improve equality, diversity and inclusion in engineering due to the skill shortage, there is a good business case for it and it's a moral imperative" (aura, 2020)[1].

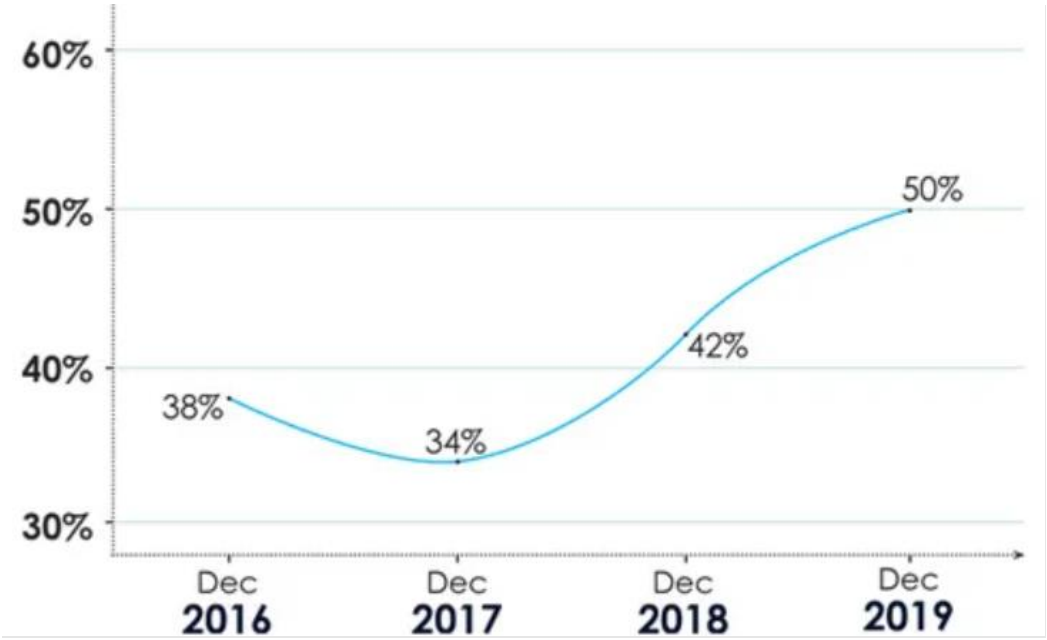
An article by Romansky in Harvard Business Review (2021) explains that more than 1,600 CEOs have signed onto the CEO Action for Diversity & Inclusion Pledge, and 40% of companies discussed diversity and inclusion in their Q2 2020 earning calls, versus only 4% in the same quarter a year prior.[2] The literature review finds very limited evidence of companies that are already achieving higher rates of diversity, although one example is Burro Happold, where women make up more than 30% of the technical workforce in the UK.[3]

Skills shortage

Many sources acknowledge there is a shortage of engineers in the UK, and Scrimgeour (2019) reports that "1.8 million new engineers and technicians are needed by 2025".[4] Improving equality, diversity and inclusion would help to fill this skills shortage. According to a research report by Search Consultancy (2021), engineering and manufacturing is the industry where managers are most likely to say their business had been affected by a skills shortage, and engineer is the third most 'in demand' job.[5] Additionally, in the latest Institution of Engineering and Technology (IET) Skills Survey report, it states that approximately half (49%) of engineering businesses are currently experiencing difficulties in the skills available to them when trying to recruit.[6]

The industry-wide skills shortage is reported as a concern that has been rising steadily for some years, and according to Cole (2020), is an issue that is likely to be exacerbated by the impending retirement of an aging workforce; 19.5% of engineers currently working in the UK are due to retire by 2026. In addition, research by Beirne (2020)[7] and others suggest there is also an expectation that COVID-19 may further exacerbate the workforce shortage and diversity issue, with school closures accentuating social disadvantages and women experiencing high levels of burn-out and, as a result, being more likely to consider leaving their jobs than before the pandemic.

Figure 1: Percentage of employers expecting to find a shortage of candidates for engineering roles, 2016-2019, REC[8]



The literature suggests the majority attitude is that increasing diversity is not only desired but required to fill the industry-wide workforce shortage. This is a view that is supported by organisations such as the IET, who states in its strategy document that it intends to use its position of influence within the engineering community to help drive a change.

Business case

The link between higher diversity levels and better business performance has been made, and widely accepted, in multiple studies carried out by organisations such as Deloitte, McKinsey, and the Centre for Talent Innovation in the US.[9] There are also several case studies within the engineering profession, which proves "diversity works". For example, according to Mark Carne, Network Rail CEO: "they found operational teams with 20% or more women had higher levels of employee engagement which in turn leads to higher productivity".[10] While the Institute of Physics (2022) identifies that "diverse organisations and teams have been shown to outperform those that are not [diverse], in [terms of] innovation, problem solving and business success."[11]

EngineeringUK details why it is determined to improve equality, diversity, and inclusion (EDI): "Research demonstrates that increased workforce diversity improves innovation, creativity, productivity, resilience and market insight". It is believed that a more diverse workforce will fill a skills shortage and better address the needs of a diverse society and world. As Griggs (2019) examples with neurodiversity: "the workforce of today and tomorrow needs dyslexic thinking, and dyslexic individuals should no longer be expected to 'fit in' but 'stand out' and focus on their strengths."[12] While the Chartered Institute of Building states that "diversity and inclusion in construction is a matter of business survival…[and] also a matter of business success."[13]

Moral case

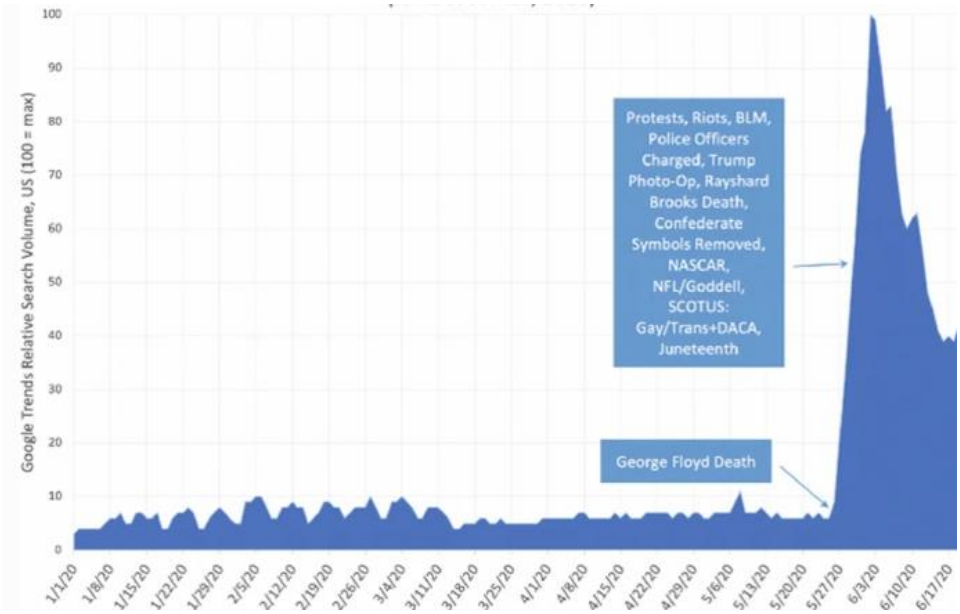
The moral imperative is a matter of simple fairness and social justice that everyone should have the opportunity to thrive and, as identified by the Institute of Physics (2021), people want to work in a more inclusive environment.[14] Additionally, the same article highlights that it is illegal to discriminate against individuals or groups based on legally defined 'protected characteristics.'

Changes in perception to inclusion since 2017 following the #MeToo and BLM movements

There is limited literature on changes in perception following the #MeToo and BLM movements. However, what is evident, according to Campbell (2021)[15] and others, is that the movements sparked conversation, highlighted social issues, and encouraged debate. Specifically, there is evidence the movement prompted open and public conversations with organisations, and highlighted instances where employers have fallen short and therefore, encouraged them to openly commit to improvement.[16]

A paper by Laurencin (2020), caveating that it focuses on America, graphs the uplift in 'interest' by looking at tracking racism searches before and after the death of George Floyd since the start of 2020:

Figure 2: The ebb and flow of concern about racism[17]



Laurencin (2020) concludes that this chart shows the shift in concern and a desire for a better understanding of racism taking place in America, following the events that took place after the death of George Floyd.

However, according to research by networking group People Like Us (non-engineering specific) "just 13% of people said their company actually hired more employees from Black, Asian, mixed-race and minority ethnic backgrounds and 29% said their company didn't do anything in response to Black Lives Matter".[18] Also, the perception from the same study is that the momentum towards improving diversity has subsided – an opinion held especially by Black, Asian, and minority ethnic workers (57% vs. 35% of the general workforce).[19] There also appears to be a regional divide, with workers outside of London more than three times more likely to say that their workplace has done nothing in response to BLM.[20]

Specifically regarding engineering, research shows the movement has been followed in the scientific community, with evidence of a pledge amongst thousands of researchers across the world to pause their work for the day in support of the ongoing BLM movements and efforts against racism in the scientific community and society at large.[21]

There is also evidence of organisations putting out statements in support of the movement, and in some instances, such as UCL Department of Chemical Engineering, going further to appoint action groups to focus on "taking action and implementing change to ensure anti-racism practice is at our core".[22]

However, perceptions following the movement are not all positive. The literature review shows anecdotal evidence of the experience of an engineering student: BLM was 'vividly affirmed' with posters along the hallways, emails from the president and from the dorm advisors. However, the increasing awareness and debate also stimulated undesired behaviours such as the defacing of posters and sharing of prejudice and biased opinions.[23]

Initiatives to increase inclusion

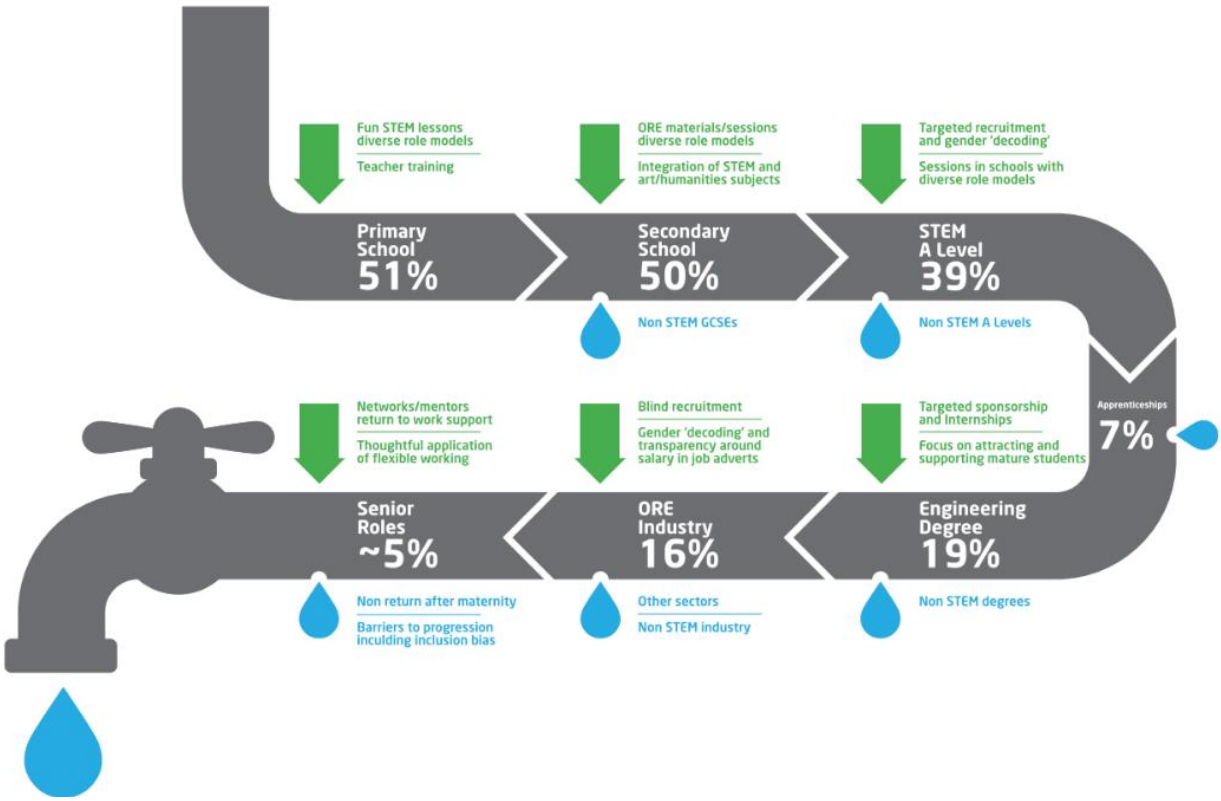
The literature review found a wide variety of initiatives have taken place since the publication of the Academy's 2017[24] inclusivity report. A key finding was that the report itself has since been widely cited and applied into strategies, action plans and frameworks. For example:

- **The Institution of Civil Engineers Fairness Inclusion and Respect Action Plan 2021-25[25]:** the Institution commits to self-monitoring through the Academy's framework, and following the specific actions mapped out across the framework to achieve Level 4 across all areas.
- **The Institution of Engineering and Technology Equality, Diversity, and Inclusion Strategy 2018-2023[26]:** the Institution commits to measuring success against the Academy's framework and to go 'beyond' the framework. There is a recognition that to date, diversity commitments have been largely focused on gender and this is a marked change to also focus strategies, campaigns, events, and awards on Black, Asian or minority ethnic groups, social mobility, LGBTQ+, disabilities, mental health, and neurodiversity.
- **EngineeringUK (2019) Equality, Diversity, and Inclusion Strategy 2019-22[27]:** includes the commitment to annually check against the Academy's framework and ensuring continual progression.

Although not explicitly mentioning the Academy's 2017 report, since its release there has also been the publication of:

- The Government Science and Engineering Profession diversity and inclusion strategy (2021)[28] which clearly outlines the objective to "ensure an inclusive environment for scientists and engineers within government". In addition, in 2020 the Government published a research and development (R&D) roadmap, setting out a "series of challenges and opportunities to drive forward UK science and innovation, across investment, regional growth, diverse skills, global talent and international collaborations".[29]
- The aura (2020) Equality, Diversity and Inclusion in Engineering: A Roadmap Towards Positive Change report puts forward suggested actions to target the 'leaky pipeline'. The report lays out specific actions for short to long-term initiatives as detailed in the diagram below (Figure 3).

Figure 3: Leaky pipeline – proportion of women and girls at each stage of progression in the energy/ORE sector[30]



Further specific initiatives are listed below and range from a commitment to standards, codes, charters and targets to marketing, networks, events, and awards to promote role models and ambassadors:

- **Updating of standards:** The UK Standard of Professional Engineering Competence (2020)[31] has been updated with greater emphasis on diversity and inclusion. In the third edition, diversity and inclusion was only included in the requirements for EngTech (competence D2). Whereas in the updated fourth edition, this is now also included in iEng and CEng, as D3 "demonstrate personal and social skills and awareness of diversity and inclusion issues".
- **Commitment to codes and charters:** Launched in 2020 the Tomorrow's Engineers Code[32] is a commitment to work towards common goals to increase the diversity and number of young people entering engineering careers. The code works by signatories (more than 100 engineering firms, professional institutions, government departments, subject associations, universities, museums, third sector organisations) making four pledges about their "approach to funding, designing, delivering, and learning from engineering-inspiration activities". A news publication shows the HS2 and Tideway, amongst others, have signed the Business in the Community's Race at Work Charter, a programme designed to improve employment outcomes for Black, Asian or minority ethnic employees in the UK.[33]
- **Commitment to targets:** set by either organisations or governments, such as the Offshore Wind (OSW) Sector Deal based on gender and Black, Asian and minority ethnic representation.[34]
- **Availability of grants:** in 2018 the Engineering and Physical Sciences Research Council funded 11 Inclusion Matters projects with the aim to "accelerate culture change with respect to equality, diversity and inclusion…aimed to incentivise behavioural and long-term culture change".[35] The funding is available on highly collaborative projects including universities, businesses and learned societies.

- **Marketing publications, campaigns, and events to increase interest and promote inclusive role models:** organisations such as universities and engineering firms are publishing articles, appointing ambassadors, running campaigns, and hosting events to promote role models and inclusivity. Examples include:
  - Campaigns such as "The Big Engineering Conversation."[36] This campaign had the aim of "encouraging discussion and increasing diversity". Also "This is Engineering" which aims "to bring engineering to life for young people and give more people the opportunity to pursue a career that is rewarding, future-shaping, varied, well-paid and in-demand."[37]
  - University of Bristol's "International Women in Engineering Day"[38] and "BAME girls in Engineering" offering the opportunity for Black, Asian and minority ethnic girls in years eight and nine to visit local engineering or technology employers to take part in mentoring meetings with professional women from Black, Asian and minority ethnic backgrounds.
  - A blog by EqualEngineers (2020) about engineering and technology LGBT role models.[39]
  - A series of videos profiling LGBTQ+ engineers, by Mott MacDonald in partnership with LGBTQ+ networking group InterEngineering and the Academy.[40]
  - A 15-page supplement "Engineering: time for change" published by the *Guardian* in 2019 which outlines how the image of engineering is considered to be slowly changing to be more inclusive.[41]
- **Awards:** organisations are using awards as an opportunity to showcase talent of all races, genders, ages, and backgrounds. One example is the 2019 Semta Skills Award where there is a category for diversity in engineering.[42]
- **Networks:** Some major engineering firms have established networks for LGBTQ+ engineers, such as BP Pride who host outreach days specifically for LGBTQ+ students.[43] Balfour Beatty has an LGBTQ+ network, women in business, multi-cultural, ability and generational issues, with information on all five groups disseminated around the business (believed to have been established prior to the Academy's 2017 report).[44]
- **Education:** for example, toys and books to avoid bias and misconceptions of engineering being just for men; Kerrine Bryan writes career-themed children's books, including *My Mummy is an Engineer*.[45]

Impact

Throughout the literature, the most common perception appears to be recognition that steps have been taken to increase diversity, but there is still much work to be done, and the pace needs to quicken. According to Kennedy (2021) "at the current rates of progress, it will take 50 years for the proportion of ethnic minorities in engineering to reflect wider society…well over a century for there to be the same number of women as men working in the sector".[46]

Also, to help illustrate this, according to Wise (2020)[47], there are now more than 53,000 women in engineering professional roles; that's almost double the number 10 years ago. However, despite all the industry-wide initiatives that have taken place to increase inclusion, the change in representation of women in engineering has been fairly limited. The number of women in engineering professions remains low, at just over 10%. This is especially low in the context of other nations such as Latvia and Cyprus where, according to research by Khan (2019)[48], women make up 30% of the engineering workforce. Katastie (2020) quotes Geofirma director Ebenezer Adenmosun to question the effectiveness of current measures: "What is the point of having charters if they are not improving the lack of representation of ethnic minorities or women in our industry?"[49]

There is limited reported evidence of positive change as a result of the initiatives, and what is available is anecdotal. One example is from Julian Phatarfod, principal transport planner at WSP,

who says "We're seeing organisations in engineering and the built environment moving beyond the surface of diversity with simple awareness-raising campaigns, but digging deeper into exploring intersectionality, the (re)definition of gender…we're seeing the status quo of our people, processes and systems being challenged".[50]

Instead, a re-occurring theme within the literature review is why the initiatives are having limited impact:

- There is no 'silver bullet' to overcoming the complex issue of EDI. There are many initiatives and groups that are working towards the goal of improving EDI but, according to aura (2020)[51], much work is in silos without large-scale collaboration. To be successful, the recommendation is that schools, universities, industry organisations, companies, and policies work in collaboration, to cooperate better to work towards overall common objectives.
- Policies are implemented with the best of intentions but, according to Chapman & Osborne and Burns & McDonnell (2020)[52], they don't yield results because the culture of the company as a whole doesn't change. It is considered that policies will only be effective if engagement starts at a young age. Perhaps suggesting it will take time before real change can be pulled through.
- As suggested by Bridget Rosewell CBE, Senior Independent Director at Network Rail, "it is not only about engaging women, but there is also a need to engage men more effectively to promote an inclusive working environment".[53] Vincent Nyambayo, Atkins principal geotechnical engineer, agrees that societal values and influence have a significant impact on perception of the world, or of those who they perceive to be different from them, and community/society needs to work harder and educate others that we are all equal.[54]
- McCarthy et al (2021)[55] propose there are important contextual factors that may prohibit (or propel) measures to promote gender equality including "a critical mass of women, role models, diverse leaders and inclusive cultures." This relates to issues in equality policies or initiatives being episodic, rarely measured, focused on short-term outcomes or entry-level and therefore, resulting in little meaningful change.
- There is a suggestion that smaller companies are finding it harder to welcome a diverse talent pool but there are toolkits with examples of good practice that are available to assist.[56]
- A report by EngineeringUK states "engineering has little curriculum presence and there is limited awareness and understanding of it amongst young people and their influencers. We must improve knowledge of engineering".[57]

Leaving engineering

The literature review found an abundance of insights on the barriers women may experience in the engineering profession, and why they may leave. There were fewer insights on diversity of ethnicity in the industry and research is very limited for protected characteristics, such as LGBTQ+.

Women

"The significant underrepresentation of women in engineering can be attributed to structural and cultural barriers within the academic and professional settings that women encounter in engineering, barriers that negatively affect their persistence in these fields."[58] With initiatives and strategies seemingly yet to make a significant impact, there are numerous articles being published on the underrepresentation of women in engineering and possible reasons for this.

According to an Institution of Mechanical Engineers survey[59] some of the top reasons for leaving the profession apply to men and women alike, for example being offered a better-paid job or

unreasonable workload and stress. However, some motives are clearly gendered, for example "54% of the surveyed women said they felt they were being treated unfairly compared to male colleagues".

The literature review highlights the following reasons for women leaving the profession:

- The culture is male dominated and can feel unwelcoming to women. Acknowledging there has been some recent improvement, the view is still held that availability of protective equipment remains an issue, with smaller sizes not always available when needed. The impact of this is two-fold: the woman feels unwelcome and like she doesn't fit in, and it undermines how she presents herself to her colleagues, dressed in oversized clothes.
- As a historically male-dominated industry, it is perceived that companies have been less considerate of women's needs so there is a lack of formal and informal women's networks. This is particularly an issue in terms of support with maternity leave and a lack of open communication on what women experience in the workplace. However, it needs to be noted that the perception of engineering seems to be changing. Boon (2020) analysed research by EngineeringUK and suggests there has been a shift, with girls no longer believing that engineering is 'just for boys': "94 per cent of girls at school-leaving age (16-19) in 2019 saying they agreed that engineering is suitable for boys and girls".
- Some women perceive they are not treated equally to their male counterparts.[60] In particular, the literature review highlights women are more likely to feel that their contributions are less valued than their male peers because tasks and roles are gender assigned.[61] This means women are more likely to perceive that they have been encouraged by mentors to take on the more professional side of engineering over the technical side. In addition, women are more likely to feel that they are being allocated the more secretarial tasks, even though they are deemed to hold the same qualifications and experience as their male counterparts.
- Although striving for improvement, there is still a lack of women in leadership positions which means women in more junior levels lack the examples to follow. There is also the mention of a potential 'glass ceiling' as a significant barrier, with anecdotal evidence that "many women get passed over for leadership opportunities and leave the engineering field".[62]
- Women are also more likely to be conscious of not wanting to be seen as 'getting advantages'[63] and feel on an uneven footing to prove themselves.
- Sibley (2016)[64] explores the idea that women are significantly more likely than their male counterparts to be interested in engineering work that is socially conscious and are therefore more likely to leave when they discover "the engineering profession is not as open to being socially responsible or dedicated to tackling pressing national and global problems as they had hoped".
- According to Brown et al (2020) research indicates that once entering an engineering career, 25% of women leave the field within five years and experience discrimination not endured by white men.[65] Instances of gender discrimination or harassment include examples of where women should adapt to the male-dominated environment in their behaviour and their dress, instead of addressing sexist behaviours to provide an inclusive workforce, or where there were no repercussions for perpetrators.[66]
- The Academy's 2017 inclusivity report also suggests there is 'inclusive privilege,' which means those who already feel included are least likely to act.
- The idea of how engineering is perceived and its relative status is lower in the UK than for example in Europe, where being an engineer is seen as equivalent to being a lawyer or doctor[67]. According to research by EngineeringUK, the perception of engineering as a desirable career path is an issue that is getting worse among girls aged 11 to 14, and young people aged 16 to 19 in particular. It is thought that this in part is due to the word 'engineering' being used far more loosely, with a sense of ambiguity around what an engineer actually is, lacking the prestige and high regard held in neighbouring European countries.

- Not valuing and thus offering limited opportunities for part-time and flexible working.

It is also important to highlight that for the above reasons, and experiences of the profession through internships, the literature review clearly highlights that the issue is not only in women leaving the profession, but also in engineering graduates never making it into the profession.

Ethnicity

In comparison to the availability of research on barriers women face in the engineering industry, insights on how those from an ethnic minority background perceive the culture is very limited. However, an article by Kennedy (2021) highlights that according to research by Atkins, "more than half of ethnic minorities abandon their engineering careers compared to 39% of white people".[68]

Kennedy (2021) also offers some insights on key challenges facing engineering, including:

- Conscious and unconscious bias operating to deny minority groups access to experiences, training and sponsors that could support their career development.
- Individuals from ethnic minority groups feeling isolated, marginalised, and lacking confidence and self-belief in their potential to progress.
- Discrimination experienced by ethnic minority groups despite existence of policies and practices to support diversity and tackle inequality.

Similar to the barriers facing women in engineering, Kala (2020) in a guest post for EqualEngineers,[69] also suggested the idea of stereotypes and lack of role models as a barrier to career progression; a lack of visibility and role models can cause Black, Asian and minority ethnic professionals to question their place and opportunity for development within a company and the sector at large.

It should also be noted that an individual's characteristics are multifaceted and as such, Stitt et al (2019)[70] describe how their experiences can be a 'double bind', meaning they can be made to feel more unwelcome due to being both a woman and from an ethnic minority background. This is further evidenced in the Academy's 2017 inclusion report which states: "White male engineers feel that the culture of engineering is more inclusive than female engineers who in turn feel that it is more inclusive than engineers from [Black, Asian and minority ethnic] backgrounds".[71]

LGBTQ+

In comparison to the availability of research on barriers women face in the engineering industry, insights on the LGBTQ+ community is very limited.

Less than half (46%) of gay engineers said that they would be comfortable in being open about their sexuality in the workplace, and this falls to only 8% of engineers working on construction sites, according to a study conducted by the House of Commons and InterEngineering. Amongst those LGBTQ+ employees surveyed in the report, 83% said they changed an aspect of their appearance or lifestyle to fit in at work.[72] The same study also suggested that homophobia is one of the few aspects left unchallenged on construction sites, resulting in direct discrimination towards gay engineers, 7.5% of whom described open abuse and discrimination at work.

Tom Guy,[73] Guy Piper Architects co-founder and National Student Pride co-founder, describes the culture of engineering as 'laddie' and 'macho.' While Sarah Foster, Stonewall head of global workplace programmes, describes construction sites as a very tough place for LGBTQ+ people to be, due to the "significant barriers to progression, from bullying and harassment in the workplace to isolation and lack of support from management".

2. Primary research

Primary research methodology in detail

Qualitative fieldwork

For the qualitative research, we conducted a small range of focus groups and in-depth interviews with engineers and employers from different sectors across the profession. When we use the term 'engineers' in this work we are referring to, and including, both chartered and non-chartered engineers as well as those working on engineering projects, such as project managers, directors, and co-ordinators. All participants had to have worked in engineering in the UK to qualify.

When we use the term 'employers' in this work we are referring to and including those working in diversity and inclusion (D&I), human resources (HR) or the heads of smaller engineering organisations whose roles encompass these responsibilities. All employers had to have worked in companies based in the UK.

We have completed **26 focus groups** with an average of three to four participants in each group. Focus groups lasted around 90 minutes and have consisted of:

- **7x** White men groups
- **5x** Women groups
- **5x** LGBTQ+ groups
- **6x** Black, Asian and minority ethnic groups
- **3x** Employer groups

Some participants identified as being in multiple characteristic groups. In this case, participants were asked which of the groups they would prefer to attend as the conversation would likely be focused on the experiences relating to the prevailing characteristic of that group.

We have also completed **50 individual in-depth interviews** with participants who self-identified as being in one or several of the following characteristic groups:

- **25x** Women
- **25x** Men
- **5x** Employers
- **11x** LGBTQ+
- **13x** Disabled
- **11x** Black, Asian or minority ethnic
- More than a quarter of the participants we spoke to had intersecting characteristics.

In total we have engaged with **150 participants** in the qualitative research.

Qualitative sessions were semi-structured using a discussion guide to ensure that key themes of the research were covered but also to allow for the natural flow and tailoring of conversation to different experiences and circumstances.

The qualitative feedback in this report will summarise the personal, lived experiences, views and opinions of the participants we spoke to. We try to present this feedback in the language and tone in which it was provided and avoid applying our own personal judgement and viewpoints to this evidence. Therefore, please note that this feedback is not a reflection of the views of DJS Research or that of the Academy. Qualitative feedback explores the different personal experiences of participants to better understand views and behaviours rather than trying to provide a consensus or quantification of a fixed concept.

Quantitative fieldwork

For the quantitative fieldwork we conducted structured online interviews with 1,507 engineers. As with the qualitative work, when we use the term 'engineers' in this work we are referring to, and including, both chartered and non-chartered engineers, as well as those working on engineering projects such as project managers, directors, and co-ordinators.

The sample of engineers we spoke to in this research was targeted through an email sent to Academy members and through a social media campaign, also led by the Academy. In addition to efforts made through these channels, we also supplemented the sample by sending the survey out via national research panels. Participants were screened in order to ensure their suitability for this study. To qualify, respondents must work 'as an engineer, or in an engineering related role, or on an engineering project', and must work within the UK.

Our aim with the quantitative survey was to reach a broad group of engineers, however there are a couple of things to note in relation to the sample of engineers who completed the online survey:

- Several networks with links to the Academy promoted the survey, including the Women's Engineering Society (WES) and the Association for Black and Minority Ethnic Engineers, UK (AFBE-UK), amongst others. This led to high response rates from typically underrepresented groups.
- Due to the survey topic of inclusivity and diversity, it is likely that there is some scope for self-selection bias, with underrepresented groups being more likely to feel strongly about this topic and perhaps more likely to participate as a result. Nevertheless, we did see a robust sample size of those who did not identify with any protected characteristics (n=177). The responses we received are wide ranging and provide a strong basis to compare feedback from those with protected characteristics, both with each other and those who did not identify with any protected characteristic. The quantitative results should therefore be interpreted as a 'collection of viewpoints', rather than a representative 'industry view.' Furthermore, when comparing results with 2017, differences between the two samples should be considered, and it may be more useful to compare subgroups rather than the samples at a total level.

Below is a breakdown of the engineer sample we spoke to:

Table 1: Demographics

Demographics	%
Gender	
Man	**59%**
Woman	**37%**
Non-binary/self-describe	**2%**
Prefer not to say	**2%**
Are you trans or do you have a trans history?	
No	**94%**
Yes	**3%**
Prefer not to say	**3%**
Nationality	
UK National	**90%**
White	*75%*
Asian/Asian British	*8%*
Black/Black British	*4%*
Mixed/multiple ethnic group	*3%*
Prefer not to say	*1%*
Non-UK national	**9%**
Europe (excl. UK)	*5%*
Asia	*1%*
Africa	*1%*
South and Central America	*1%*
North America	*<1%*
Middle East	*<1%*
Oceania	*<1%*
Prefer not to say	*<1%*
Prefer not to say	**1%**
Age	
18-24	**8%**
25-34	**25%**
35-44	**26%**
45-54	**18%**
55-64	**12%**
65+	**5%**
Prefer not to say	**6%**

Sexual orientation	
Straight/heterosexual	**81%**
Asexual	3%
Bisexual	6%
Gay man	3%
Gay woman/lesbian	1%
Queer	1%
Pansexual	1%
Self-describe	1%
Prefer not to say	4%
Disability or physical or mental health condition lasting or expected to last 12 months or more	
No	**81%**
Yes	**16%**
Prefer not to say	**3%**
Experience barriers or limitations in day-to-day activities related to any disability, health conditions or impairments	
No	**77%**
Yes	**20%**
Prefer not to say	**2%**
Care responsibilities	
No	**71%**
Yes	**27%**
Childcare	*18%*
Adult care	*6%*
Both child and adult care	*2%*
Prefer not to say	**3%**
Type of school attended from ages 11-16	
UK state	**60%**
UK independent	**13%**
UK state selective	**11%**
UK other	**2%**
School in a country outside of the UK	**12%**
Prefer not to say	**2%**
When you were 18, had any of your parents or guardians completed a university degree course or equivalent (for example BA, BSc or higher)?	
No	**57%**
Yes	**39%**

Don't know	**3%**
Prefer not to say	**2%**
Did/do any of your parents or close family work in the engineering profession?	
No	**52%**
Yes – father	**32%**
Yes – grandparent	**9%**
Yes – brother	**8%**
Yes – mother	**6%**
Yes – sister	**2%**
Yes – other	**4%**
Prefer not to say	**2%**

Source: D01, D02, D03, D04a/b, D05, D06, D07, D08, D10, D11, D12, D13 **Base:** all respondents (n=1,507).

Table 2: Firmographics

Firmographics	**%**
Region mostly worked in	
England	**85%**
Scotland	**7%**
Wales	**3%**
Northern Ireland	**2%**
Across the UK	**4%**
Number of employees	
Small (1-49)	**20%**
Medium (50-499)	**34%**
Large (500+)	**47%**
Job level/grade	
Intern	**3%**
Apprentice	**5%**
Graduate	**14%**
Non-management	**36%**
Management	**28%**
Senior management	**14%**
Years post- qualification experience	
Less than 2 years	**11%**

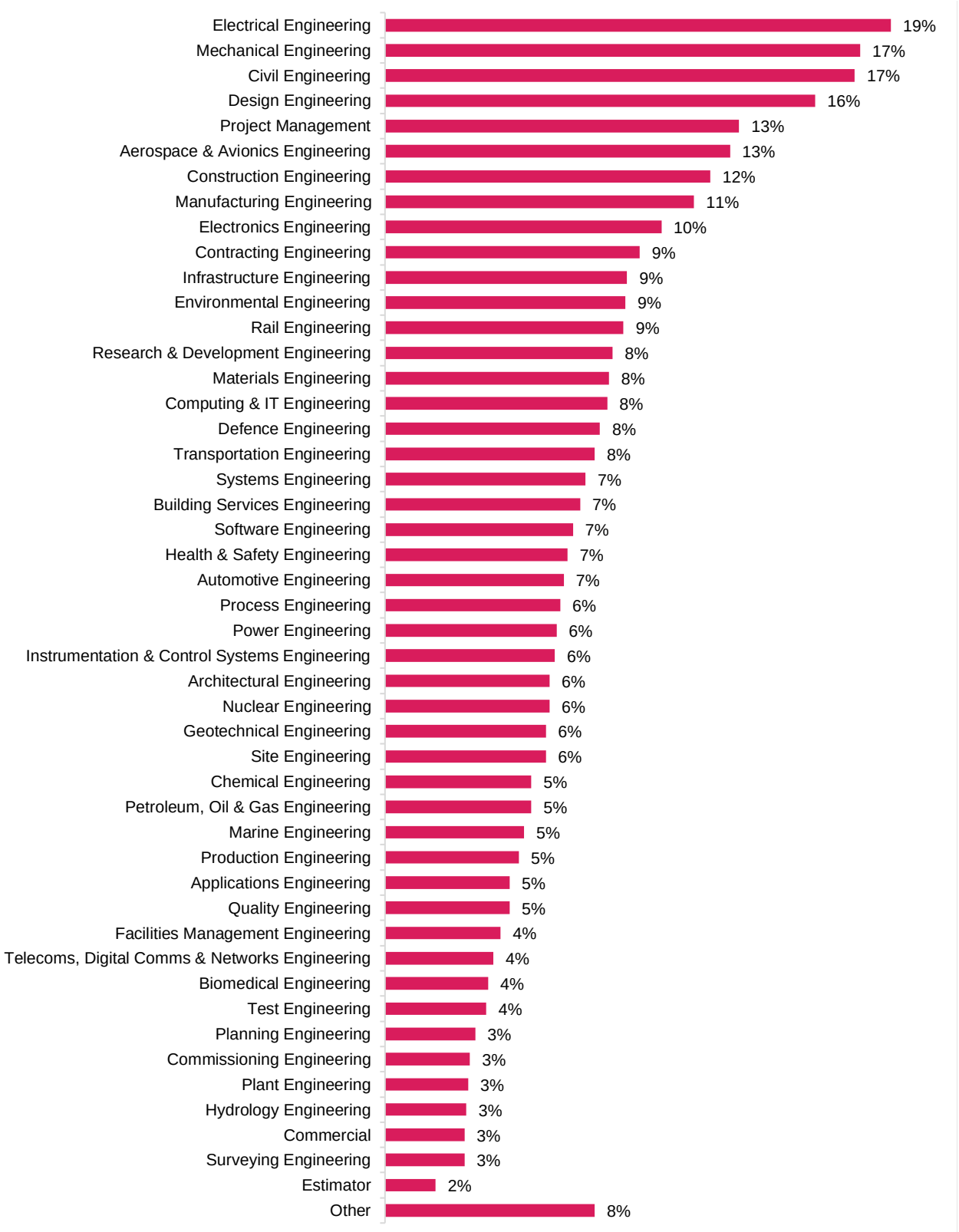
2-5 years	**16%**
6-10 years	**20%**
11-15 years	**14%**
16-20 years	**10%**
More than 20 years	**30%**
Main job location	
Office-based	**43%**
Manufacturing	**20%**
Home-based	**15%**
Site/field-based	**11%**
University	**7%**
Offshore	**2%**
Other	**2%**
Do you work flexibly, either formally or informally?[1]	
Yes	**69%**
Hybrid working (for example informal / ad-hoc remote working)	*50%*
Contractual agreement to work remotely / from home	*7%*
Term time only	*2%*
Compressed hours	*3%*
Part-time (<30 hours per week)	*4%*
Other	*2%*
Prefer not to say	*1%*
No	**29%**
Prefer not to say	**2%**
I am a member of a professional engineering institution at any grade/level	**60%**
I am a registered engineer	**57%**
I belong to an engineering network outside work (social or professional)	**44%**
I belong to an employee network at work linked to diversity	**38%**

Source: S02, D14, D16, D17, D18, D19, D20 **Base:** all respondents (n=1,507).

[1] Question asked is 'Which of the following best describes your flexible working arrangement?'. Respondents could only select one answer.

We managed to speak to engineers working across a broad range of industries:

Figure 4: Discipline of engineering



Source: D15. Which field/discipline of engineering do you currently work in/is your company involved in?
Base: all respondents (n=1,507). Please note, respondents could select multiple options from the list.

Entering the profession of engineering

This section will review the experiences of engineers and the opinions of employers that were received in the qualitative fieldwork only. This section explores the attraction of the engineering profession, influencing and detracting factors when considering engineering and any barriers or supporting factors when gaining qualifications or employment in engineering.

Sources of inspiration

Family connections (qualitative feedback)

The qualitative feedback from engineers identifies a significant pattern around having a close family member who has worked in the engineering profession. This appears to be almost exclusively limited to male family members, typically fathers. This seems to be particularly the case for women engineers.

Having this family connection appears to be key in terms of getting engineers engaged in the topic at a young age, with experiences such as visits to plants/facilities as a child or supporting a family member to construct something at home often helping to ignite a level of interest and excitement.

This family connection is also noted as important in terms of it ‘preparing’ them for what to expect from the industry and that it offered some exposure into the work culture of engineering which appears to have been helpful when entering into the industry.

The influence of schools (qualitative feedback)

Many engineers note in the qualitative feedback that they found themselves in engineering or were able to break into the industry despite their school level education. Often experiences at school seem to be that engineers were not provided with much in the way of knowledge or guidance around the topic. Schools appear to often have solely focused on maths and sciences in isolation rather than being connected to wider science, technology, engineering and mathematics (STEM) industries and opportunities.

However, some engineers did note they had been inspired by talks at school from a visiting company or they had taken part in activities at summer schools that involved outside/third party organisations (often younger engineers). In light of this, there seems to be a theme around organisations in the industry doing a much better job at sign-posting and inspiring young people than internal resources at schools (bearing in mind that most of these experiences will be dating back to more than 20 years ago).

We also heard from some (almost exclusively male) engineers about being strongly persuaded or even told to pursue a STEM career by their teachers who felt they didn’t have the softer skills required to enter into creative industries or the arts. Some teachers appear to have profiled pupils at a young age and either shut off other options or pushed students down a particular subject route. This perceived profiling is assumed to be at the disadvantage of encouraging young women into the profession.

> "My teachers made this assumption that I couldn't do literature or the arts and pretty much forced me down the STEM route. I've produced several publications now in my life, so I clearly can write. I think if I were a different gender this wouldn't have been the case as many of my female peers were pushed towards the Arts."
>
> **Engineer, Defence, White, Male**

> "I remember telling a teacher that I was interested in becoming an engineer and they looked at me in almost disgust – open mouthed! They pretty much explained to me that it wasn't an appropriate career for women."
>
> **Engineer, Defence, White, Female**

There is also a view expressed by engineers from less wealthy backgrounds, who attended schools in more deprived areas, that there was an assumption made by their teachers that they were unlikely to succeed in occupations such as engineering due to the need to go to university. As a result, even some extremely capable and high-achieving students in STEM subjects were given little encouragement to pursue engineering as a viable career option.

There are also instances recalled of teachers and fellow pupils questioning and challenging women students who chose to pick STEM subjects or who demonstrated an interest in engineering. One woman notes that this was the case for her at school but is unfortunately also still the case for her daughter currently in secondary school.

> "The boys in my daughter's coding class still ask her why she's there as it's a 'boy thing', she even finds herself having to justify her interest in engineering to teachers. Her teachers appear to know very little about engineering but seem to know enough to try and dissuade her from going into it."
>
> **Engineer, Software, White, Female**

Family pressures (qualitative feedback)

Some engineers, particularly those from South Asian or Black African backgrounds note feeling some amount of pressure to study and succeed in STEM subjects with family members believing this to be the best route to take to end up in a 'prestigious' profession. Interestingly, a few noted sensing some level of disappointment from their parents that they had chosen to go into engineering as opposed to the medical profession, with the latter being perceived as more esteemed. Others found family members selected the engineering route for them, but again this was sometimes as a second option, behind medicine.

While family connections can be influential to entering the profession, we also heard of some engineers being discouraged by family members already in the profession. The reason for this was to protect them from some of the more negative aspects of the engineering culture that they had themselves experienced, including:

- The perceived lack of work/life balance.
- The need to be "tough"' or "thick-skinned" in order to fit in and thrive.
- The lack of job and progression opportunities in some engineering sectors/roles.
- Negative perceptions or pre-conceptions of how engineers from Black, Asian and minority ethnic backgrounds are treated or might be treated.

The appeal of engineering

Making a "tangible" difference

For many engineers, the main appeal of engineering came from a desire to play a part in building, creating, or designing something that is visible and tangible rather than working in a service-related industry where it is much harder to measure and gauge your efforts and achievements.

> "I just really liked the idea of working towards building something that I could see with my own eyes, you can see what all that time and effort went into. That's incredibly rewarding."
>
> **Engineer, Construction, White, Male, LGBTQ+**

A "natural ability" (qualitative feedback)

There is a key trend among engineers around being hands-on and inquisitive from a very young age, having a desire to pull things apart, understand how they work and put them back together again. There seems to be a natural ability amongst some engineers from their childhood years to quickly pick up a basic principle and understanding of how things work and then apply that practically.

> "As a little girl I would go around the house and pull apart all the objects and electronics to see how they were working and try to 'fix' them. My mother was not best pleased."
>
> **Engineer, Chemical Engineering, Other Minority Ethnic, Female**

Many engineers also noted being gifted at STEM subjects, particularly maths and how that made it much more accessible to them to easily and naturally transition into engineering. Some engineers even go as far as describing themselves as being 'nerds' or having the right characteristics to 'fit' the job, such as being very precise or even pedantic. However, employers note that this assumption that you have to be naturally gifted at maths or a particular personality type can also be quite prohibitive to those considering a career in the industry.

> "I was a nerd and I was proud of it, I was always good at maths and sciences so I was the 'right type' so to speak."
>
> **Engineer, Oil and Gas, White, Male, Disability**

A world of opportunities (qualitative feedback)

Engineering is felt to be a great industry to enter into in order to ensure continued self-development, with there being a strong recognition of organisations helping to equip employees with the tools, skills and further training they need to succeed in the profession.

In addition, for some engineers, the opportunity to enter into an industry that could help them travel and experience new places and opportunities was particularly appealing. We heard this especially from those that chose to join the defence industry, as this route was seen to offer opportunities to those who may not have otherwise been able to access them, often due to coming from more economically deprived backgrounds. Such opportunities included being able to go abroad for the first time, or further education opportunities that were not perceived to be attainable to them through traditional routes at that time (often because of economic background).

> "I came from a very working-class background so the university route would have been largely unachievable for me. One day I saw this documentary on the Navy and I saw all places they would visit and the responsibilities they were given… I was able to get all my higher and further education through the Navy."
>
> **Engineer, Defence, White, Male**

Prior concerns and preconceptions of the industry

A narrow perception and awareness of the industry (qualitative feedback)

Both engineers and employers note there is currently an 'image' problem in the industry, with perceptions of limited opportunities and routes into the profession. There is a view that the opportunities that do exist tend to be roles in hands-on manufacturing and construction, which can be less appealing to some due to the following:

- Concerns about working outside in the elements.

- Concerns about working in a factory/plant type environment.
- Concerns about wearing particular uniforms or health and safety protection.

There appears to be less awareness and focus on the more desk-based and management/design type roles that can seem more appealing and/or accessible to some. This is particularly the case for those who have a disability that prevents them from doing more hands-on forms of engineering or accessing facilities/plants that may not be very accessible to those with mobility issues.

Some engineers also feel that the profession is not widely recognised as being a highly skilled occupation due to the title 'engineer' not being protected and therefore often used in relation to less qualified, manual occupations such as domestic heating, ventilation and air conditioning or telecoms engineers. However, others do argue that this view is in itself quite excluding and comes from a place of elitism and snobbery.

> "I was acutely aware of others having a perception of it as being like Kevin Webster of Coronation Street, you know, fitting a Sky dish."
>
> **Engineer, Utilities, Female, LGBTQ+, Disabled**

> "You're going to hear a lot about the definition of engineers and whether it should be limited to those who are chartered. As the son of a gas engineer though I find that quite insulting to assume that my dad was any less of engineer just because he couldn't afford to go to university."
>
> **Engineer, Consulting, White, Male, LGBTQ+**

A masculine/male-dominated culture (qualitative feedback)

Many engineers said they expected the engineering profession would be mainly male dominated, particularly in the areas of chemical, oil and gas, rail and defence. Some even had the impression that women didn't tend to get very far in the industry due to a lack of women in senior roles or within the companies of their relatives in the industry.

> "My dad had been in engineering for over 30 years, and he had never experienced women going far in the industry so this gave him the impression that it wasn't a good choice for me as a female at that time to go into it, as it wasn't for females."
>
> **Engineer, Rail, Other Minority Ethnic, Female, LGBTQ+**

Some did have concerns that this may result in a 'macho' culture and that the industry may not be welcoming to someone outside this 'macho' personality type. This was a concern expressed among a range of characteristic types including white, heterosexual men.

> "My dad didn't think I would cut it because it is a very 'macho' culture so to speak, and I wasn't like that at all, fortunately at uni I found a group of friends that took it upon themselves to take the micky out of me at any opportunity and I guess that helped to prepare me and toughen up for it."
>
> **Engineer, Oil and Gas, White, Male**

Engineers regularly referred to preconceptions and concerns about entering into an industry where a 'micky-taking' culture was prevalent. Those with family members in the industry already appeared to be more aware of this culture and even claimed that having their own relatives bring some of this culture home – or exposing them to it at a young age – helped to mentally prepare them for this. There were concerns however that those who were not as 'prepared' for this may find it off-putting.

> "I think my father brought some of the engineering culture home, so he's probably prepared me for my career, it was very much a micky-taking environment at home. And I think, though I don't think that's a good thing for the engineering profession. I think it was good for me in my career, because it meant I could deal with that when I went into the work environment."
>
> **Engineer, Aerospace, White, Female**

> "If you grow up around an engineering culture you learn that it's not personal and it's just a black humour that helps you get through the job. I guess if you've not grown up around that though it may be harder to accept."
>
> **Engineer, Automotive, White, Female**

Others claim that this 'male-dominated' culture was to be expected and they were more accepting of this as being 'simply the nature of the industry'.

The vast majority of women we spoke to noted that they were one of only a few women on their courses at university, with the number of women on engineering courses noted to be as little as 10% in many cases, if not lower. As a result, this set an expectation early on that they would be a minority within their industry.

A narrow concept of routes into the profession (qualitative feedback)

Some employers note that a barrier to receiving a good and broad range of candidates may be that often candidates assume that only more traditional routes into their sectors will be accepted, such as relevant degrees and apprenticeships/work experience. However, there are often other routes and experience types that can be considered by some organisations. It is possible some companies are insistent on a very specific set of entry requirements and there is an assumption by some that this is reflective of the wider industry still.

> "There is still an assumption out there that organisations will only be interested in candidates with STEM degrees or through apprenticeships but actually there's a whole management and leadership aspect to the industry. We often find the best people for those roles don't always come from the STEM backgrounds but because of that perception, they don't even consider it."
>
> **Employer, Diversity and Inclusion, Utilities**

A profession not suited to family life (qualitative feedback)

Engineers from across all groups noted a perception (and often a reality, in fact) of engineering not being suited to those who wish to focus on, or place importance on, family life.

This impression is due to the understanding that engineers are often:

- Expected to travel for work.
- Placed on long-term secondments in different locations.
- Expected to work shifts or unsociable hours.
- Expected to not allow anything to get in the way of project delivery.

This perception is often reinforced by experiences of family members who have worked in the industry and may have spent a lot of time working away from home.

> "In my Dad's company you would see this level at which women with families just wouldn't progress beyond or they would drop-out at, because at that level they would be expected to go to secondments abroad. It was really the only way to climb the ladder and it's just not possible for most mums to relocate to the Middle-East or South America or wherever for a few months."
>
> **Engineer, Oil and Gas, White, Female**

There is a general recognition that this perception disengages some women from entering the industry, particularly since there is often still the expectation of women, or indeed the desire from women, to take on the largest burden of responsibility when it comes to childcare commitments.

> "As fantastic as my husband is, the fact of the matter is [that] as women, we are often landed with the extra level of responsibility at home and we are expected to project manage home life and childcare, on top of our careers."
>
> **Engineer, Civil Engineering, White, Female**

Barriers to entering the profession

Poor experiences in academia (qualitative feedback)

The experiences that prospective engineers have while at university can sometimes appear to set the tone in terms of how welcomed they feel when trying to enter the profession. A poor experience stays with engineers for some time and even appears to impact their confidence in their ability or chances of progression – even once they have qualified and started employment.

In fact, some engineers feel that their experiences in the world of academia were some of the worst examples of discrimination and bias they had experienced, and that the reality of working in paid employment was better than they had expected, given the expectations these experiences had set.

Many of the examples of poor experiences and discrimination faced in the academic world appear to be from women, including:

- Inappropriate comments/comments of a sexual nature.
- Women students not being put forward for speaking events or conferences.
- Male students appearing to receive more encouragement and reassurances about their prospects in the industry.
- Women PhD students asked to do more administrative or mundane tasks.
- Talks and lectures noting a 'glass ceiling' for women in the profession but providing little advice or guidance as to how to mitigate this issue, and instead simply setting expectations for women in the industry to encounter it.

> "I was told that if I didn't achieve the points I needed, that the tutor would make an exception because he liked redheads."
>
> **Engineer, Professor, Female, Disability**

> "We all attended an important faculty meeting, and I was the only female there and I was asked by one of the senior professors if I could make the coffees."
>
> **Engineer, Academia, Other Minority Ethnic, Female**

Some negative experiences relating to ethnicity were also mentioned, particularly at PhD level and above including:

- Not being assigned to the more prestigious research projects, despite being better qualified.
- Projects with mainly Black or Asian students and/or professors working on them not being successful in receiving funding.
- Professors taking white students 'under their wing' and investing more time and energy into them than Black or Asian students.

> "I just couldn't understand why I wasn't assigned to the project. I had the highest grades, the most relevant experience, but it went to the only white student that applied to work on that project who on paper was the weakest."
>
> **Engineer, Aerospace, Asian, Male**

Some of these experiences are attributed to outdated views and attitudes remaining unchallenged and that the world of academia has failed to move with the times in the way that commercial organisations have had to, to help with retention and to meet industry and client demands. As a result, there appears to be less pressure and scrutiny in some universities to tackle the issues around EDI.

> "I think the commercial world has moved on, whereas universities don't feel the need to in the same way, they are populated with older, white male professors who often haven't worked in the commercial world for decades, so they still hold those outdated views and belief systems as to how the industry operates."
>
> **Engineer, Chemical Engineering, White, Female**

Feeling excluded or not well represented at interview stage (qualitative feedback)

A number of Black, Asian and minority ethnic engineers noted feelings of exclusion or feeling like 'an outsider' when going through interviews and other recruitment processes at organisations. Experiences relating to this include:

- Seeing no Black, Asian or minority ethnic representation in the company either on interviewing panels or on company tours.
- Seeing a lack of ethnic diversity and representation in the local areas where some companies are based.
- Having their CV with their actual name declined but being successfully selected when using their 'Anglicised' name.

> "We see it a lot where we finally manage to get some really good [Black, Asian or minority ethnic] talent coming through at interview stage and they may even like us as a company but then they take a walk around the town here and it's as white, middle-class suburbia as it gets, and it just doesn't feel welcoming to them."
>
> **Employer, Diversity and Inclusion, Defence**

Even after being successfully selected for roles, some Black, Asian and minority ethnic engineers felt compelled to decline offers based on how represented and included they felt at interview stage.

> "I really liked the sound of the job but the way they made me feel during the interview was awful, there was no way I could accept the role. It was a room full of white men in suits. I felt like they were looking down on me from the start. There was no engagement at all. They spoke to me in a very condescending way."
>
> **Engineer, Oil and Gas, Black, Female**

Concerns about inclusion also extended to women engineers who noted both a lack of representation on interviewing panels and senior teams, as well as some negative experiences during the interview stage such as being asked when and if they intended to start a family.

Employers noted issues when attempting to provide more representative and diverse panels for interviews. The main barrier appears to be that because organisations often have far fewer Black, Asian, minority ethnic or women employees at senior levels, the task of attending interviews becomes onerous and time consuming to them.

Nepotism (qualitative feedback)

Engineers note the importance in some engineering professions of securing work placements or work experience, particularly in order to demonstrate an interest in a particular field.

However, without family connections in the field it can be much harder to gain such opportunities and there is noted to be some sectors strongly reliant on nepotism and the recruitment of various members of the same families. This practice makes it harder for 'first generation' engineers to break through and to bring in a greater variety and diversity of employees.

> "You see it a lot still, we're employing this person and he just happens to be the son of this Director… it becomes much harder to have a diverse workforce when you have generations of the same families keeping some businesses going or at least taking opportunities with that advantage."
>
> **Engineer, Manufacturing, White, Male**

> "In the railway, a lot of it is about who you know. It's a really incestuous industry so everyone has worked with each other before and there's a lot of 'railway families' working across the sector. I have three family members in the industry currently."
>
> **Engineer, Rail, White, Female**

Job requirements creating a crisis of confidence (qualitative feedback)

Entering into a career in engineering is noted to be daunting and intimidating given the often important nature of the projects worked on and the serious (potentially fatal) or costly consequences of projects failing or mistakes being made. As a result of this, organisations are noted to be extremely picky or even ambitious in the level of aptitude, skill and experience they expect from potential candidates, even at entry levels, and this can often be reflected in the job requirements advertised.

Both employers and some engineers have noted that employers listing ambitious 'ideal' level requirements, as opposed to just the core basics required to do the job, can alienate potential candidates, particularly those from underrepresented backgrounds.

The language and tone used in engineering job adverts were noted to, at times, sound "very masculine" and were even described as intimidating:

> "If you already feel that you are at a disadvantage because of your background and your gender, you are far less likely to apply for a job unless you really feel like you are meeting if not exceeding all the stated requirements, and the descriptions they use are very male in nature."
>
> **Engineer, Oil and Gas, Black, Female**

> "There have been studies that have shown that men are far more likely to apply for a job if they only meet the basic requirements, whereas women will often only apply if they meet all the requirements listed so they are discounting themselves from the outset."
>
> **Employer, Diversity and Inclusion, Oil and Gas**

Getting a foot in the door – a key barrier for Black and Asian candidates (qualitative feedback)

Very few white, particularly male, engineers noted difficulties in finding employment once they had gained the qualifications needed to meet the basic entry requirements of a job. However, some women, and many Black, Asian and minority ethnic engineers, noted far more difficulties when it came to being considered for a job – particularly getting to interview stage.

While it is recognised that companies claim to be trying to employ a more diverse workforce, there was a sense of scepticism among some engineers as to whether or not this was, in reality, the case. It was also questioned whether sufficient changes have been made to recruitment processes to ensure that there is not bias against certain groups and backgrounds based on the use of language, qualification type and descriptions of their capabilities.

Concerns were raised about how open companies are to employing first generation immigrants given that their qualifications and job experiences where not gained in the UK.

> "I have worked in a few countries and never experienced an issue finding work before. I have a PhD, all the qualifications, I have worked in the industry for years and have project managed numerous projects in the sector but after sending out hundreds of applications in the UK, I only heard back from one company. I can only assume this is because of where I am from and who I am."
>
> **Engineer, Oil and Gas, Black, Female**

Concerns were also raised about name biases still existing, with some engineers noting that they felt using their actual name was holding back their employment opportunities and that

they were more likely to be invited to interview for a position if they used their anglicised name.

> "I still see it now, that many candidates feel that they need to use the English version of their names when applying for the job and interestingly I have seen the same CV submitted with different names before, so there's clearly still candidates feeling they are facing this barrier."
>
> **Employer, HR, Chemical Engineering**

A logistical and physical barrier: an inability for all sectors to adapt (qualitative feedback)

In addition to barriers based on biases and perceptions, there were also noted to be some physical barriers to entering certain sectors of the profession. For instance, in some sectors there is still a lack of separate hygiene facilities for women, meaning companies are unable to offer opportunities to women to work in these facilities, or for women to work in these facilities for any length of time, including submarines, construction sites, factories, ships and oil rigs.

> "I needed access to a feminine hygiene bin and when I asked what I should do I was told I needed to take home my period products, no other solution was offered. I had to use a plastic sandwich bag and carry it in my handbag."
>
> **Engineer, Construction, White, Female**

> "I needed to be onsite at a factory for a few days for a project but soon found out that there were no female toilets on the site and no female changing facilities. I decided it just wasn't possible for me to attend for more than a couple of hours. I didn't feel comfortable sharing the men's facilities."
>
> **Engineer, Manufacturing, White, Female**

Some women engineers even noted a reticence for companies to offer them opportunities or roles in facilities where they would likely be one of a few, if any, women. We were also told of instances where women engineers were made to feel intimidated because they were one of the women in the company or facility.

> "Recently for the first time we had a female officer on a ship with over 300 men, she was the only female. She was given a lot of attention and I would say most of it unwanted and that must be intimidating."
>
> **Engineer, Defence, White, Male**

In the qualitative research we found that we have spoken to very few engineers with a disability significantly impacting their mobility, and out of those that we have spoken to, many developed this disability later on in their careers. Feedback from these engineers also suggests that they believe they would not have been able to have entered the industry at all if their disability was pre-existing because of:

- The sometimes physically demanding nature of the job (handling equipment, operating machinery)
- The need for some engineers to access equipment and machinery in hard to access areas within facilities (climbing ladders or scaling tight platforms)
- The need to be on-site in often hard to access places (construction sites, train lines)
- The need to pass fitness tests (particularly in the military)

It is noted that there are a limited number of ways in which employers can currently support those with a disability to mitigate all of the areas above and in some cases a reluctance to make such investments or changes, particularly for someone at the start of their career.

When speaking to employers about disability, there appeared to be a considerable focus on neurodiversity and learning or cognitive disability but less of a focus on making workplaces more accessible for those with physical disabilities.

The culture of engineering

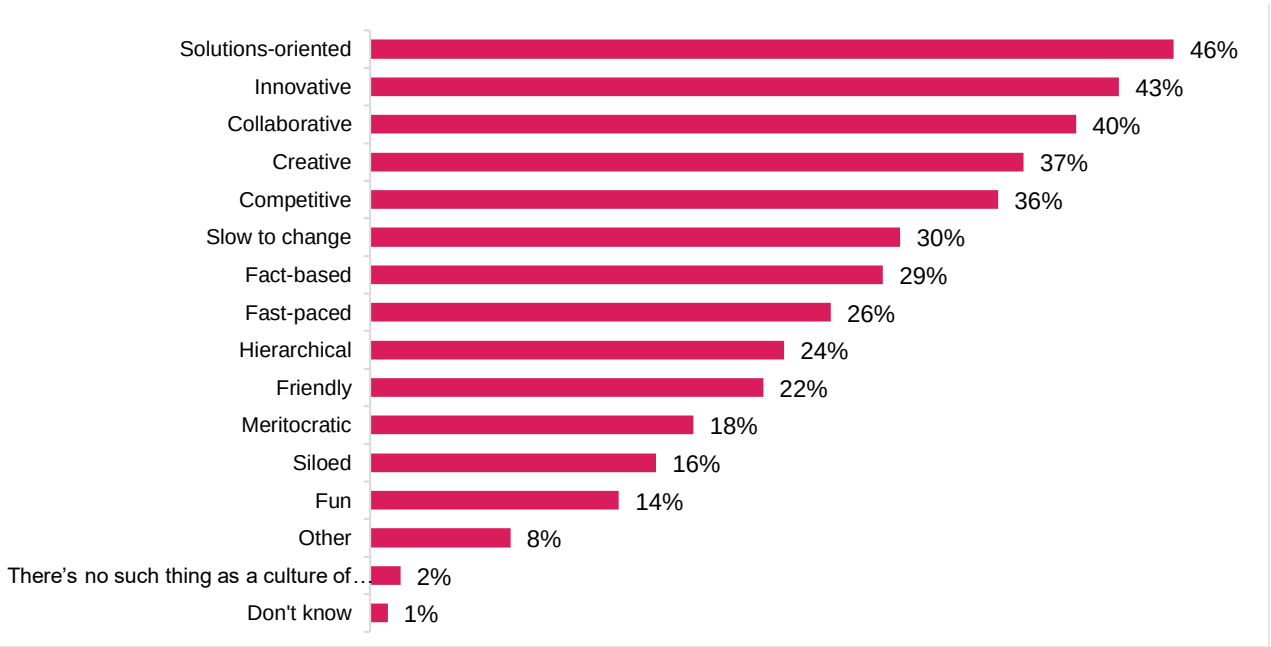
Overview of the culture of engineering within the UK

This section focuses on views and experiences relating to the working culture of engineering, both positive and negative, and perceptions of the industry. This section combines evidence from both the quantitative survey and related insights from the qualitative research.

Words to describe the culture of engineering (quantitative feedback)

Respondents were asked to select from a list the words they think best describe the culture of engineering. Respondents could select a maximum of five words from the list or add their own (other).

Figure 5: Words to describe the culture of engineering



Source: Q01. In your experience, which of the following best describes how you view the culture of engineering in the UK? **Base:** all respondents (n=1,507).

The most common words selected to describe the culture of engineering are positive, such as solutions-oriented, innovative, collaborative, and creative. However, three in ten think that the culture of engineering is 'slow to change', while around one in seven describe it as 'siloed'.

Men are more likely to say creative (43%), fun (16%) and innovative (47%) while women are more likely to say hierarchical (31%), siloed (19%) and slow to change (40%).

Positive aspects of the engineering culture (qualitative feedback)

While many of the engineers we spoke to in the qualitative research noted a number of issues and negative aspects to the culture of inclusivity in engineering, virtually all engineers were able to note a number of positive aspects to the culture too. In particular, engineers spoke positively about the nature and type of work they do as well as the team-focused structure within many engineering organisations. Key positive themes of the culture include:

- **A strong culture of teamwork:** this appeared to be a positive where engineers were working in a team dynamic that they enjoyed, and where they got on well with other members of the team.
- **A creative element to the work:** thinking of different ways to solve problems and different designs.
- **A strong focus on personal development:** engineers noted being well supported in seeking opportunities for further training and qualifications.
- **Making a difference:** engineers felt that there was a great deal of job satisfaction and numerous opportunities to work on meaningful projects where their contributions were making a tangible difference. However, concerns were raised that the best opportunities and most impactful projects were sometimes awarded to those that 'fitted in' most to the company 'type'.
- **An opportunity to push yourself:** there is a general consensus among engineers that the industry provides the opportunity to work on truly challenging projects and that this element of the job ensures a stimulating environment to work in. This aspect of the job is noted to result in a great sense of satisfaction, personal growth and confidence building when the work goes to plan. However, as we will explore later, this can also result in increased stress and worry, particularly when the job doesn't go to plan.

Negative aspects of the engineering culture (qualitative feedback)

Negative aspects to the culture tend to focus on outdated and divisive attitudes and behaviours in engineering and a reluctance among employers to embrace more progressive ways of working, particularly around flexibility and a focus on improved wellbeing of employees.

- **The reluctance to embrace new working patterns**: as mentioned earlier, the reluctance for some companies to accept part-time work or working from home can be seen as a negative, particularly since these ways of working appear to help support diversity in the workplace.
- **The long hours and workload:** a number of engineers noted that companies do have some flexible working policies but that their ability to take advantage of these was negligible due to the demands of the job. Long and unsociable hours was noted to make it particularly difficult for those with childcare commitments to enter or progress within the field.
- **The 'macho', stereotypically masculine culture:** As mentioned earlier, the cultural tendency is that traits, personalities, and approaches that are more typically 'masculine' in nature tend to be most valued and form the modus operandi in many organisations. This is felt to alienate and disadvantage those who do not conform to these traits.

- **The pressure of getting it wrong:** while engineering is felt to be challenging and engaging, which can be a positive, the sheer pressure and the potential consequences of getting it wrong was felt to result in an extraordinary amount of stress at times. Younger engineers often noted being 'thrown into the deep end' with projects and given a lot of responsibility while still trying to get to grips with the role itself.
- **The lack of support or importance placed on mental health:** the culture of engineering is highly driven by an adherence to health and safety and great importance is placed on the protection of physical health. However, the industry is noted to let itself down when it comes to supporting the mental health of engineers and a few of the engineers we spoke to mentioned the high rates of suicide experienced in the industry, with many knowing of colleagues that had committed suicide. The pressure to complete large projects on time and within budget often seemed to be the root cause of periods of stress and depression.
- **The culture of banter:** the banter culture in engineering is accepted by many as simply being 'part of the job' and is even defended by some engineers as being a way to help deal with the more stressful elements of the work by providing a jovial respite. It is clear this 'banter' or 'micky-taking' appears to go too far on occasion and results in real offence and discomfort among some engineers. It is also noted that in workplaces where a 'banter culture' is prevalent, there appears to be more instances of jokes over-stepping the line. There are also concerns among some engineers that banter is used as a way to express genuinely prejudiced and discriminatory views while using the excuse that they 'didn't mean it' or that it 'wasn't meant to cause offence'.

> "Where we are there's a lot of banter. And a lot of things that are said which people don't know if they actually mean it or not. And where do you draw the line?"
>
> **Engineer, Rail, Male, LGBTQ+**

> "My brother-in-law was an engineer and he like many in the sector crumbled under the pressure of a particularly stressful turnaround event. You end up working 80-hour weeks and night shifts to get the job done. It ran into delays and he didn't end up coming back home one day after committing suicide. I also found myself having to pay for stress management counselling after one of these projects too."
>
> **Engineer, Oil and Gas, White, Male**

A split culture (qualitative feedback)

In the qualitative feedback, engineers note a difference in culture between operational/production-based work and more office-based roles, with the former being described as most likely to be macho and 'laddish'. This can have an impact on how likely engineers are to being exposed to more discriminatory behaviours.

> "There are definitely more micro-aggressions in the construction side of the business because of the lad culture in that part of the business. There's much less of it in the corporate and planning side of things."
>
> **Engineer, Construction, Asian, Female, LGBTQ+**

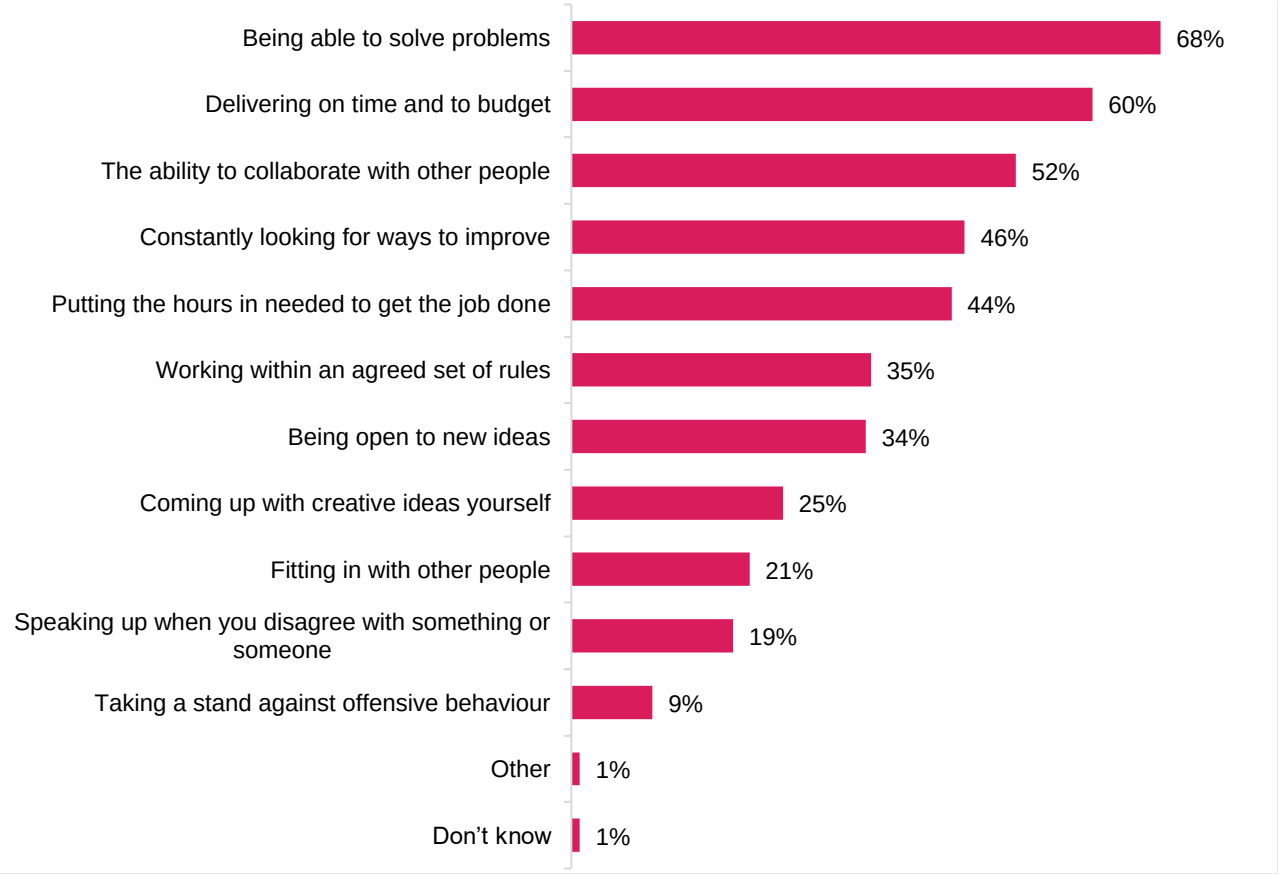
> "I consider myself to be really lucky as I happen to work in an office with - by chance - a number of other gay men so the representation is great and the culture is great but I know this is not the case when you look at the production side of the business and you do hear of there being more issues there when it comes to how inclusive it is."
>
> **Engineer, Mechanical Engineering, White, Male, LGBTQ+**

There is also felt to be considerably less diversity in the operational side of many engineering organisations, and that the statistics of those from underrepresented groups working in the industry are often boosted by those employed in more administrative roles.

Valued behaviours within engineering (quantitative feedback)

Participants were asked to select the behaviours they think are most valued within UK engineering. They could select a maximum of five statements or add their own.

Figure 6: Valued behaviours within UK engineering



Source: Q02. Which of the following behaviours do you think are most valued within UK engineering?
Base: all respondents (n=1,507).

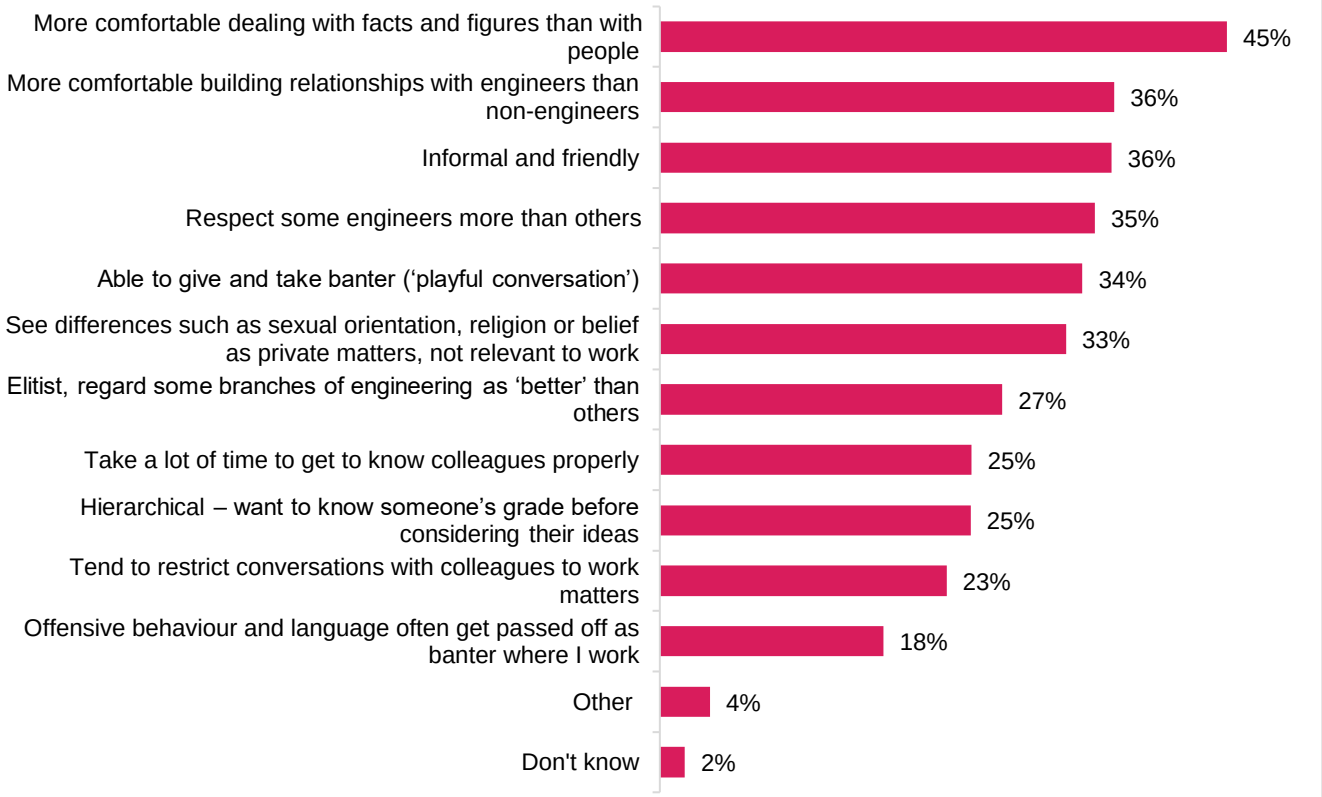
The most valued behaviours relate to the job in hand, which are being able to solve problems and delivering on time. Statements related to inclusivity were less commonly selected, with one in five rating 'fitting in with other people' as the one of the most valued behaviours in engineering and only around one in ten saying 'taking a stand against offensive behaviour'.

Those working for large organisations (more than 500 employees) are more likely to value 'delivering on time and budget' (66%) and 'being able to solve problems' (72%), while those working for smaller organisations (less than 50 employees) are more likely to select 'coming up with creative ideas yourself' (30%).

How engineers relate to others (quantitative feedback)

Respondents were asked to select the statements that best describe how engineers relate to each other. They could select a maximum of five statements or add their own.

Figure 7: How engineers relate to others



Source: Q03. In your experience, which of the following best describes how engineers in the UK relate to others? **Base:** all respondents (n=1,507).

The most common behaviours selected highlight that engineers are viewed as being more comfortable dealing with facts and figures than people, and more at ease building relationships with engineers than non-engineers. Almost one in five believe that offensive behaviour gets passed off as banter. Engineers who did not identify with any protected characteristics are more likely to select 'able to give and take banter' (40%) than those with protected characteristics. For example, just 29% of engineers from a Black, Asian or minority ethnic background selected this statement.

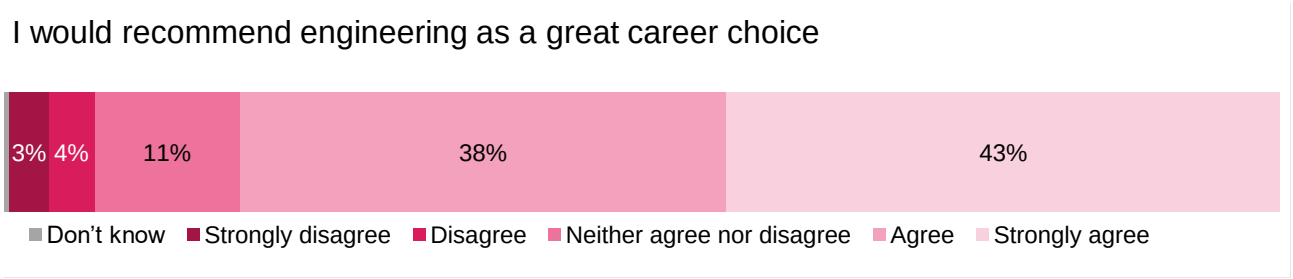
Men are more likely to say the culture is 'informal and friendly' (40%), while women are more likely to say 'hierarchical' (31%), 'offensive behaviour being passed off as banter' (23%) and 'some engineers being respected more than others' (38%). This suggests that men feel more positive about the culture of engineering than women.

Level of engagement with the engineering profession

Recommending the engineering profession (quantitative feedback)

Respondents were asked to what extent they would recommend engineering as a great career choice on a scale of one to five, where one is 'strongly disagree' and five is 'strongly agree'.

Figure 8: Recommending engineering



Source: Q04.1 To what extent do you agree with the following statements. I would recommend engineering as a great career choice to friends and family. **Base:** all respondents (n=1,507).

Around eight in ten (81%) agree that they would recommend engineering as a great career choice, with roughly four in ten saying 'strongly agree' and another four in ten saying 'agree'.

Those with no protected characteristics are significantly more likely to agree, compared to those with protected characteristics as shown in the table below.

Table 3: Recommending engineering as a great profession – by subgroup

Protected characteristic	% NET Agree
Women	81%↓
Black, Asian and minority ethnic	76%↓
LGBTQ+	76%↓
Those with a disability	78%↓
None	86%↑

N.B ↑↓ indicates statistical significance (higher and lower)

Engineers from Black, Asian or minority ethnic backgrounds, those who identify as LGBTQ+ and those who have a disability or impairment are less likely to agree that engineering is a great career choice compared to those with none of these characteristics.

Drivers and detractors for recommendation of the profession (qualitative feedback)

Engineers who participated in the qualitative research often said that they would recommend the profession as a whole, particularly as they are keen for more people to enter into the industry, and they would encourage younger people to consider becoming an engineer.

Many of the drivers for recommendation happened to include the reasons these engineers initially chose to embark on a career in engineering, perhaps demonstrating that the industry had delivered on many of these initial hopes and desires for their own careers.

Drivers for recommendation included:

- Entering into an industry that makes the most of your skills/natural abilities.
- Entering into an industry that helps makes a tangible difference and you can often see the product of your labour.
- Entering into an industry that will mentally challenge and stimulate you.
- Entering into industry where there is a skills shortage helps to ensure that a good job can be attained.

However, while most engineers felt able to recommend the industry as a whole, there were some deterrents mentioned around recognition, pay and potential progression.

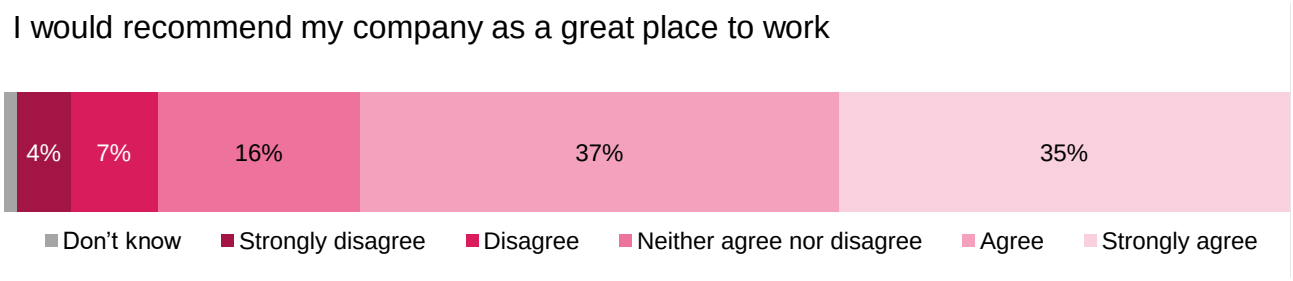
Drivers for detraction included:

- Lack of room for development in certain sectors unless you choose to go down a people management route (which is not always well suited to all personalities/neurodivergent engineers).
- Limited pay progression in certain sectors (some engineers noted being able to command higher salaries in other STEM sectors, such as finance).
- Lack of recognition as a skilled professional (relating frustrations around the lack of protection of the title of 'engineer').

Recommending individual workplaces (quantitative feedback)

Respondents were then asked to what extent they agree that their company is a great place to work, from 'strongly disagree' to 'strongly agree'.

Figure 9: Recommending my company



Source: Q04.2 To what extent do you agree with the following statements. I would recommend my company as a great place to work for engineers or those in the engineering profession. **Base:** all respondents (n=1,507).

Just over seven in ten (72%) agree that they would recommend their place of work, and just over one in ten (11%) disagree.

Again, there are some differences by subgroup, although to a lesser extent compared to recommending engineering as a career choice.

Table 4: Recommending my company as a great place to work

Protected characteristic	% NET Agree
Women	73%
Black, Asian or minority ethnic	69%
LGBTQ+	70%
Those with a disability	66%↓
None	76%↑

N.B ↑↓ indicates statistical significance (higher and lower)

Engineers with a disability, health condition or impairment are less likely to agree their company is a great place to work compared to engineers with no protected characteristics.

Drivers and detractors for recommendation of the workplace (qualitative feedback)

Engineers who participated in the qualitative research were less likely to recommend individual workplaces and there appears to be a strong connection between likelihood to recommend and having more inclusive and flexible working policies.

Drivers for recommendation included:

- Being in organisations where there appeared to be clear and equitable options for progression.
- Being in organisations with a good approach towards helping staff achieve a good work-life balance (flexible working policies, work from home options, less expectation to consistently work overtime, etc.).
- Being in organisations where there appears to be a strong emphasis on promoting a diverse and inclusive culture (staff from different backgrounds feeling well represented, staff from different backgrounds feeling included within work culture and work events etc.).

Drivers for detraction included:

- Having a lack of transparency around promotion, pay and progression.
- Having a ‘toxic work culture’ where microaggressions and harmful banter are allowed to continue unchecked.
- Having a work culture that disregards family life and childcare commitments.
- Having a work culture that appears to work to the advantage of the most represented groups in the organisation.
- Having line managers or management teams who are reluctant to embrace new or different ways of working or communicating to them.

A reluctance among some groups of engineers to take on new roles (qualitative feedback)

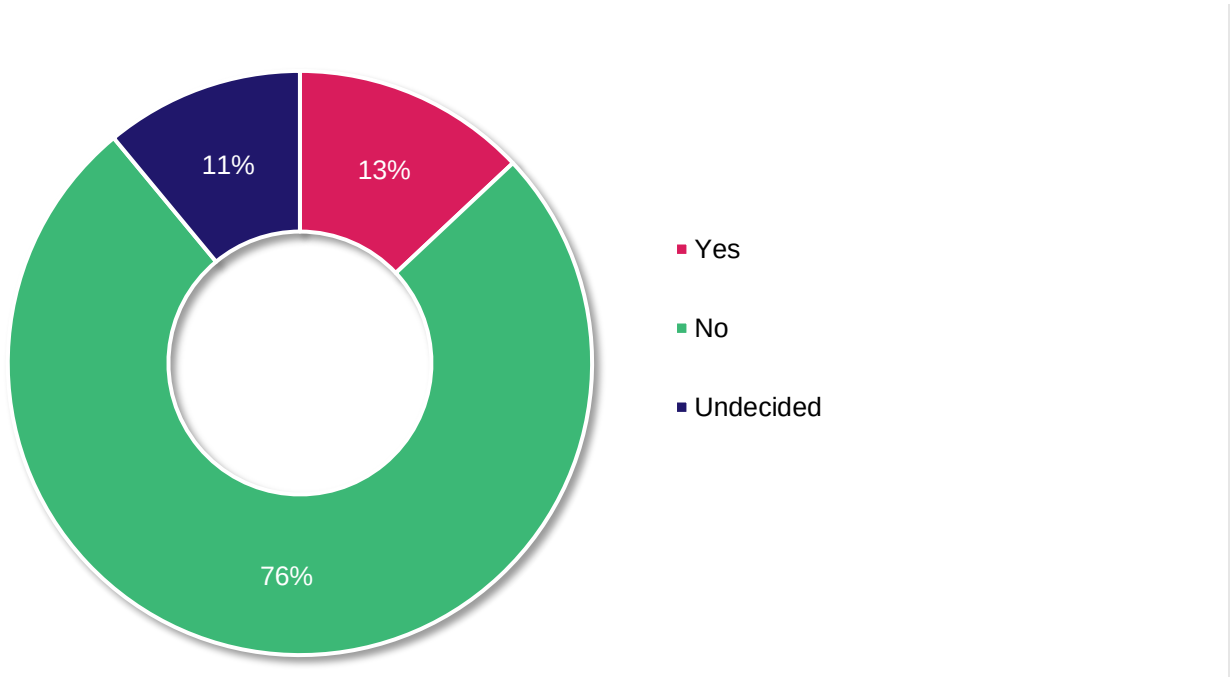
Both engineers and those working in D&I noted that sometimes there is a reluctance for engineers to consider new jobs or even move to different departments within their own companies (in larger organisations) through fear of not being accepted elsewhere. This was noted particularly among LGBTQ+ engineers who often mentioned the anxiety of having to effectively 'come out' every time they started a new role was enough to put off career changes, unless they were already not feeling accepted in their current role.

> "In our LGBTQ+ group, they talked about their genuine fear, and that is the word they used, of joining new organisations and starting jobs. Because they didn't know if they would be welcome, if they could bring their full selves to work."
>
> **Employer, Renewable Energy**

Plans to leave the engineering profession (quantitative feedback)

Respondents were asked if they are planning to leave the engineering profession permanently in the next 12 months, for reasons other than retirement.

Figure 10: Those planning to leave the engineering profession permanently



Source: Q05. Are you planning to leave the engineering profession permanently (as opposed to your employer) for reasons other than retirement in the next 12 months? **Base:** all respondents (n=1,507).

Three quarters of respondents said 'no', however just over one in ten said they do plan to leave the engineering profession (aside from retirement) in the next year. A further one in ten are undecided.

There is a strong correlation with age, with younger respondents more likely to say they are planning to leave the engineering sector compared to older respondents. For example, one in five of those aged 18-24 said yes compared to one in ten of those aged 45-54.

Table 5: Those planning to leave the engineering sector by age

Age	% who plan to leave the engineering profession permanently in the next year
18-24	21%
25-34	16%
35-44	14%
45-54	11%
55-64	7%
65+	6%

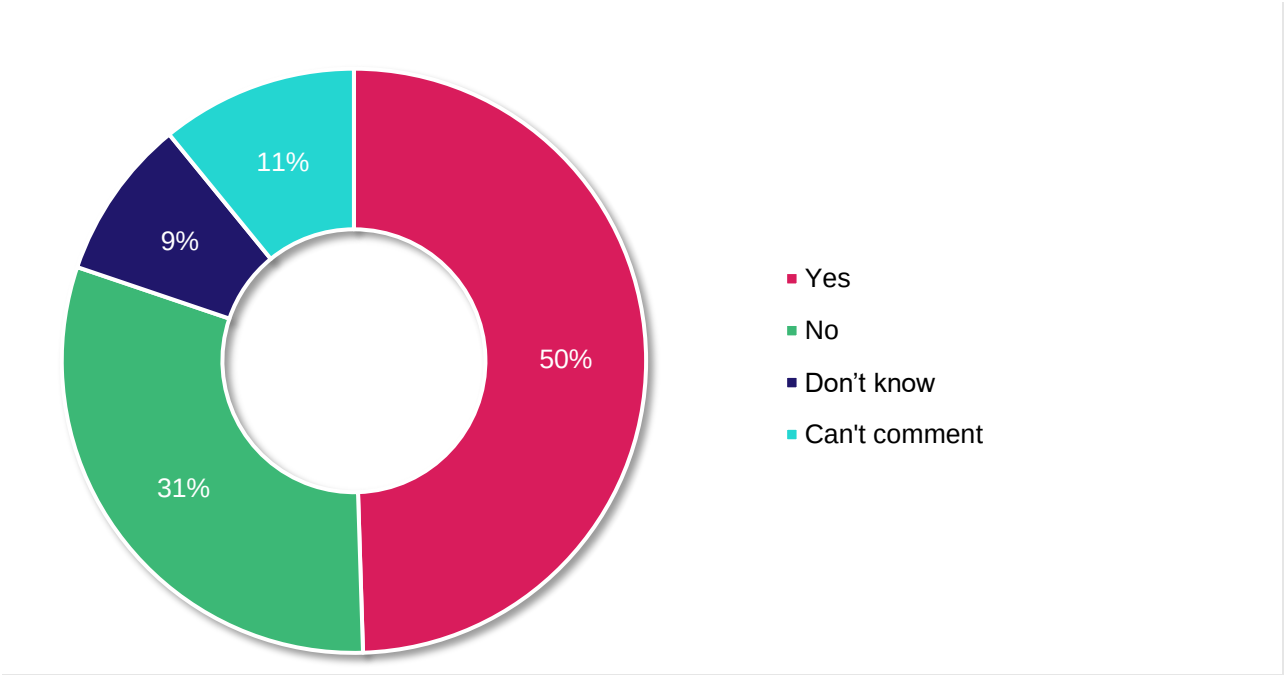
Another notable difference is that respondents who identify as transgender, or who have a trans history, are significantly more likely to say they plan to leave the engineering profession in the next year (52%). Further research into this finding may be required to understand the issues which are pertinent to this particular sub-group of engineers. While the proportion of engineers saying they are planning to leave the industry is low, this is a concerning figure given the skills gap and the findings from the literature review, which suggests that increasing diversity is not only desired, but required, in order to fill the industry-wide workforce shortage.

Has the culture of engineering changed?

Culture changes over the past five years (quantitative feedback)

Respondents were asked if they think the culture of their engineering sector has changed over the past five years. Half believe that the culture of engineering has changed, with three in ten saying it hasn't. One in ten say they don't know and another one in ten told us they haven't worked in engineering for long enough to comment.

Figure 11: Has the culture of your engineering sector changed over the past five years?



Source: Q06. In your opinion, has the culture of your engineering sector changed over the past five years?
Base: all respondents (n=1,507).

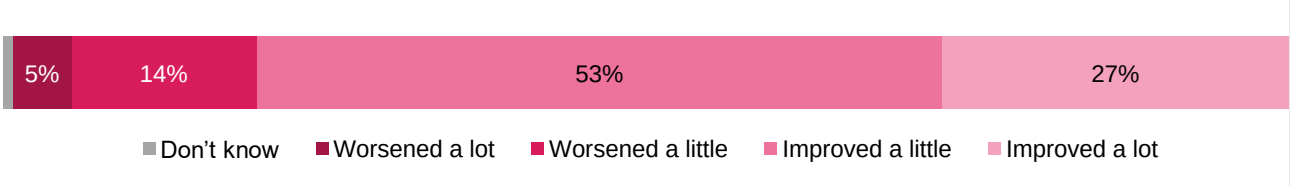
Perhaps unsurprisingly, certain groups are more likely to say they can't comment (due to not working in engineering long enough), including women and those aged 18-24.

Engineers who identify as transgender, or those who have a trans history, are significantly more likely to say yes (70%).

Has the culture of engineering changed for better or worse? (quantitative feedback)

Respondents who said they do think that the culture of their engineering sector has changed were asked if the culture had improved or worsened, and whether this was 'a lot' or 'a little'.

Figure 12: Culture change for better or worse?



Source: Q06a. Do you think the culture of your engineering sector has changed for better or worse?
Base: those who think the culture of engineering has changed over the past five years (n=750).

Just over half of those who think the culture of engineering has changed in the past five years say it has 'improved a little' with a further almost three in ten saying it has 'improved a lot'. However, almost one in five think it has worsened.

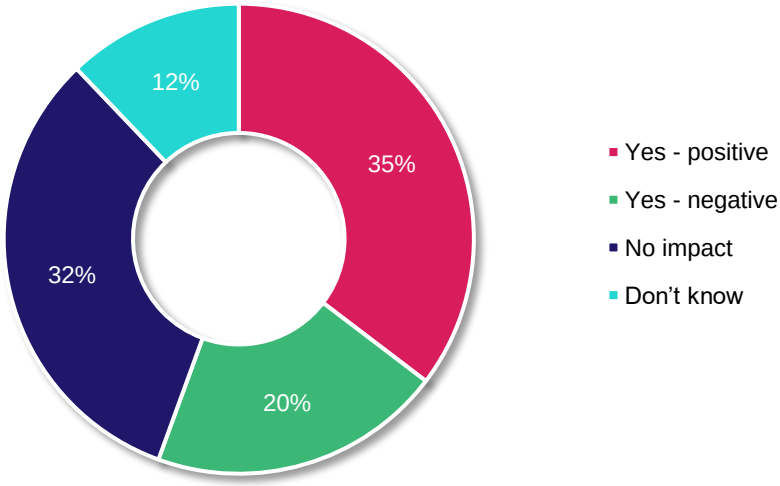
Engineers who identify as transgender, or those who have a trans history, who said that the culture of engineering had changed mostly felt that the culture had improved (87%).

Interestingly, women are more likely to say culture has improved (86%) compared to men (78%).

Factors influencing culture: COVID-19 (quantitative feedback)

Respondents were asked if they think that COVID-19 has had an impact on the culture of engineering.

Figure 13: Impact of COVID-19 on the culture of engineering?



Source: Q10.1. Do you think COVID-19 has had an impact on… The culture of engineering?
Base: all respondents (n=1,507).

Just over half think that COVID-19 has had an impact on the culture of engineering, just over a third think it has had a positive impact, and one in five think it has had a negative impact. Men are more likely than women to say that it has had no impact (34% vs 29%). Interestingly, engineers from Black, Asian or minority ethnic backgrounds are more likely to say that COVID-19 has had a positive impact on the culture of engineering (43%) compared to white engineers (34%). However, LGBTQ+ engineers and those who have a disability are more likely to say that COVID-19 had a negative impact on the culture of engineering (24% and 25% respectively).

In the qualitative feedback from engineers, many felt that the shift towards having to embrace more flexible and home-based working during the pandemic had improved the working culture in their organisation, particularly for those with family commitments. Given that women often appear (as part of wider societal norms) to take on the largest share of childcare commitments, the shift towards this way of working appears to benefit them most, with engineers noting they are increasingly judged more on their performance than their presence in the workplace.

Factors influencing culture: The importance of line managers (qualitative feedback)

In the qualitative feedback, those working in engineering often linked both positive and negative working cultures and experiences with the attitudes of their direct line managers. Having an understanding and supportive line manager, who sets the right level of expectation and tone in terms of work-life balance, appears to be key in helping to create a good work culture. This is particularly relevant in terms of allowing for some understanding and flexibility around non-work related commitments (for example, family life, religion, or cultural events).

The key to career success and progression appears to be having a line manager who champions and actively promotes the good work of their line reports (particularly important for less represented groups) and also appreciates and accepts different approaches, ways of working and communicating. Line managers who expect their reports to be 'in the image of themselves' and to share the same attributes and ways of conducting themselves appear to be more likely to alienate employees who are from different backgrounds or characteristics to them.

> "I think my line manager won't be happy until I start talking like him, acting like him, doing the things he likes, working in exactly the same way he does. There's no acceptance of difference. They can accept employees who have different skin colours but really it boils down to acting like a white, middle-class man who's had a private education."
>
> **Engineer, Automotive, Asian, Male**

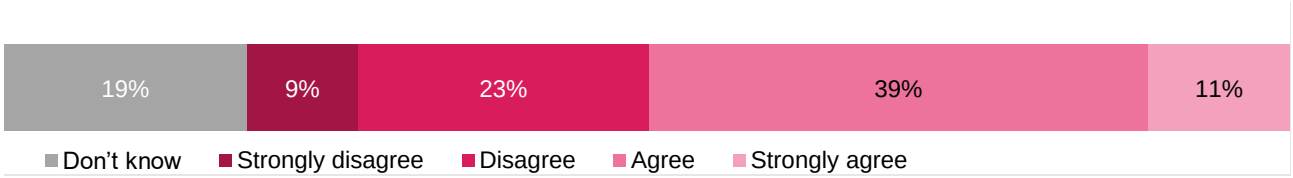
Conversely, a poor line manager appears to be key in terms of experiences of discrimination and feelings of cultural isolation. In fact, many of the instances of discrimination and microaggressions mentioned were as a result of the behaviours of line managers or were allowed to continue as a result of inaction from line managers.

Factors influencing culture: Societal movements (#MeToo, Black Lives Matter) (quantitative and qualitative feedback)

Respondents were asked if political, social and cultural movements such as #MeToo and Black Lives Matter had impacted the culture of engineering within their sector.

Figure 14: Impact of societal movements on the culture of engineering

To what extent have these movements impacted culture within your engineering sector



Source: Q11. Over the past few years, there have been several political, social and cultural movements such as #MeToo and Black Lives Matter (BLM). To what extent do you agree that these movements have had an impact on the culture within your engineering sector? **Base:** all respondents (n=1,507).

The impact of broader societal movements such as #MeToo and Black Lives Matter on the culture of engineering divides opinion. Half of respondents believe that these movements have had an impact on the culture within engineering, however three in ten disagree. One in five said they 'don't know'.

When looking at engineers particularly impacted by these issues, there are some key differences. For example, engineers from Black, Asian or minority ethnic backgrounds are more likely to agree (60%) compared to white engineers (48%). Women are more likely to agree than men (44% vs 36%).

In the qualitative feedback, engineers felt that these movements had been helpful in raising these issues and starting conversations around what is and isn't acceptable behaviour and language, which has been helpful in calling out instances of racist or sexist discrimination. However, some engineers felt that, while these movements have helped to highlight and tackle more overt prejudiced behaviours, they have yet to fully tackle the fundamental cultural norms that allowed these forms of discrimination to become established in the engineering culture, and the more subtle pressures to 'fit-in' with the status quo.

> "The culture hasn't changed in the sense that they might be employing more women but unless those women essentially 'man-up' and talk and deliver things in a typically masculine way and act like 'one of the lads' then they're going to come across many barriers. It's a case of fit in or get out in many organisations."
>
> **Engineer, Rail, White, Female**

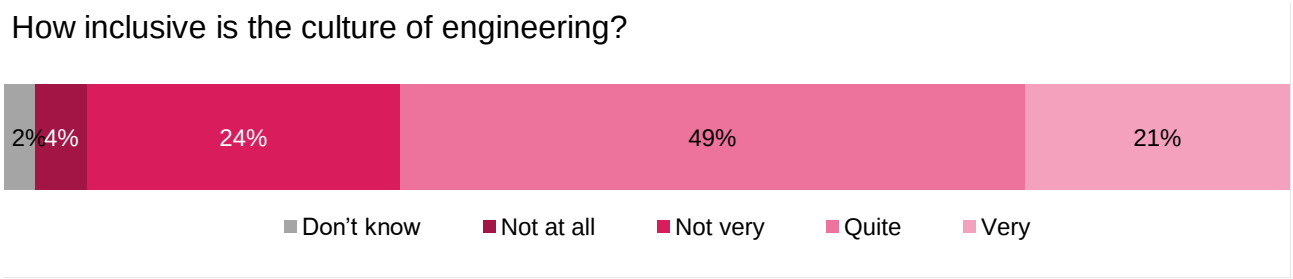
Inclusivity within engineering

How included do engineers feel?

Inclusivity of the engineering profession (quantitative and qualitative feedback)

Respondents were asked to rate how inclusive they think the culture of engineering is as a whole from 'not at all' through to 'very inclusive'.

Figure 15: Inclusivity of the engineering profession



Source: Q08. Overall, how inclusive do you think the culture of engineering is? **Base:** all respondents (n=1,507).

Seven in ten say they feel that the culture of engineering is inclusive (69%), with just under three in ten saying not inclusive (28%).

Those with protected characteristics are less likely to say the culture of engineering is inclusive, with women feeling least included overall.

Table 6: Inclusivity of engineering profession by subgroup

Protected characteristic	% NET Inclusive (Quite+Very)
Women	59%↓
Black, Asian or minority ethnic	68%↓
LGBTQ+	63%↓
Those with a disability	62%↓
None	79%↑

N.B ↑↓ indicates statistically significance (higher and lower)

Another notable difference in responses is observed according to company size, with those working in large organisations being less likely to say 'inclusive' (64%) compared to engineers working in small (71%) and medium (76%) organisations.

This difference based on company size is interesting given that larger organisations are perhaps more likely to have the resources and infrastructure to invest in D&I policies.

In the qualitative feedback, engineers working in some larger organisations expressed frustrations around D&I policies appearing to be more of a 'tick-box exercise' for marketing purposes, and that they were not always well-resourced or valued enough through all

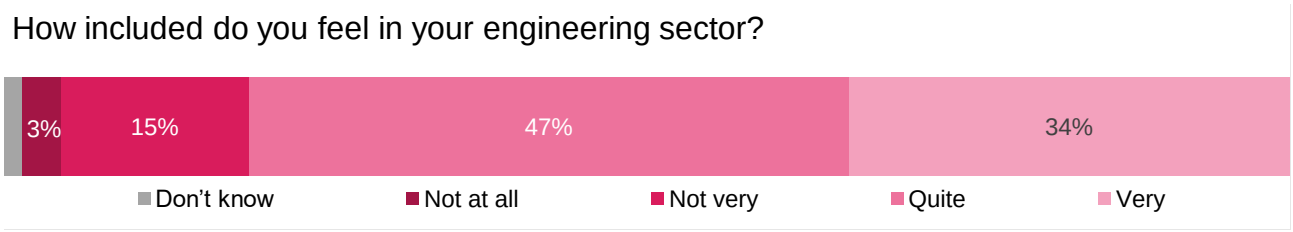
management levels of the organisation to be completely effective. Conversely, those working in small to medium organisations appeared to have less formal D&I policies and activities in place but where they were in place management teams appeared to be more connected to and invested in them.

> "I think in a way it's much easier for a company of our size because it just takes one or two senior team leaders to be really committed to D&I to ensure that the company is truly embracing and embodying those values, as we have that visibility of the culture and agility to make improvements quite quickly if needed."
>
> **Engineer and Employer, Construction, White, Male, LGBTQ+**

Inclusivity of engineering sector (quantitative and qualitative feedback)

Respondents were also asked about their feelings of inclusion in relation to the sector of engineering in which they work (as opposed to the inclusion within engineering as a whole).

Figure 16: Inclusion within the engineering sector



Source: Q07. How included do you feel in your engineering sector? **Base:** all respondents (n=1,507).

Overall, around eight in ten (81%) say they feel included in their engineering sector. However, there are notable differences across various subgroups. Engineers with no protected characteristics are more likely to feel included (91%) and those with a disability or impairment are least likely to feel included (73%).

Table 7: Inclusion within engineering sector by subgroup

Protected characteristic	% NET Inclusive (Quite + Very)
Women	76%↓
Black, Asian or minority ethnic	79%↓
LGBTQ+	75%↓
Those with a disability	73%↓
None	91%↑

N.B ↑↓ indicates statistical significance (higher and lower)

Within the LGBTQ+ community, those who are least represented in the sample appear to feel least included. For example, of the 12 respondents who identify as 'queer' just 58% feel included, similarly 50% of the 14 respondents who identify as pansexual feel included and 50% of the 12 respondents who prefer to self-describe their sexuality feel included. In contrast to this, 80% of gay men and 85% of gay women/lesbians feel included. While these sample sizes are small and no conclusions of statistical significance can be drawn, these findings suggest that feelings of inclusion are very unique in the LGBTQ+ community and experiences differ widely depending on the individual.

> "I have worked in a few different organisations now and I have had some fantastic experiences and some terrible experiences in terms of inclusion, it's very much dependent on the mix of people you work for and how accepting they are, and also how familiar they are with gay people. If you're on a shop floor with mostly men in their 50s or 60s they may never have come across a gay man in the workplace before and may need to be educated on what is and isn't acceptable."
>
> **Engineer, Manufacturing, White, Male, LGBTQ+**

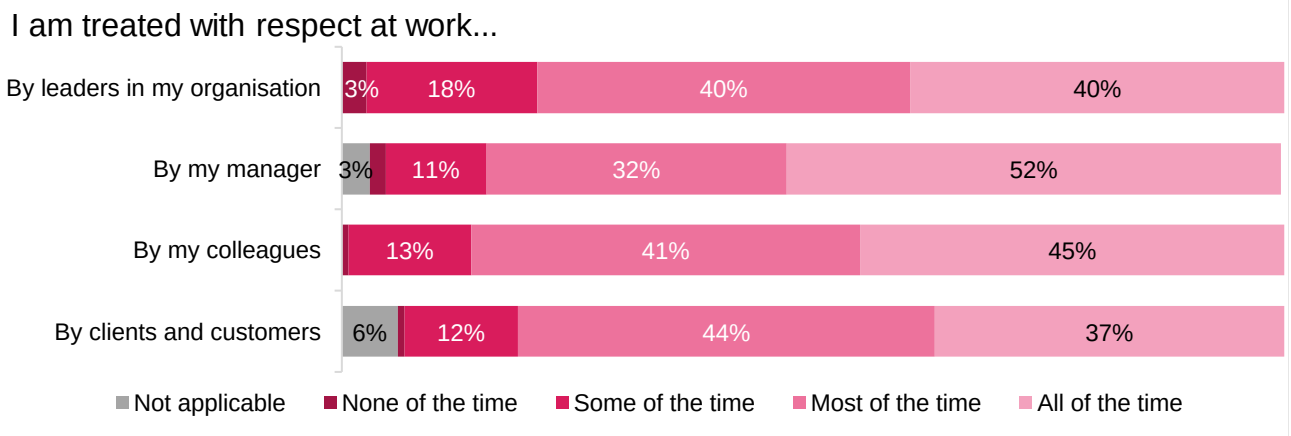
Drivers of inclusivity

Several areas were investigated in relation to inclusivity in the workplace. Respondents were asked about being treated with respect by being listened to and how confident they feel to speak up when experiencing inappropriate behaviour. The following questions investigate this at various levels.

Being treated with respect (quantitative feedback)

Respondents were asked to select which option applies to them in relation to the following statements about being treated with respect by various people or groups of people at their workplace.

Figure 17: Being treated with respect



Source: Q12. Please indicate which of these options applies to you in relation to the following statements. **Base:** all respondents (n=1,507). *N.B. Not applicable option was only available for 'by my manager' and 'by clients and customers'.*

Respondents feel they are treated with respect (most or all of the time) by their colleagues (86%) the most and by leaders in their organisation (79%) the least.

However, respondents are more likely to feel that they are treated with respect 'all of the time' by their manager, and least likely to feel this in relation to leaders in their organisation.

Respondents with no protected characteristics are more likely to feel that they are treated with respect by colleagues most or all of the time (92%) than those with a protected characteristic. Engineers from a Black, Asian or minority ethnic background, or those with a disability or impairment, are least likely to say they are treated with respect by colleagues all or most of the time (78% for both groups).

Table 8: Treated with respect by colleagues – by subgroup

Protected characteristic	% NET treated with respect (all/most of the time)
Women	84%↓
Black, Asian or minority ethnic	78%↓
LGBTQ+	85%↓
Those with a disability	78%↓
None	92%↑

N.B ↑↓ indicates statistical significance (higher and lower)

Respondents with no protected characteristics are also more likely to feel that they are treated with respect by clients, most or all of the time.

Table 9: Treated with respect by clients – by subgroup

Protected characteristic	% NET treated with respect (all/most of the time)
Women	78%↓
Black, Asian or minority ethnic	78%↓
LGBTQ+	77%↓
Those with a disability	74%↓
None	86%↑

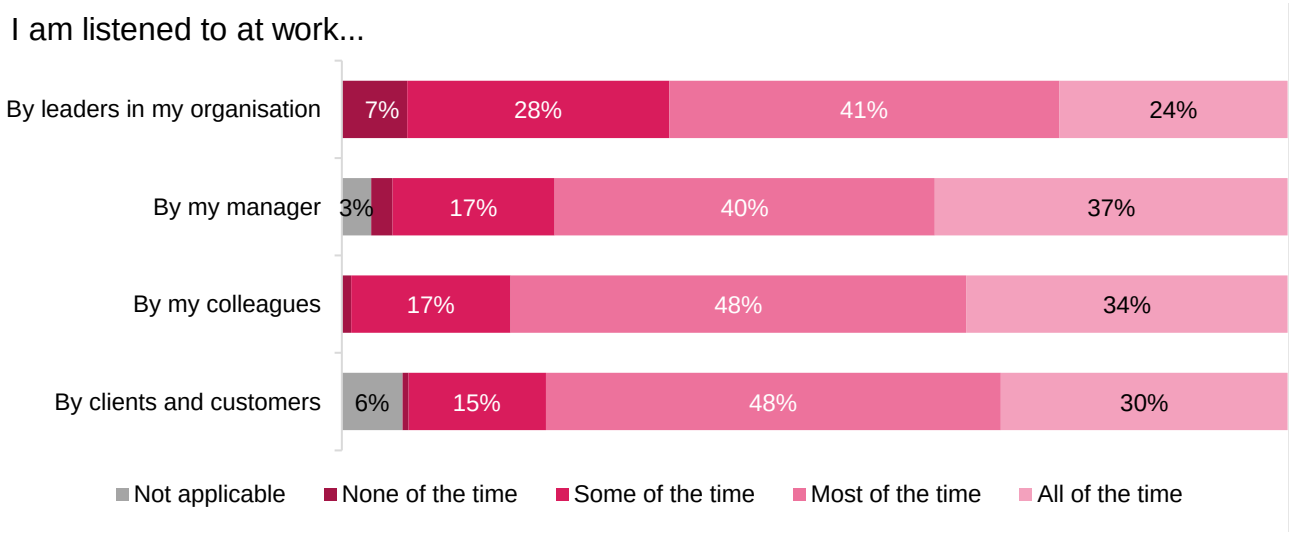
N.B ↑↓ indicates statistical significance (higher and lower)

Those with a disability are least likely to say they feel treated with respect by clients, most or all of the time.

Being listened to (quantitative feedback)

Respondents were asked to select which option applies to them in relation to the following statements about being listened to at their workplace.

Figure 18: Being listened to at work



Source: Q13. Please indicate which of these options applies to you in relation to the following statements. **Base:** all respondents (n=1,507). *N.B. Not applicable option was only available for 'by my manager' and 'by clients and customers'.*

Respondents felt most listened to (either most or all of the time) by their colleagues (82%) and least listened to by leaders at their organisation (65%).

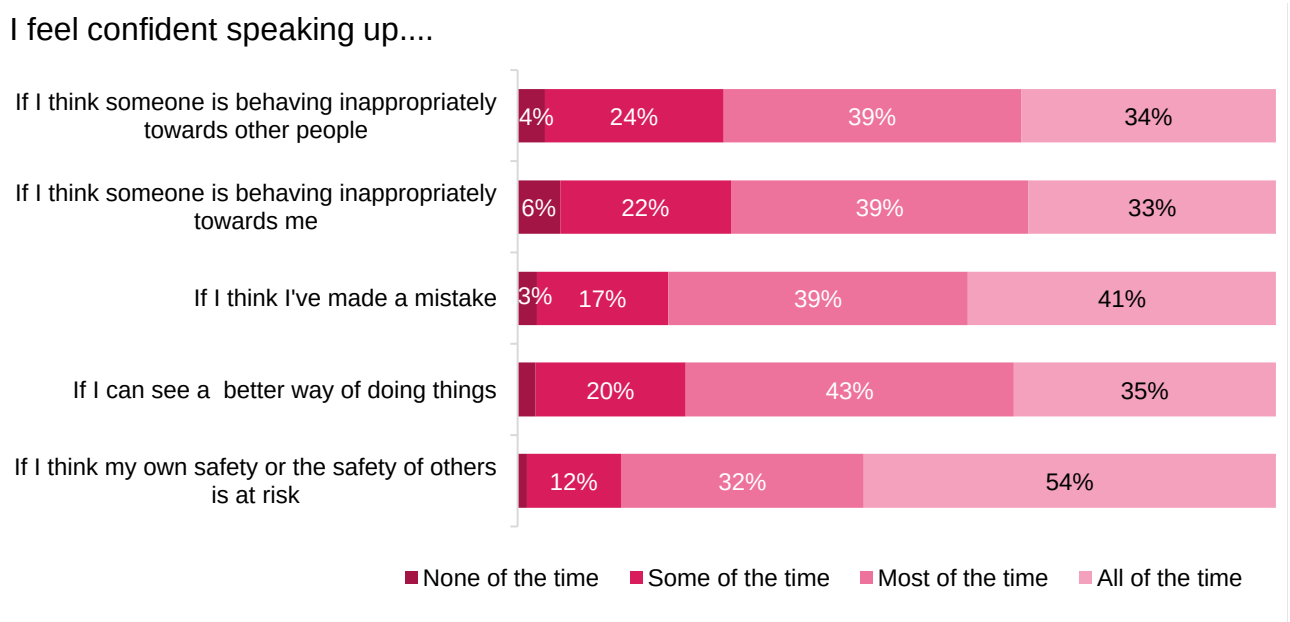
Respondents with no protected characteristics are more likely to feel that they are listened to by colleagues most or all of the time (90%) than those with a protected characteristic.

Again, engineers from a Black, Asian or minority ethnic background (73%) and those with a disability or impairment (74%) are least likely to say they are listened to by colleagues all or most of the time.

Being confident to speak up (quantitative feedback)

Respondents were asked to select the option that applies to them in relation to feeling confident to speak up in various situations at work.

Figure 19: Ability to speak up at work



Source: Q14. Please indicate which of these options applies to you in relation to the following statements.
Base: all respondents (n=1,507).

The statement that was agreed with the most was ‘speaking up if safety is at risk’, with more than half saying they would speak up ‘all of the time’. The statements that were agreed with least related to inappropriate behaviour, either towards themselves or others.

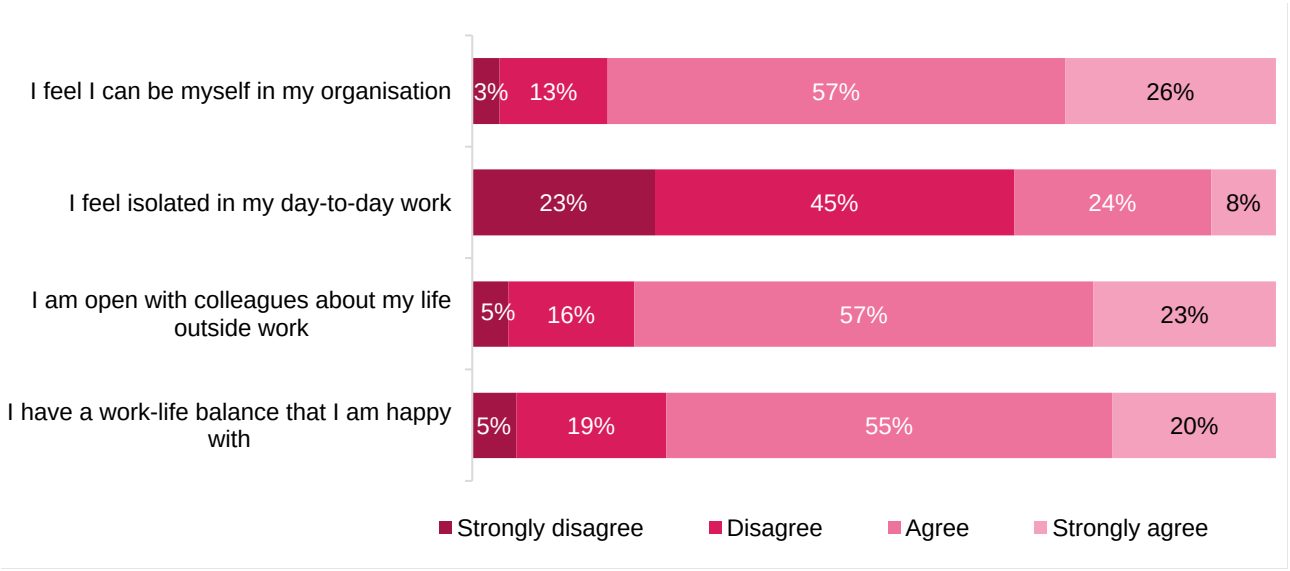
Engineers with no protected characteristics were more likely to feel confident speaking up (for all statements) compared to those in underrepresented groups.

For example, 44% of engineers with no protected characteristics said they would speak up all of the time if they can see a better way of doing things, compared to just 24% of those from Black, Asian or minority ethnic backgrounds.

Other factors linked to inclusion (quantitative feedback)

Respondents were asked their level of agreement with a range of statements relating to inclusion, including being ‘myself’, feeling isolated, being open with colleagues, and work-life balance. Respondents rated agreement on a four-point scale, from strongly disagree to strongly agree.

Figure 20: Agreement with various statements relating to inclusion



Source: Q15/1,2,5,10. Please rate the extent to which you agree or disagree with the following statements.
Base: all respondents (n=1,507).

Overall, most engineers agreed that they can be themselves (83%), they can be open with colleagues about their life outside of work (80%), and they have a good work-life balance (76%). Around two-thirds disagree that they feel isolated in their day-to-day work, however this means a third of respondents do feel isolated.

There are also some key differences across subgroups. Those with no protected characteristics are more likely to agree that they can be themselves (91%), while LGBTQ+ respondents are least likely to agree with this statement (73%). Those with no protected characteristics are also more likely to agree that they have a work-life balance they are happy with (81%).

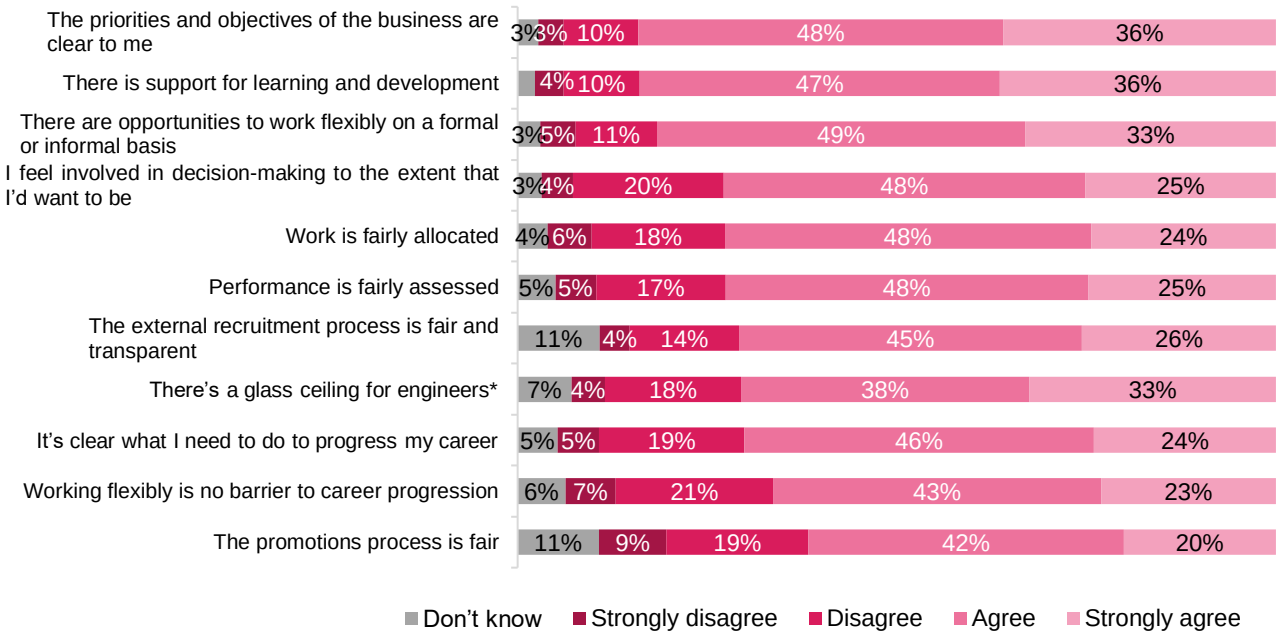
Engineers from a Black, Asian or minority ethnic background, those with a disability, or those who are LGBTQ+, are more likely to say they feel isolated compared to those with no protected characteristics.

Organisational drivers of inclusion and barriers to progression

Experiences in the workplace (quantitative feedback)

Respondents were asked their level of agreement with a range of statements relating to experiences at their workplace, in terms of career progression, recruitment and learning and development.

Figure 21: Agreement with statements relating to progression at an organisational level



Source: Q16. From your own experience, please rate the extent to which you agree or disagree with the following statements about where you work. **Base:** all respondents (n=1,507).

*Full answer is 'There's a glass ceiling for engineers. If you want to progress you have to become management'

Respondents are most likely to agree that the priorities and objectives of the business are clear (84%) and that there is support for learning and development (84%). However, just six in ten (62%) agree that the promotions process is fair and seven in ten agree there is a glass ceiling for engineers.

Engineers with no protected characteristics are more likely to agree with certain statements in particular (compared to those with protected characteristics):

- The external recruitment process is fair and transparent.
- The promotions process is fair and performance is fairly assessed.
- There's a glass ceiling for engineers. If you want to progress you have to become management.
- I feel involved in decision-making to the extent that I'd want to be.

Barriers to progression: being the right 'fit' for the organisation (qualitative feedback)

A number of engineers noted that while they have seen an increased focus from organisations to try and improve diversity and employ a greater range of people from different backgrounds, there appears to be an existing reluctance to change organisational expectations and preferences when it comes to personality types. The result of this appears to be that if employees don't fit into the 'culture' of the organisation and embrace and embody the values and preferred ways of operating, then employees from diverse backgrounds were often less likely to progress and more likely to eventually leave.

Some engineers argue that if companies want to be truly diverse, they need to accept that by employing people from different backgrounds and with different characteristics there should be more allowance for different views, ways of working and personalities.

> "It was so obvious to spot all the new graduates taken on as they would be like the 'Stepfords' as I would call them, they would all wear the same shoes and ties, all look the same, all speak with the same accent and 'bravado'."
>
> **Engineer, Oil and Gas, White, Male**

> "I feel like they can just about accept employing a Black man but where they struggle is to accept that I have come from a very different upbringing to most of them, so I'm going to talk differently, I'm going to have a different way of communicating but because it's different to them they see that as being 'the wrong way' or 'not good enough'."
>
> **Engineer, Automotive, Black, Male**

The prevailing personality type and the behaviours that are perceived more favourably in the profession were almost always more 'masculine' in nature and this has put pressure on those from a variety of backgrounds to embody a personality or way of operating that is not always 'true' to their own. Some women even noted having to 'tone down' their femininity by changing what they wore, how they styled themselves or even altering their personality.

> "I love wearing colour but I found if I ever wore anything remotely feminine - so not black or blue - it was always commented on and pointed out so I stopped. I stopped doing anything with my hair other than scraped back and even started smoking in order to try and make some male allies, as that seemed to be the place where the 'lads' would hang out."
>
> **Engineer, Energy, White, Female**

The prevailing view is that those who are best able to adapt or embody more typically 'male' traits were most likely to succeed, including engineers who do not identify as male but have more perceived 'male' traits in their personality. This is to the disadvantage of those who identify as male but have more perceived 'female' traits.

> "I am a straight, white, male but even I have felt the pressure to adapt and change as I guess my personality type is naturally closer to what you might see in a female… by emulating a senior colleague of mine who I felt better embodied those traits it was the turning point in my career."
>
> **Engineer, Defence, White, Male**

> "There's definitely something there about femininity and how it's perceived, as the women who are more masculine in their approach seem to fare better than those you might perceive as being more feminine in their traits, in the traditional sense of the word."
>
> **Engineer, Rail, White, Female**

Engineers from Black and Asian backgrounds often went one step further to describe the prevailing culture and personality type to be that more in line with 'white middle-class British males' with engineers in this cohort also struggling to identify with and fit in with this culture.

> "I'm born and raised British but sometimes I feel like I'm from a different planet. The things my family do and the way my family talks is completely different to how my managers would have been brought up, so we're going to talk differently and have different interests and ideals. I find myself having to hide aspects of my culture to try and avoid standing out any more than I do."
>
> **Engineer, Motorsport, Black, Male**

Barriers to progression: establishing senior level allies (qualitative feedback)

In the qualitative feedback, engineers noted that in some organisations there is a strong sense that making connections and 'allies' in more senior positions is needed to be considered for promotion.

It is suggested that those being promoted are often more likely to be able to relate and form connections with senior people who they share similarities or hobbies with, which works to the disadvantage of underrepresented characteristic types who are less likely to see people like them represented higher up the chain.

> "You would often find that those who would be offered the promotions were the ones that would spend time on the golf course with the boss or go to the bar after work, it's a big disadvantage to those of us who have families or that don't share those kinds of interests."
>
> **Engineer, Oil and Gas, Black, Female**

Barriers to progression: a glass ceiling (qualitative feedback)

While many industries are noted to be trying to improve diversity and there is a desire to employ more entry level employees from a diverse pool of characteristics, there is still noted to be a reluctance to promote those from certain characteristic groups beyond middle management level.

There is a perception that there is only a certain level of diversity that some companies can tolerate and that shaking up the status quo as to who sits at the top of organisations is seen as a 'step too far' in some cases.

> "The railway is happy to employ women, but the railway is still very reluctant to be led by women and allow them to get into those positions. I think that's because it works better for those in those senior positions to be surrounded by people they feel they can relate to and will help protect and reinforce their position in the company."
>
> **Engineer, Rail, White, Female**

Barriers to progression: managing family commitments (qualitative feedback)

The engineering industry is frequently referred to as not being the most progressive or adaptive when it comes to supporting engineers with family commitments or who need to work flexibly to help support childcare commitments. There appears to be particular reluctance in some organisations to allow employees to work part-time or work from home.

This stance on flexible working can often be because of the focus on project delivery and not allowing anything to get in the way of that. However, it is also sometimes because organisations want to ensure that those in desk-based jobs are not perceived to be offered any additional perks or flexibility to staff working in production roles where it is much harder to make allowance for flexible working.

The result of this reluctance to support engineers to work more flexibly appears to be that women are more likely to feel they need to take career breaks while their children are young since they are more likely to take on childcare responsibilities (this is reflective of the wider society and not just in the engineering profession).

"There has been, for many years, this reluctance to allow those in management positions to work part-time or work flexibly and it just doesn't make sense because you can guarantee that those asking for this, who are mostly women, would absolutely make this work. As a result, we just end up losing really good female talent."

Engineer, Defence, White, Male

"Engineering organisations have been notoriously slower than other industries to embrace these more progressive ways of working and get away from that presenteeism. The result of this is that you are seeing a much slower progression of women into senior positions as society naturally puts the onus of running a household and a family on women still."

Employer, Diversity and Inclusion, Utilities

Barriers to progression: an inability to self-promote (qualitative feedback)

Many engineers feel that a lot of the promotions in their organisations were linked not just to achievements, but to how vocal individual employees are when it comes to shouting about, and raising attention to, the things they do and being seen to assert themselves.

The concern from many engineers is that the way in which this behaviour is received and perceived can vary depending on the person, their background, and characteristics.

"In meetings it often feels like a battle of the peacocks between men but as soon as a woman tries to assert herself they get ignored or branded as 'whinging', I once heard our HR manager told she had a very 'whiney' voice when she was trying to make a point."

Engineer, Rail, White, Female

For instance, women, or those who had previously identified as women, noted that when they would assert themselves, they would often be received very differently to their male colleagues. There were instances recalled of when women would make constructive feedback or suggestions they would be labelled as 'moaning' or 'nagging' but when men would make similar suggestions, in a similar way, they were labelled as 'good critical thinkers'.

> "Being someone that has transitioned and experienced being both a female and a male in the profession, I can say that I have noticed the difference in the way I am treated and listened to as a man and how women just can't really get away with saying things that men can."
>
> **Engineer, Utilities, White, Male, LGBTQ+**

Black, Asian and minority ethnic engineers also note issues around being seen to be too assertive or not being taken seriously when trying to make suggestions in the same way a white colleague would.

> "I think for Black women in particular, we face a barrier when trying to be assertive as we are often misrepresented as being 'aggressive'."
>
> **Engineer, Oil and Gas, Black, Female**

This need to 'self-promote' to progress appears to not only be impacting the progression of some, but also results in some engineers having to consider leaving their current role or the industry entirely.

Barriers to progression: Disability and neurodiversity still a barrier to progression (qualitative feedback)

In the qualitative research we spoke to a number of engineers from different backgrounds and characteristics and where engineers fell into multiple protected characteristics that included disability, they often attribute this particular characteristic as being the most impactful in being a barrier to progression.

> "I'm a gay, middle-aged woman working in engineering and despite all that I've found the biggest barrier in my career has been my disability."
>
> **Engineer, Academia, White, Female, LGBTQ+, Disability**

We also came across engineers who felt that they could still not openly discuss or even make their employers aware of their disability through fear of repercussions to their career development.

> "I can see why some people may not feel comfortable discussing disability still in the same way they might feel able to discuss their sexuality or race because those things don't actually impact your ability to do the job whereas in many cases disability can, or at least it can be perceived to."
>
> **Engineer, Defence, White, Male, Disability**

In some sectors it is required that any disability is reported due to the need to perform health and safety assessments. This can mean employees have to undertake a process that in some cases may result in them being re-assigned to a different role or even result in the termination of employment if reasonable adjustments cannot be made.

Employers in particular note that there appears to be a reluctance among employees to disclose any diagnosis in this area, or even to explore getting a formal diagnosis, when they appear to be experiencing symptoms or indicators for certain neurodiverse conditions.

> "We have a long way to go in terms of monitoring and approaches with neurodiversity and a lot of that is because of the reluctance to disclose still. There is a fear still, I think, that you would be effectively talking yourself out of progression and that shouldn't be the case especially in an industry where there is a lot of neurodiversity."
>
> **Employer, Diversity and Inclusion, Utilities**

Some engineers with a disability noted that the need to be seen to be present and attend work events, conferences, and social events to be 'noticed' and considered for promotion opportunities was a barrier to promotion. This is because these events were either not always accessible or involved attending out of hours which was prohibitive to those with conditions that result in chronic pain or fatigue.

Bullying and harassment in the workplace (quantitative feedback)

Respondents were asked if they had experienced bullying or harassment in the workplace, either personally or of someone else. This was defined as any unwanted behaviour that makes someone feel intimidated, degraded, humiliated, or offended.

Figure 22: Experiences of bullying and harassment in the workplace

Source: Q18. In the past 12 months, I have…**Base:** all respondents (n=1,507).

In total, 35% say they have experienced bullying, with a quarter experiencing bullying or harassment of someone else, and just under one in five experiencing bullying or harassment personally.

Respondents with no protected characteristics are less likely to experience bullying (7%) personally (as one might expect), however these respondents are also less likely to say they have witnessed bullying or harassment of someone else (17%).

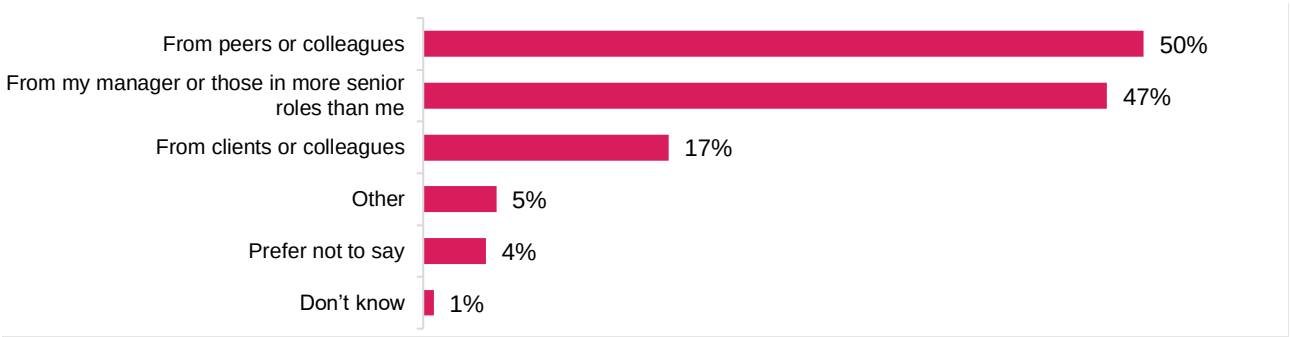
Table 10: Experiences of bullying and harassment – by subgroup

Protected characteristic	% Experienced bullying/ harassment personally	% Experienced bullying/ harassment of someone else
Women	25%↑	29%↑
Black, Asian or minority ethnic	31%↑	36%↑
LGBTQ+	25%↑	32%↑
Those with a disability	32%↑	34%↑
None	7%↓	17%↓

N.B ↑↓ indicates statistical significance (higher and lower)

Those who said they did experience bullying or harassment personally were asked who they experienced this from. Respondents could select multiple options and therefore percentages will not sum to 100.

Figure 23: Who bullying or harassment is from - personally



Source: Q18a. Who did you experience bullying or harassment from personally?
Base: those who experienced bullying/harassment personally (n=276).

Half of those who experienced bullying or harassment said it was from peers or colleagues, with a similar proportion saying this was from their manager or more senior colleagues. One in seven said bullying or harassment was from clients or colleagues.

Those who witnessed bullying or harassment of others were also asked who this was from.

Discrimination and microaggressions in the workplace (quantitative and qualitative feedback)

In the feedback from engineers in the qualitative research, most forms of reported discrimination appear to fall into the microaggressions category. It seems that most instances were related to gender and race, with fewer instances appearing to be related to sexuality or disability, although some examples of discrimination in these areas were still given.

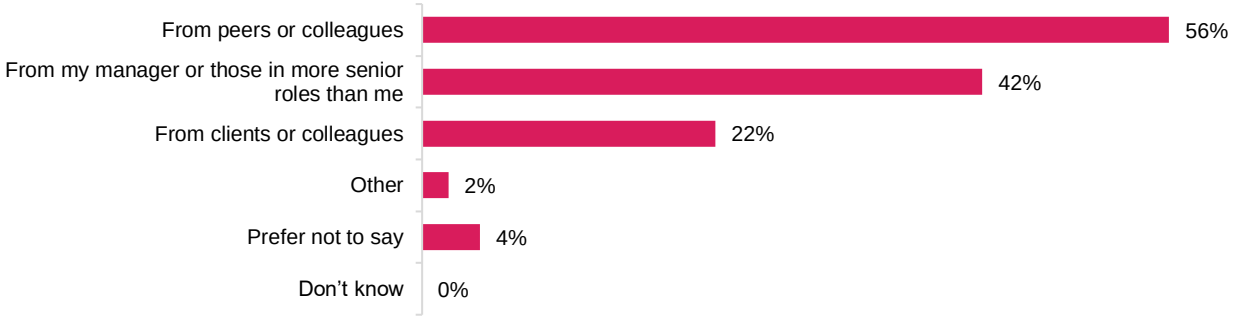
There were unfortunately still some instances of more explicit discrimination but these were noted to be less common and these behaviours were often called-out and challenged (often, but not always). In comparison, microaggressions appeared to go mostly unchallenged and many of those at the receiving end of them felt it would be difficult or unbeneficial to report them due to concerns around proving them or being perceived as 'hard work' or 'rocking the boat'.

Microaggressions were often felt to be too intangible to report and since most reporting procedures appear to focus on specific events rather than a series of behaviours, it can be almost impossible to make a substantial enough case for employers to act upon. However, these behaviours appear to wear down those at the receiving end of them and can often have a more detrimental impact on mental health than explicit discrimination which can be more easily identified and acted upon.

"I think it's hard enough to raise things as a woman anyway as you're often labelled as being some sort of moaning troublemaker if you do, but as a Black woman I think that issue is further compounded. So unless there is a very clear and explicit instance where it is unarguably unacceptable then it becomes quite difficult."

Engineer, Oil and Gas, Black, Female

Figure 24: Who bullying or harassment is from - witnessed



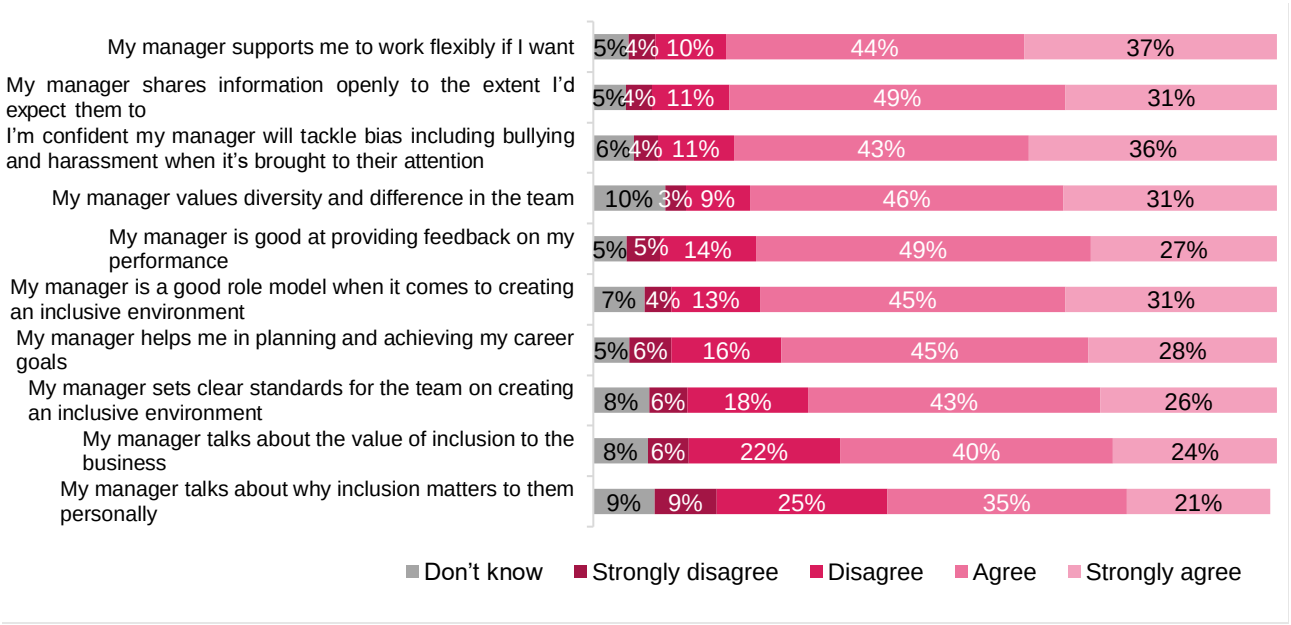
Source: Q18b. When you witnessed bullying or harassment, who was this from?
Base: those who witnessed bullying/harassment (n=367).

Just over half of those who witnessed bullying or harassment of others said this was by colleagues or peers, four in ten said managers or more senior colleagues, and just over one in five said clients or colleagues.

A manager's role in inclusion (quantitative feedback)

Respondents were asked to rate various statements on a four-point scale (from 'strongly disagree' to 'strongly agree') in relation to their manager.

Figure 25: Rating of statements relating to managers



Source: Q19. Please respond to each of these statements about your current manager. **Base:** all respondents (n=1,507).

Respondents were most likely to agree that their manager supports them to work flexibly (81%), that they share information openly (80%), and that they would tackle bias and bullying/harassment if it was brought to their attention (79%).

However, there is a lower level of agreement that managers talk about why inclusion matters to them personally (56%) and that managers talk about the value of inclusion to the business (64%).

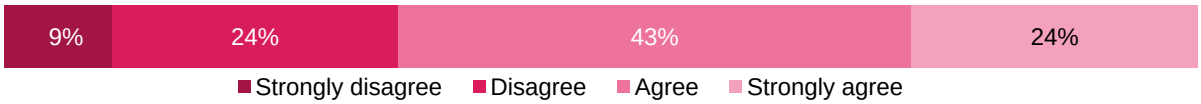
Respondents with no protected characteristics are more likely to agree that their manager would tackle bias and bullying/harassment (85%) compared to those who have protected characteristics, for example engineers with a disability or impairment (74%) or engineers from a Black, Asian or minority ethnic background (75%).

Protected characteristics and inclusion

Factors influencing feelings of inclusion: Gender (quantitative feedback)

Respondents were asked their level of agreement with the statement 'my gender is irrelevant to how I am perceived at work', on a four-point scale, from strongly disagree to strongly agree.

Figure 26: 'My gender is irrelevant to how I am perceived at work'



Source: Q15.3 Please rate the extent to which you agree or disagree with the following statements.
Base: all respondents (n=1,507).

Overall, around two-thirds agreed with this statement and a quarter 'strongly agree'. A quarter disagree and one in ten 'strongly disagree' that their gender is irrelevant to how they are perceived at work.

As one might expect, there are clear differences in the level of agreement according to gender, with women being twice as likely as men to disagree.

Table 11: 'My gender is irrelevant to how I am perceived at work' - by gender

Gender	% NET Disagree
Man	23%↓
Non-binary (n=20)	50%↓
Woman	48%↑

N.B ↑↓ indicates statistical significance (higher and lower)

Experiences of discrimination or exclusion related to gender (qualitative feedback)

In the qualitative research, many women noted instances where they were not made to feel included or felt discriminated against based on their gender. These experiences appeared to include both conscious behaviours and language as well as some unconscious biases, such as;

- Incorrect assumptions made about women's seniority in the organisation.
- Unwanted advances or comments of a sexual nature made to women.
- Inappropriate comments made about their clothing in the workplace.
- Women having their suggestions dismissed but when male colleagues make the same suggestion they are listened to.
- Women being assigned less meaningful work or tasks.

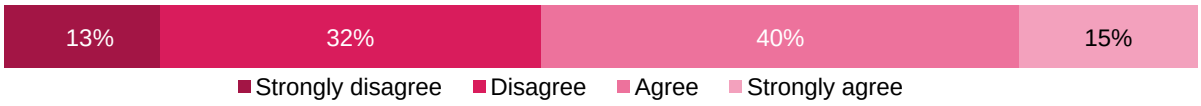
> "The amount of times people have assumed that I was some sort of secretary or assistant. I worked as a senior engineer for years in one company and one day I was asked by a male member of staff who had also been there for years whose assistant I was."
>
> **Engineer, Automotive, White, Female**

> "I've seen female colleagues being stared at by groups of men in the office for wearing a smart dress. It's inappropriate and makes everyone feel uncomfortable."
>
> **Engineer, Oil and Gas, White, Male**

Factors influencing feelings of inclusion: Ethnicity and background (quantitative feedback)

Respondents were also asked for their level of agreement with the following statement: 'people make assumptions about me at work because of my background (e.g., ethnicity, nationality, accent, socio-economic background)', on the same four-point scale.

Figure 27: 'People make assumptions about me at work because of my background'



Source: Q15.4 Please rate the extent to which you agree or disagree with the following statements. **Base:** all respondents (n=1,507).

Over half of respondents agreed with this statement, with a third saying 'disagree' and just over one in ten saying 'strongly disagree'.

Engineers with protected characteristics are more likely to agree that assumptions are made about them at work because of their background, with engineers from a Black, Asian or minority ethnic background being most likely to agree (71%).

Table 12: 'People make assumptions about me at work because of my background' – by subgroup

Protected characteristic	% Agree (NET)
Women	61%↓
Black, Asian or minority ethnic	71%↓
LGBTQ+	64%↓
Those with a disability	64%↓
None	45%↑

N.B ↑↓ indicates statistical significance (higher and lower)

Experiences of discrimination of exclusion related to sexuality (qualitative feedback)

In the qualitative research, Black, Asian and minority ethnic engineers often recalled instances of experiencing discriminating or marginalising behaviours in the workplace. Again, these appeared to include some conscious and explicit discriminatory behaviour as well as some unconscious biases and behaviours, including:

- Being spoken down to, spoken to in an overly loud or demeaning way (as if to assume that they cannot understand English).
- Having their opinions dismissed or ignored.
- Incorrect assumptions made about their seniority in the organisation.
- Incorrectly assuming they are not British.
- Unwanted comments relating to their clothing or hair (particularly when wearing non-Western clothing or hair styles).
- Derogatory language or descriptions of race or skin colour (these experiences ranged from both explicit terms to comparisons with food items).
- Colleagues expressing a desire to not employ engineers from certain ethnicities or races.

> "I was wearing a traditional dress, which I thought was actually very smart but someone told me I should re-think what I wear for client meetings."
>
> **Engineer, Consulting, Asian, Female**

"I was made aware of a culture at one of the plants, where the workforce was more ethnically diverse, of referring to staff members by different types of chocolate bars. It went unchallenged for some time."

Employer, Utilities

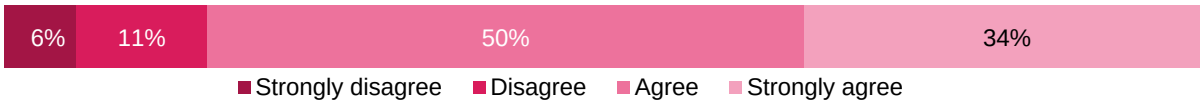
"I had colleagues in the past who couldn't talk to me without shouting all the time as they assumed because I had a slight accent that I couldn't understand them."

Engineer, Financial Services (recently left engineering), Black, Male

Factors influencing feelings of inclusion: LGBTQ+ (quantitative feedback)

Respondents were also asked their level of agreement with the statement 'I am open at work about my sexual orientation'.

Figure 28: 'I am open at work about my sexual orientation'



Source: Q15.6 Please rate the extent to which you agree or disagree with the following statements. **Base:** all respondents (n=1,507).

Overall, three quarters agreed with this statement (a third 'strongly agree' and half 'agree'), one in ten 'disagree' and just 6% 'strongly disagree'.

There are differences in the levels of agreement with LGBTQ+ engineers being less likely to agree (68%) than those with no protected characteristics (89%).

However further analysis highlights vast differences within the LGBTQ+ community with gay women/lesbians being most likely to agree (90%) and those who describe their sexuality as bi-sexual (59%) or pansexual (57%) being least likely to agree.

Table 13: 'I am open at work about my sexual orientation' – by sexual orientation

Sexual orientation	% Agree (NET)
Asexual	77%↓
Bisexual	59%↓
Gay man	62%↓
Gay woman/lesbian	90%↑
Queer	58%↓
Straight/heterosexual	88%↑
Pansexual	57%↓
Self-describe	58%↓

N.B ↑↓ indicates statistically significance (higher and lower)

Experiences of discrimination or exclusion related to sexuality (qualitative feedback)

In the qualitative research, a number of engineers from the LGBTQ+ community had experienced instances of exclusion and discrimination related to their sexual orientation. While these instances tended to be experienced less frequently, they were less often unconscious biases and behaviours and more often conscious and aggressively overt forms of discrimination, including:

- Unwanted gossip relating to their sexuality and making assumptions about their sexuality.
- Demeaning or de-valuing partnerships they have, or not recognising or referring to their married partners as husbands/wives.
- Employers asking them to refrain from talking about their sexuality too openly.
- Homophobic comments and slurs used in the workplace (often not used directly at a colleague but used in general language and 'banter').
- Colleagues refusing to work with or expressing disgust at having to work alongside LGBTQ+ colleagues.

> "I had a colleague approach me saying 'you are aware that the project manager you've assigned me is a lesbian?!', it turns out he was an Evangelical Christian and didn't feel comfortable working with her. I had to explain that her personal life has absolutely no relevance to her ability to do the job."
>
> **Engineer, Oil and Gas, White, Male**

"In a previous job with a very large company, I was in an office of 12 people. We had three people in there who were openly homophobic. I was not able to, as a gay man, come out or be open about my sexuality. The fact that they weren't aware that probably made them feel they had a safe space to express those views."

Engineer, Product Development, Male, LGBTQ+

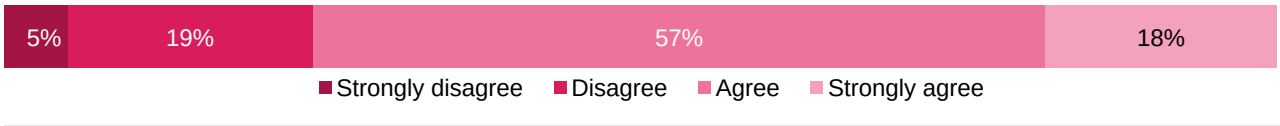
"No one knew I was gay for months and there was no problem until I happened to mention my husband, and then attitudes changed straightaway. I was told to 'tone it down'."

Engineer, Manufacturing, White, Male, LGBTQ+

Factors influencing feelings of inclusion: People with disabilities (quantitative feedback)

Respondents were asked to rate their level of agreement on a four-point scale with the following statement: 'My workplace is inclusive of people with disabilities'.

Figure 29: 'My workplace is inclusive of people with disabilities'



Source: Q15.7 Please rate the extent to which you agree or disagree with the following statements. **Base:** all respondents (n=1,507).

Three-quarters of respondents agree with this statement, with one in five strongly agreeing. However, one in five disagree and one in twenty strongly disagree.

Those who have a disability or impairment are less likely to agree with this statement (70%) compared to those who do not have a disability or impairment (77%).

Interestingly, those with other protected characteristics are also less likely to agree with this statement, compared to those with no protected characteristics.

Table 14: 'My workplace is inclusive of people with disabilities'- by subgroup

Protected characteristic	% Agree (NET)
Women	72%↓
Black, Asian or Minority Ethnic	71%↓
LGBTQ+	69%↓
Those with a disability	70%↓
None	81%↑

N.B ↑↓ indicates statistical significance (higher and lower)

Experiences of discrimination or exclusion related to disability (qualitative feedback)

Engineers participating in the qualitative research who have a disability noted fewer instances of discriminatory behaviours or language being used, but did note a number of ways in which they felt excluded at times, including:

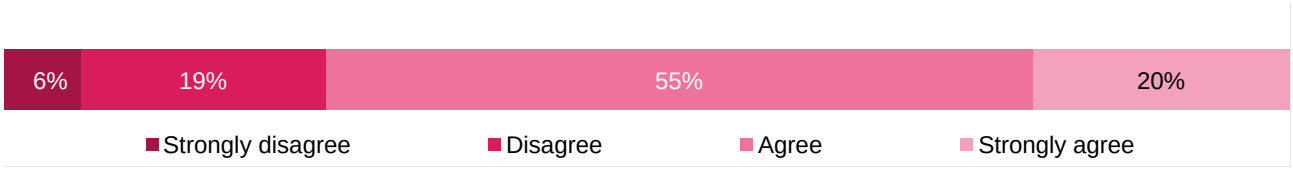
- Work events not always being accessible.
- Certain jobs or roles are unattainable due to the reluctance among some industries to consider access adaptations (site or plant-based work).
- A lack of dialogue and openness around disability compared to other protected characteristics, particularly physical/mobility disabilities.

> "The extent to which employers are willing to talk about disability is very limited. I think neurodiverse disabilities are seen as a safe discussion because, let's face it, many engineers are autistic but with disabilities impacting mobility it seems like a topic that employers are unwilling to engage with because of their reluctance to invest in access adaptations. "
>
> **Engineer, Consulting, White, Female, LGBTQ+**

Factors influencing feelings of inclusion: Religion (quantitative feedback)

Respondents were asked their level of agreement on a four-point scale with the following statement 'I feel I can speak openly about my faith/religious beliefs/non-beliefs at work'.

Figure 30: 'I feel I can speak openly about my faith/religious beliefs/non-beliefs at work'



Source: Q15.8 Please rate the extent to which you agree or disagree with the following statements. **Base:** all respondents (n=1,507).

Three quarters of respondents agree (76%) with one in five strongly agreeing. However, one in five disagree and 6% strongly disagree.

While there were some differences in levels of agreement across religions, these are mostly not statistically significant. However, it appears that those from less common religions are least likely to feel they can be open about it at work.

Table 15: 'I feel I can speak openly about my faith/religious beliefs/non-beliefs at work' – by religion

Religion	% Agree (NET)
None	80%↑
Christian	76%
Muslim	76%
Other* (Buddhist, Hindu, Jewish, Sikh, Spiritual, any other religion or belief)	64%↓

N.B ↑↓ indicates statistical significance (higher and lower). *Religions have been grouped together due to low sample sizes when analysed individually.

Experiences of discrimination or exclusion related to religion (qualitative feedback)

Participants in the qualitative research noted experiencing some discriminatory or excluding behaviours based on their religion. These experiences appeared most prevalent among Muslim engineers. Examples include:

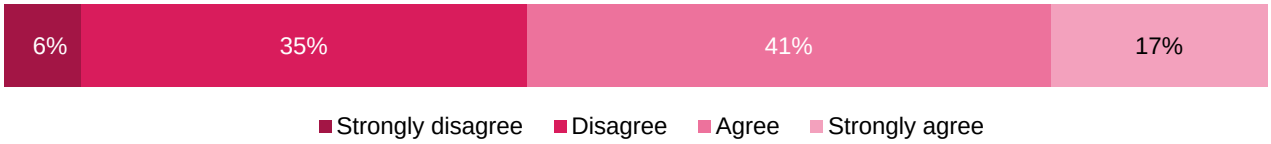
- Colleagues making inappropriate references and jokes related to terrorism.
- Employers questioning their backgrounds and religious beliefs.
- Work events often involving or centred around the consumption of alcohol.

> "People would come into the room and be like 'hey, Mo', make a little bomb noise and then just walk out as if it was just banter and they'd laugh it off."
>
> **Engineer, Aviation, Asian, Male**

Factors influencing feelings of inclusion: Caring responsibilities (quantitative feedback)

Respondents were asked their level of agreement on a four-point scale with the statement 'It's harder for people with caring responsibilities to progress their career where I work'.

Figure 31: 'It's harder for people with caring responsibilities to progress their career where I work'.



Source: Q15.9 Please rate the extent to which you agree or disagree with the following statements. **Base:** all respondents (n=1,507).

Sentiment here is less positive with just under six in ten agreeing with this statement. Four in ten 'agree' while one in six 'strongly agree'. However, four in ten disagree that it's harder for those with caring responsibilities to progress their career where they work.

Those who have caring responsibilities are more likely to strongly agree (25%) with this statement compared to those with no caring responsibilities (14%).

Experiences of discrimination or exclusion related to caring responsibilities (qualitative feedback)

In the qualitative research, engineering participants had experienced some instances of feeling excluded because of their caring responsibilities. Many of these experiences related to being put at a professional disadvantage because of these responsibilities, including:

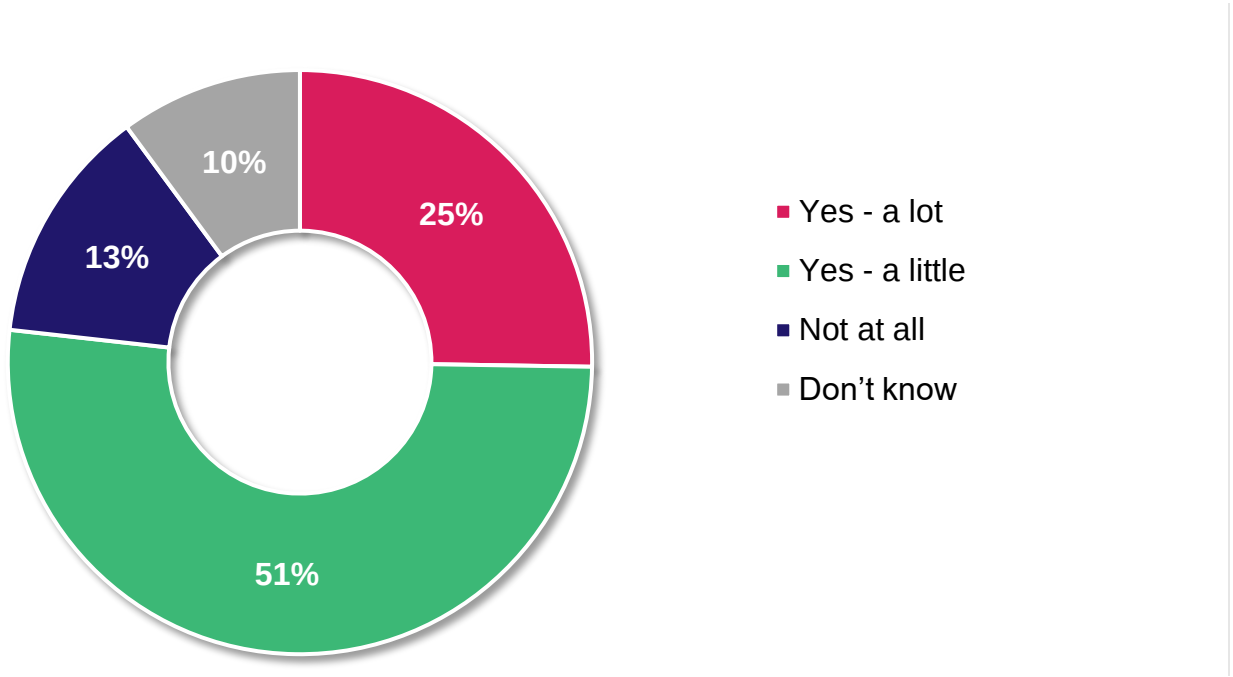
- Not being able to attend important work events because they had been arranged outside office hours.
- Having to leave or consider taking a career break because their employer won't allow them to work part-time.
- It being assumed that they won't return to work or want to progress in their career after having a child.

Has inclusion improved?

Changes to inclusion over the past five years (quantitative feedback)

Respondents were asked if they think that inclusion has improved in their sector over the past five years, and if it has improved, if this has been a little or a lot.

Figure 32: Has inclusion improved over the past five years?



Source: Q09. Do you think that inclusion has improved in your engineering sector over the past five years**?**
Base: all respondents (n=1,507).

Three quarters of engineers think that inclusion has improved over the past five years, with half saying it has improved 'a lot' and a further quarter saying 'a little'. There were numerous differences in responses according to various characteristics.

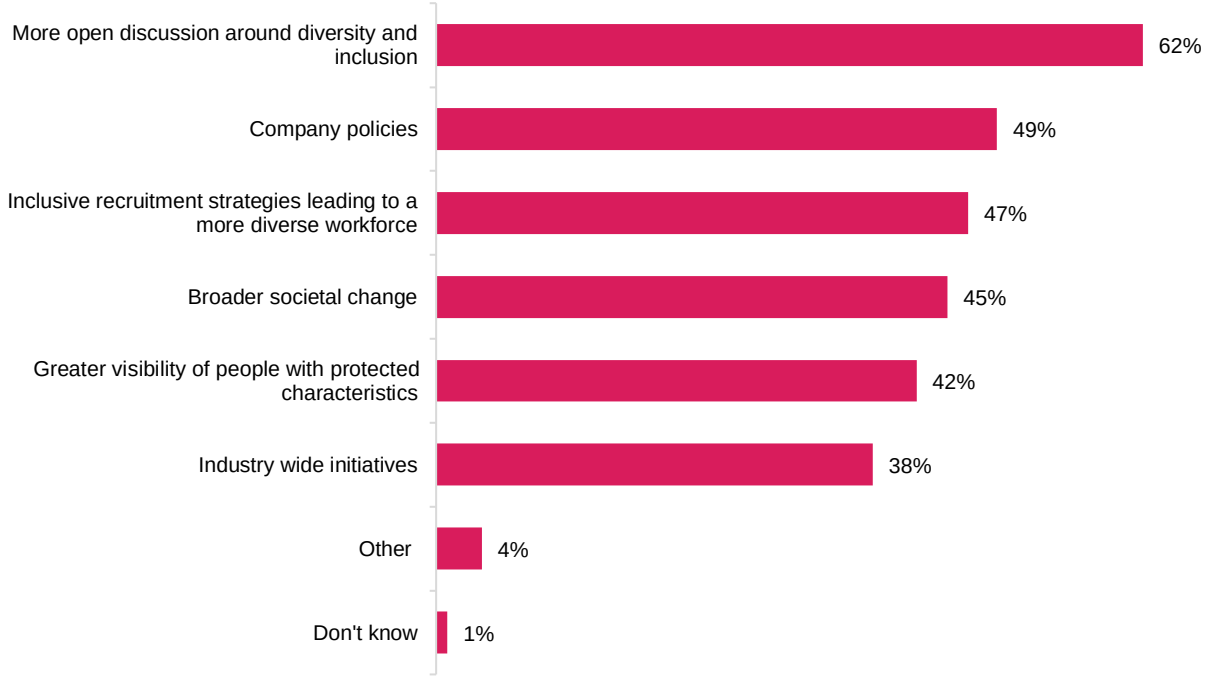
Men are more likely to say that inclusion has improved 'a lot' (28%) compared to women (20%). Almost nine in ten engineers who say they are transgender or have a trans history said inclusion had improved.

Those working in medium-sized firms were more likely to say inclusion has improved (82%) compared to those in small and large organisations (73% and 74%). Furthermore, those in management roles were more likely to say inclusion has improved (82%) compared to graduates/non-management (72%) and interns/apprentices (75%).

How has inclusion improved? (quantitative feedback)

Respondents who think inclusion has improved were then asked in what ways inclusion has improved over the past five years.

Figure 33: Ways in which inclusion has improved over the past five years



Source: Q09a. In what ways has inclusion in your engineering sector improved over the past five years? **Base:** those who think inclusion has improved over the past five years (n=1,152).

By far the most common way inclusion has improved was more open discussion around diversity and inclusion. Those working in large companies were most likely to say inclusion had improved due to company policies (57%) compared to just 36% for small companies and 46% for medium companies. Large companies were also more likely to have inclusive recruitment strategies (52%) than medium (45%) or small companies (35%).

Views on improvements in inclusivity (qualitative feedback)

In the qualitative research there was a recognition that some efforts have been made to try and improve inclusivity in many organisations, including:

- Encouraging the creation of D&I support groups and taskforces (however, many of these groups are noted to be employee-led and therefore not assigned any budget and/or time allowance or even in some cases discouraged if they became too vocal).
- Having more rules and processes in place for dealing with any instances of discrimination, bullying or harassment.
- More awareness and conversations around what may or may not be perceived as acceptable behaviour in the workplace (for example inappropriate language, ‘Page 3’ style calendars, sexual harassment).

- More celebration of diversity and marking of events such as Black History Month and International Women's Day.
- Providing staff with unconscious bias training (however this training is noted to not always be taking place throughout the company and sometimes those in senior leadership roles do not attend).

> "It's much better than it used to be. You don't have to walk past a load of nude pin-up calendars anymore, they made them get rid of those a while ago."
>
> **Engineer, Automotive, White, Female, LGBTQ+**

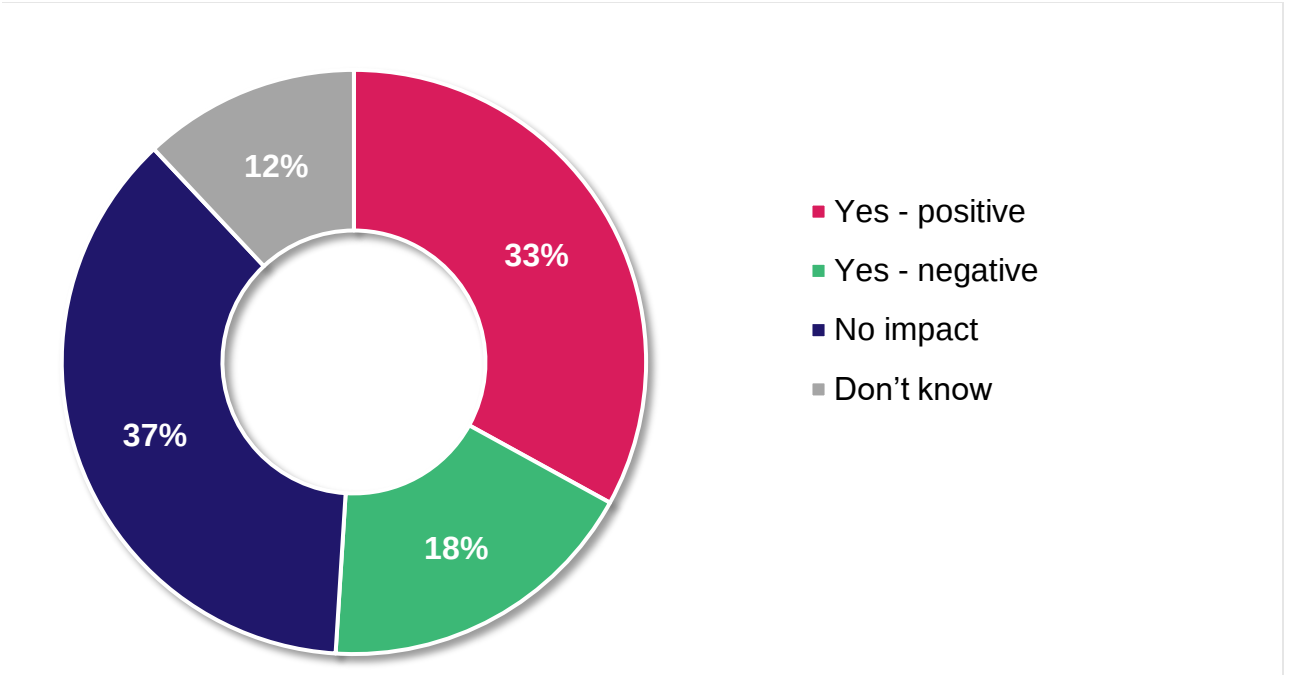
However, despite there being a lot of negative experiences relating to diversity and inclusion, there is a sense that many of the attitudes and behaviours experienced had largely come from colleagues of a slightly older generation and that as time passes and these colleagues start to leave the profession, the culture is gradually starting to improve. Many engineers also expressed the opinion that newer entrants into the profession appear to be much more inclusive in their attitudes.

> "I think a lot of the 'dinosaurs' who would express those types of views are gradually dying out and retiring. The industry seems a lot better and more inclusive in the past few years, and I think with more and more of the next generation of engineers finding these behaviours unacceptable it makes it harder at least for those dinosaurs still remaining to express these opinions openly."
>
> **Engineer, Construction, Male, LGBTQ+**

Factors influencing feelings of inclusion: COVID-19 (quantitative feedback)

Respondents were asked if they think that COVID-19 had an impact on inclusion within engineering (the profession as a whole) and if the impact was positive or negative.

Figure 34: Impact of COVID-19 on inclusion within the engineering profession



Source: Q10.2. Do you think COVID-19 has had an impact on inclusion within engineering? **Base:** all respondents (n=1,507).

Half of respondents believe that COVID-19 has had an impact on inclusion within engineering. A third think this is a positive impact and just under one in five think this is a negative impact.

There were some notable differences, with women being more likely to think there has been a positive impact (36%) compared to men (31%). Those with caring responsibilities are also more likely to think there has been a positive impact compared to those without caring responsibilities (37% vs 31%). This could be linked to increased working from home during the pandemic making balancing home and work life easier.

Diversity: A backdrop to inclusive culture

Lack of diversity in the industry a shock to some (qualitative feedback)

Many of the engineers we spoke to in the qualitative research who grew up in the UK noted being aware from a fairly young age that the engineering industry isn't particularly diverse, especially in terms of gender representation.

However, engineers who have moved to the UK for work often noted finding the UK engineering sector to be far less diverse than in their home countries, particularly in terms of ethnicity and socio-economic background. They describe being shocked by the lack of diversity in a country where there is a highly diverse population.

> "I found that when I was in France at university there was a much greater mix in terms of ethnicity and background when doing the courses, so it was a real shock to me to start working in the UK to find pretty much only white, middle-class engineers here."
>
> **Engineer, Biomedical Engineering, Asian, Male**

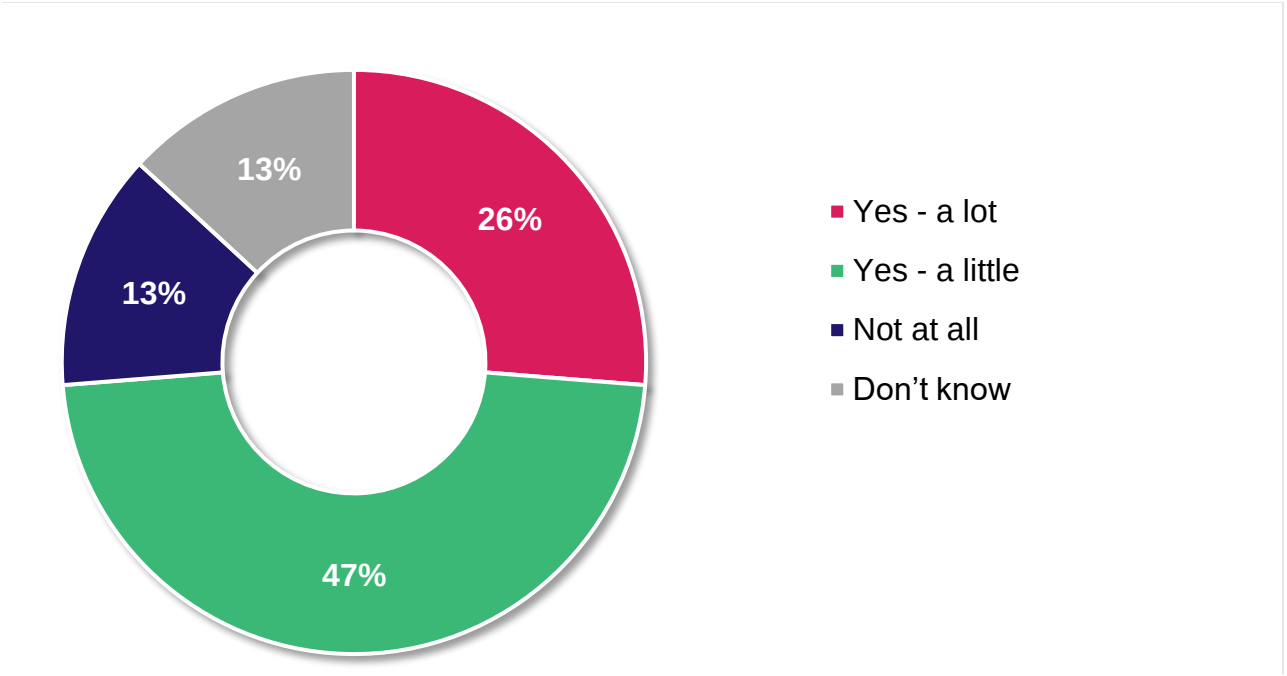
Even at higher education level there seems to be some disconnect between the UK and other countries.

> "Back in my country it was actually quite normal for women to go into engineering there were lots of other girls in my form at university. It's strange as now I work at a university in the UK I see far fewer girls and this is like more than a decade on from when I attended back home."
>
> **Engineer, Academia, Other Minority Ethnic, Female**

Improvements in diversity (quantitative feedback)

Respondents were asked if they think that diversity in their organisation has improved over the past year, and if so, is it either a little or a lot.

Figure 35: Improvement in diversity at organisation over the past five years?



Source: Q20. Do you think that diversity has improved in your organisation over the past five years? **Base:** all respondents (n=1,507).

Overall, three quarters think that diversity has improved, almost half said it has improved a little, with a quarter saying it has improved a lot. However, just over one in ten said 'not at all' with the same proportion saying 'don't know'.

Responses were similar for engineers with protected characteristics and those without. However, younger engineers are more likely to say diversity has improved 'a lot' compared to older engineers. For example, around a third of engineers (34%) aged 18-24 said 'a lot' compared to just 21% of those aged 65 and over.

Views on improvements in diversity (qualitative feedback)

In the qualitative research there was a recognition among participants that diversity in the sector is slowly improving, in that organisations are claiming that it is now an area of focus and priority with some putting things in place to help with diversity, including:

- Setting recruitment targets around gender and in some cases ethnicity (there appears to be less focus in terms of sexuality and disability).
- The opening up of some industries to different characteristic groups that previously weren't considered or even allowed to join previously (such as homosexuals being allowed to join the military and women being allowed to join the Navy).
- Performing and reporting on pay gap analysis (again most of the focus appears to be on gender in this area).
- Trying to take some of the opportunities for bias out of the recruitment process (such as removing names and where applicants attended university)

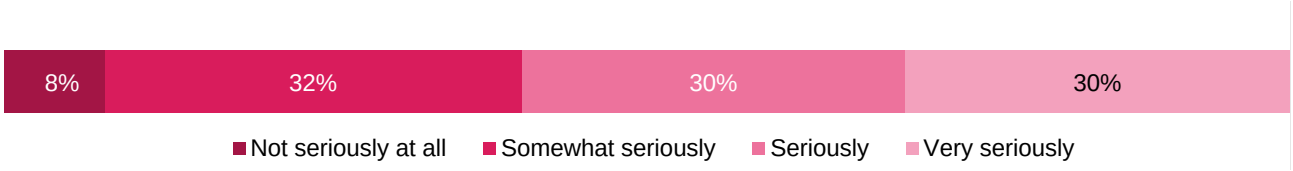
While workforces are noted to have become slowly but progressively more diverse, there is felt to be some way to go until the industry is truly reflective of the wider population. With the gender disparity felt to be the area of most concern in most industries. Additionally, where some industries were ethnically quite diverse, they were noted to not be recruiting from local ethnic population groups, even where organisations had sites based in areas with high levels of diversity.

Importance of diversity (quantitative feedback)

Respondents were also asked how seriously they feel their organisation takes issues around diversity and inclusion. There were four options, each option had some context around it, for example:

- Not seriously at all (rarely mentioned, no policies in place).
- Somewhat seriously (some effort made, certain policies in place, infrequent discussions).
- Seriously (policies in place, lead discussions and training, some change in evidence).
- Very seriously (high level of training and/or awareness, clear policies and advocates for D&I, visible tangible change experienced, accountability at senior leadership/board level).

Figure 36: Is diversity taken seriously at organisational level?



Source: Q21. How seriously do you think your organisation takes issues around diversity and inclusion? **Base:** all respondents (n=1,507).

Views were mixed with three in ten saying ‘very seriously’, the same proportion saying ‘seriously’ and a third saying ‘somewhat seriously’. Less than one in ten say diversity is not taken seriously at all.

Respondents with protected characteristics feel that diversity is taken less seriously than those with no protected characteristics.

Protected characteristic	% NET: Not / somewhat seriously	% NET: Seriously / very seriously
Women	43%↑	57%↓
Black, Asian or minority ethnic	46%↑	54%↓
LGBTQ+	50%↑	50%↓
Those with a disability	43%↑	57%↓
None	35%↓	65%↑

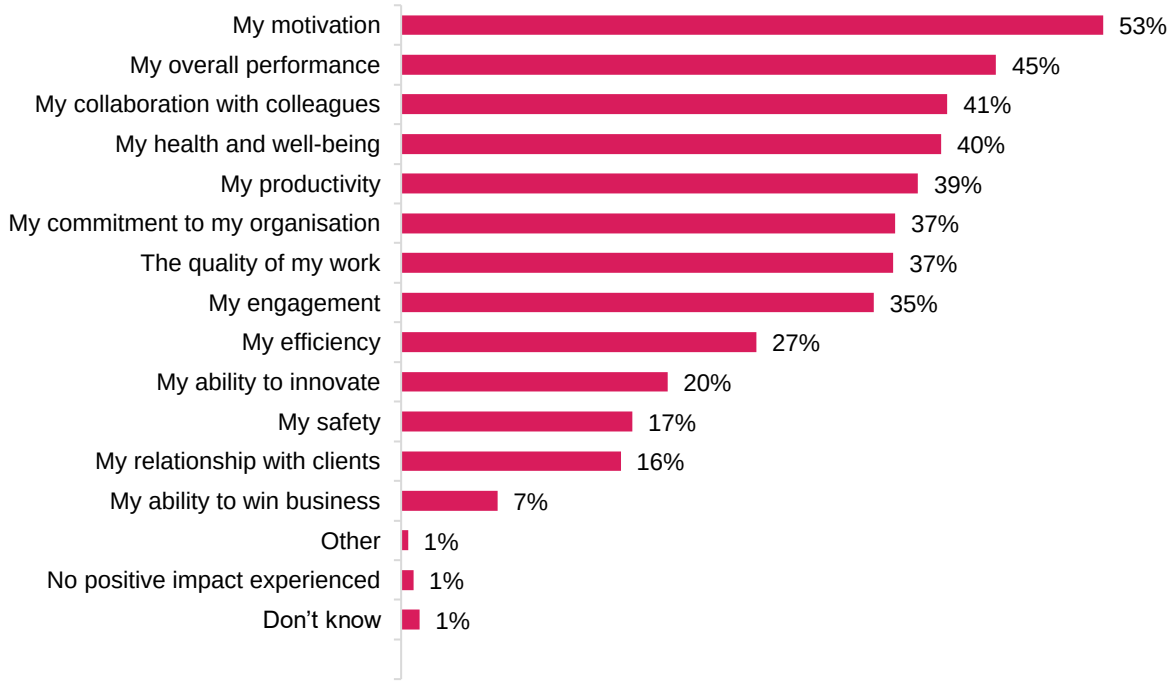
Actions to improve inclusivity

Benefits of inclusion

The impact inclusion has on performance and wellbeing (quantitative feedback)

Respondents were asked to select from a list, what is most improved by feeling included at work. Respondents could select up to a maximum of five statements.

Figure 37: Improvements by feeling included at work



Source: Q17. In your experience which of the following (if any) are most improved by feeling included at work?
Base: all respondents (n=1,507).

The most common benefits of feeling included at work are feeling more motivated, overall performance, and collaboration with colleagues. Four in ten said feeling included benefitted their health and well-being and productivity.

Women were more likely than men to say feeling included improved their motivation (58% vs 49%), their commitment to their organisation (42% vs 33%) and their health and well-being (48% vs 35%).

Organisational benefits to inclusion (qualitative feedback)

Employers who took part in the qualitative research were very vocal about the benefits of improved diversity and inclusion, identifying numerous advantages to their businesses in investing more time, money, and resource in this area. However, as many of the employers who participated in this work were D&I professionals, it is perhaps unsurprising that they hold this view. While many engineers noted that there had been more talk of the need to improve D&I in their organisations and some actions taken, there was also a lot of talk of

companies being unwilling to fund (in any substantial or effective way) D&I activities and that many were employee-led initiatives, reliant on the willingness of internal employees to conduct such activities in their own time.

> "I was told that I needed to stop the work I was doing in D&I as it was taking up too much time and told it was taking away my focus from my work. I used to do it at the evenings and weekends, so I know that wasn't the case. They just didn't want us uniting together, I don't think, as we were starting to raise some issues around race."
>
> **Engineer, Motor Sport, Black, Male**

> "What you find in many organisations still is that these groups are completely employee-led and given how stressful and pressured their day jobs are, they end up having to give up on running these groups so they become ineffective."
>
> **Employer, Diversity and Inclusion, Utilities**

Actions and improvements required

Desired improvements and actions for employers (qualitative feedback)

Despite there being some progress and advances made in diversity and inclusion there is a general consensus that the engineering profession, and particularly certain sectors within it, still has some way to go in order to be completely diverse and fully inclusive. In fact, some of the efforts and actions taken so far within organisations were described as being largely superficial and just 'for the good PR' or to 'pay lip service' to a topic that is felt to be quite on-trend within the sector at the moment. While there is felt to be a lot of talk around the topic there was a sense that tangible improvements and meaningful actions were still thin on the ground.

Desired improvements expressed by engineers include:

- Ensuring that the focus is not just on recruiting more diversely but promoting diversely.
- Ensuring that diversity is seen throughout the company including in operations/delivery roles and in leadership.
- Ensuring that some of the cultural issues in engineering (as shown earlier) are properly addressed in order to encourage and retain staff from different backgrounds.
- Explore and challenge the status quo when it comes to why certain traits, personalities and characteristics are valued over others.
- Providing more guidance on banter and outlining when banter becomes unacceptable.
- Setting organisational quotas for diversity, and beyond just gender.
- Providing 'truly' anonymous ways of reporting issues relating to D&I.

- Cracking down on microaggression-type behaviours and allow for grievance reporting mechanisms that better reflect the nuances and subtlety of these types of actions and behaviours.
- Creating work environments where minority characteristic groups don't feel 'one-off' or 'out of place' by celebrating and encouraging difference, including different attitudes, working styles and ways of communicating.

Employers and those working in HR and D&I provided some additional desired actions including:

- Putting more time and investment into targeting and helping to re-shape perceptions among young girls (before major education choices are made).
- Measuring and reporting on diversity at all levels and roles to ensure that figures are not artificially inflated by those in non-engineering roles.
- Creating D&I networks and groups but also encouraging ally groups and ally participation.
- Being more honest with all employees about the types of behaviours that make some groups feel not included – even if it may be considered controversial.
- Exploring and considering candidates that have taken 'alternative' routes into the profession or that may not have all the desired qualifications or criteria but show potential.
- Ensuring that D&I events, taskforces and support groups are assigned a good budget and time within working hours in order to be impactful.
- Avoiding reliance on blind recruitment to ensure diversity: there is some concern around the reliance on blind recruitment techniques to ensure that candidates from diverse backgrounds were considered, with the concern being that any existing/unchallenged biases were likely to still become a barrier once the candidate is interviewed or employed.
- Having diverse recruitment panels – although many employers recognise this is hard sometimes if the number of existing engineers from diverse backgrounds is low.
- Investing in D&I personnel to take on the responsibility of running and co-ordinating groups and activities so that the responsibility does not fall on staff with other full-time duties.

> "Our Women's Group reported women being talked over in meetings, not being acknowledged by a man when there are other men around, not being included in conversations. I am writing a report and bracing myself for sending it out to the whole company as I know it won't be a popular message, but I feel it's an important one nonetheless."
>
> **Employer, Renewable Energy**

> "I know that in order to have a diverse workforce in my business I have to consider candidates that may not have the degrees or the work experience already. If I see that passion and potential, I will invest in them and you find these employees often are the most loyal and give you more back over time."
>
> **Employer, Manufacturing**

Desired improvements and actions for industry bodies (qualitative feedback)

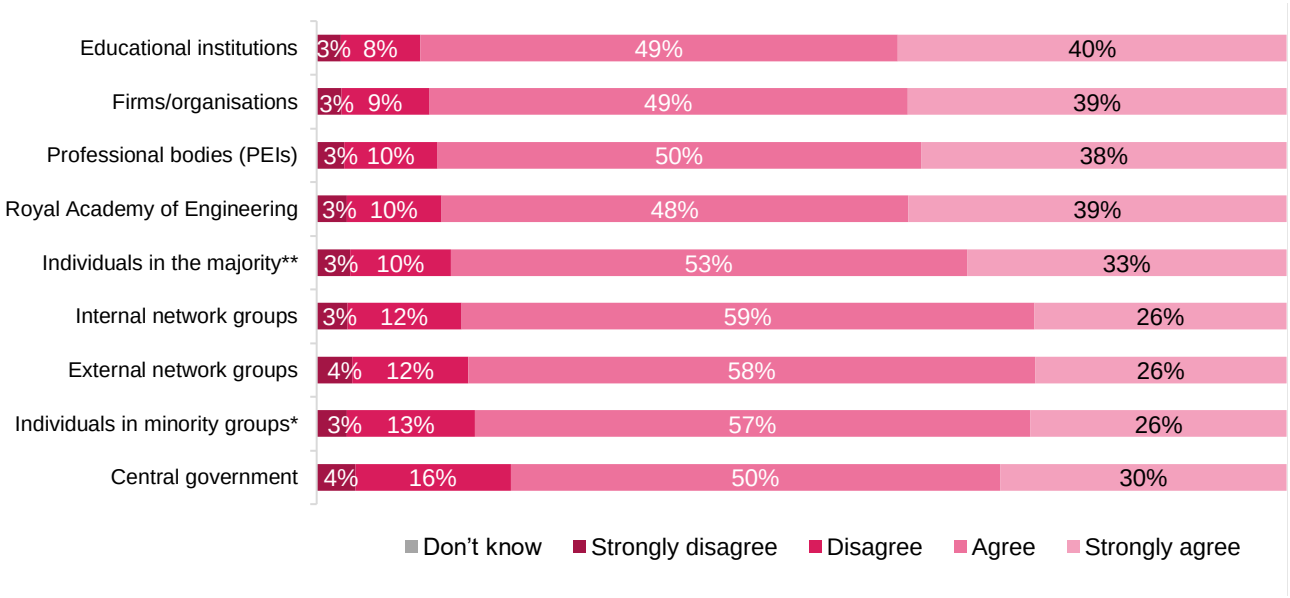
Engineers and employers expressed several desired actions they would like to see from the Academy as well as other industry bodies such as EngineeringUK, including:

- Ensuring that there is a good level of diversity seen within their own organisations and particularly within leadership teams.
- Providing a league table for diversity and celebrating the actions and efforts of the most diverse organisations.
- Providing an anonymous reporting platform for engineers experiencing issues relating to D&I in their organisations and taking action against those organisations where a pattern of experiences or behaviours are reported.
- Challenging and putting pressure on organisations with poor diversity.
- Providing more support and guidance to those who feel they are struggling to enter the industry or those looking to leave the industry due to D&I issues.
- Working more closely with schools and education institutions to provide better, more engaging careers information and events.
- Providing teachers with training sessions and toolkits to help better inform them about the engineering profession and the various options open to their students.
- Provide information packs for parents of children who express an interest in engineering and to make them aware of different career options and routes into the profession.

Promoting talent from underrepresented groups (quantitative feedback)

Respondents were asked the extent to which they agree that different bodies and organisations should play a role in promoting engineering talent from underrepresented groups (for example Black, Asian or minority ethnic, LGBTQ+, women and those with disabilities).

Figure 38: Promoting engineering talent from underrepresented groups



Source: Q22. To what extent do you agree that the following should play a role in promoting engineering talent from underrepresented groups? For example, Black, Asian or minority ethnic, LGBTQ+, women, disabled people. **Base:** all respondents (n=1,507).

The level of agreement was very similar across the range of answers with 80% agreeing central government should promote engineering talent from underrepresented groups and 89% agreeing that educational institutions should play their part. This suggests that it is felt that lots of different organisations and bodies need to come together to tackle this issue, rather than it being the sole responsibility of one over the other.

Women have higher levels of agreements for most except those in minority groups, as shown below.

NET Agree – should play a role in promoting underrepresented engineering talent	Women	Men
Central/local government	83%↑	78%↓
Educational institutions	95%↑	87%↓
Royal Academy of Engineering	91%↑	85%↓
Professional bodies	93%↑	84%↓
Firms/organisations	93%↑	86%↓
Internal network groups	90%↑	82%↓
Individuals in minority groups	85%	84%
Individuals who are in the majority	90%↑	85%↓
External network groups	82%↑	88%↓

Conclusions

The overall feeling in the engineering profession is that, although many engineers have noticed improvements to the culture of inclusivity in the profession over the past five or so years, more needs to be done to address the existing lack of diversity and some of the cultural issues that remain. Several issues were raised by engineers from all background types that continue to act as barriers to consideration, entry, and progression in the profession. In fact, some of the positive advances in the sector have been noted to relate more to wider cultural shifts in terms of what behaviours are deemed acceptable in the workplace and the natural 'dying out' of these opinions as generations of engineers who hold these views retire or leave the sector.

Our conversations highlighted, through personal stories, the disadvantages that many engineers still face and the pressure and need to conform or fit into a specific organisational culture. In many sectors there appears to be continued preference and favouring of the personality types, characteristics, and backgrounds of those individuals largely still seen in senior positions of engineering organisations. And those in such senior positions are more often than not white, middle-class men.

While some organisations appear to be proactively trying to improve the diversity of their workforce and are willing to employ engineers from different backgrounds and characteristics, there still appears to be a reluctance to embrace the different personalities, viewpoints, working styles and approaches that come along with it. The attributes and ideals that some employers continue to hold in high esteem appear to be those that are more in-line with typically white, middle-class men. In addition, where employers are successfully managing to create more inclusive environments in office-based project management type roles, engineers noted feeling less comfortable with the 'macho' and 'banter' culture that is still prevalent in operational areas, for example in production, on-site, and on factory floors.

Although diversity and inclusion has become a 'hot topic' in the industry and is viewed as a fashionable issue for businesses in engineering to discuss and promote, there is a view that many of these conversations just pay lip service to the topic. Engineers and employers both recognise that there is a long way to go to ensure that policies and approaches within organisations are effective at changing the cultural issues that remain. There is also a strong recognition that, until some wider cultural issues are addressed (such as traditional views around gender roles and the suitability of certain professions to those from particular backgrounds or characteristics), there is unlikely to be a major improvement to diversity in the industry anytime soon.

Employers often note struggling to find candidates from more diverse backgrounds, particularly women. Both engineers and employers attribute the root cause of this as being the inability for schools to engage young girls in engineering at a young enough age, and before connotations about what the industry is like to work in or 'who it is for' become engrained. Most engineers noted that their sources of inspiration for joining the industry were from outside their school setting, and those that expressed an interest at school age often found that their teachers knew very little about the industry or the variety of career opportunities it holds. Having existing family connections or being inspired by a family member in the industry appears to be highly influential in encouraging young people to consider engineering. While this may be viewed positively given the lack of young people in general entering the industry, this mode of engagement and entry appears to be reinforcing

the same profile and background types of candidates entering the industry. It also, in many industries, results in nepotism and an unfair advantage to those with this existing connection.

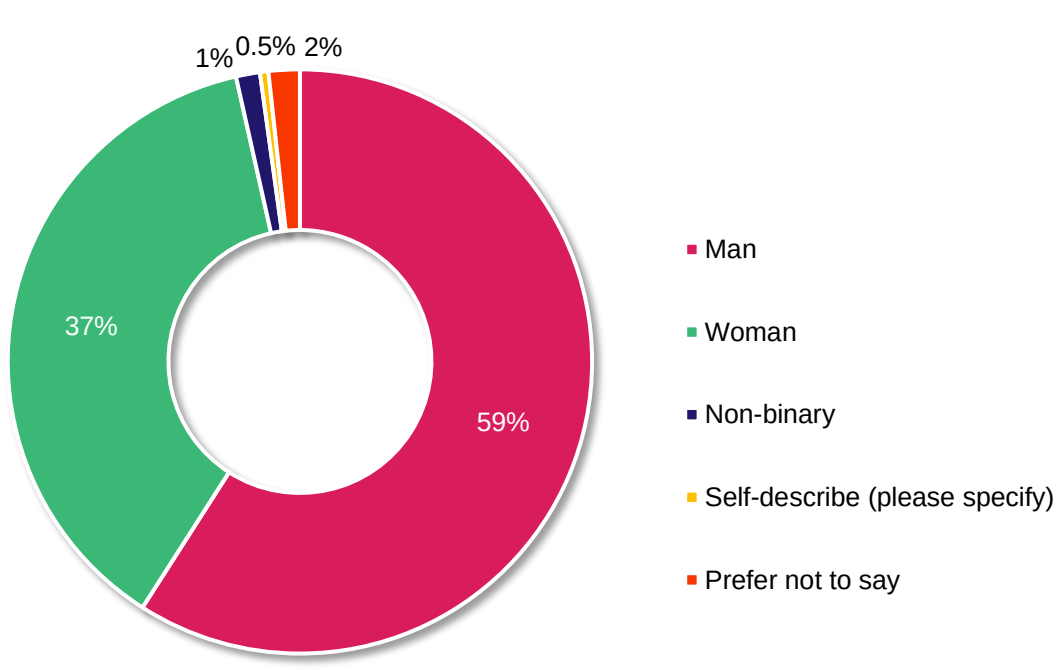
Some organisations note struggling to attract diverse talent due to potential candidates not seeing enough people like them in interviewing panels or from similar backgrounds in senior positions. However, engineers also noted that senior managers appeared to want to promote and support employees who were 'in the image of themselves' and shared similar interests or who made the most effort to connect with them socially. Again, this behaviour seems to be reinforcing similar profiles reaching senior positions and contributes to the continuation of a lack of diversity in some sectors.

The skills shortage that is faced by the industry has opened up many organisations to the benefits of encouraging and supporting the recruitment of more diverse workforces. However, if the industry fails to address some of the key barriers and cultural issues engineers are experiencing at work, then the industry will struggle to retain and support the progression of those from less represented backgrounds or characteristics.

Appendix

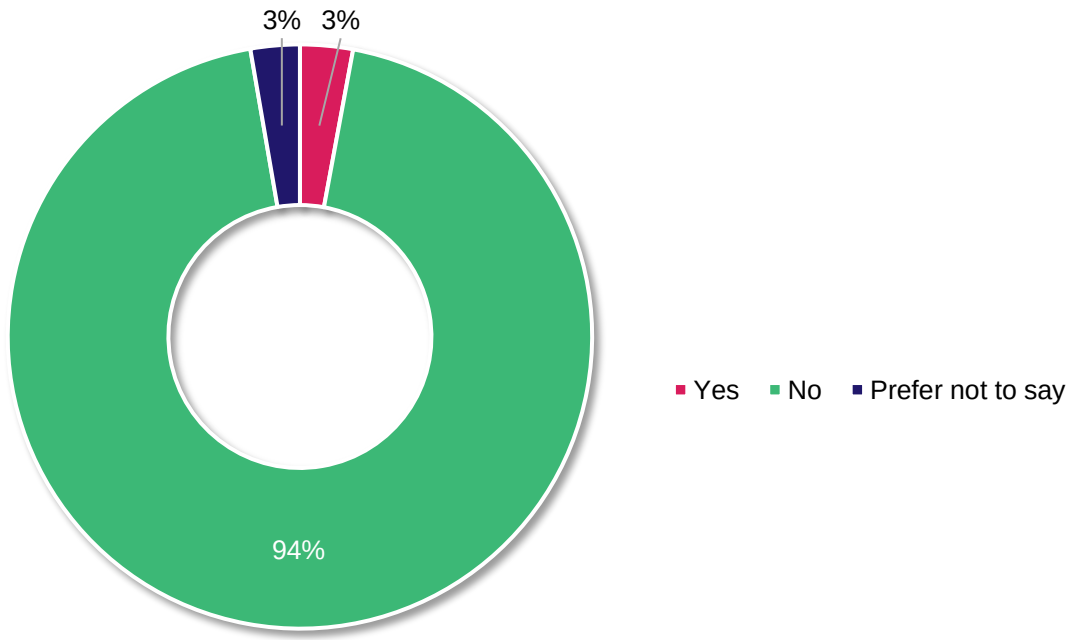
Demographics and firmographics

Figure 39: Gender



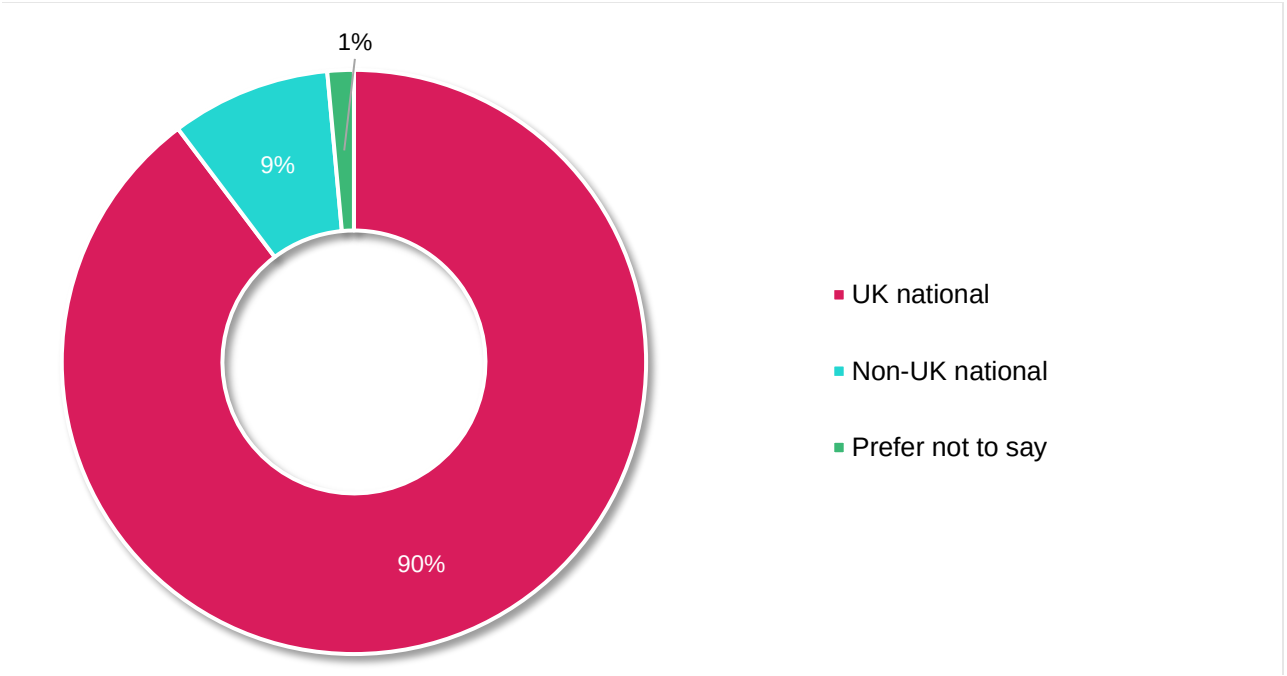
Source: D01. Which of the following best describes your gender? **Base:** all respondents (n=1,507).

Figure 40: Trans



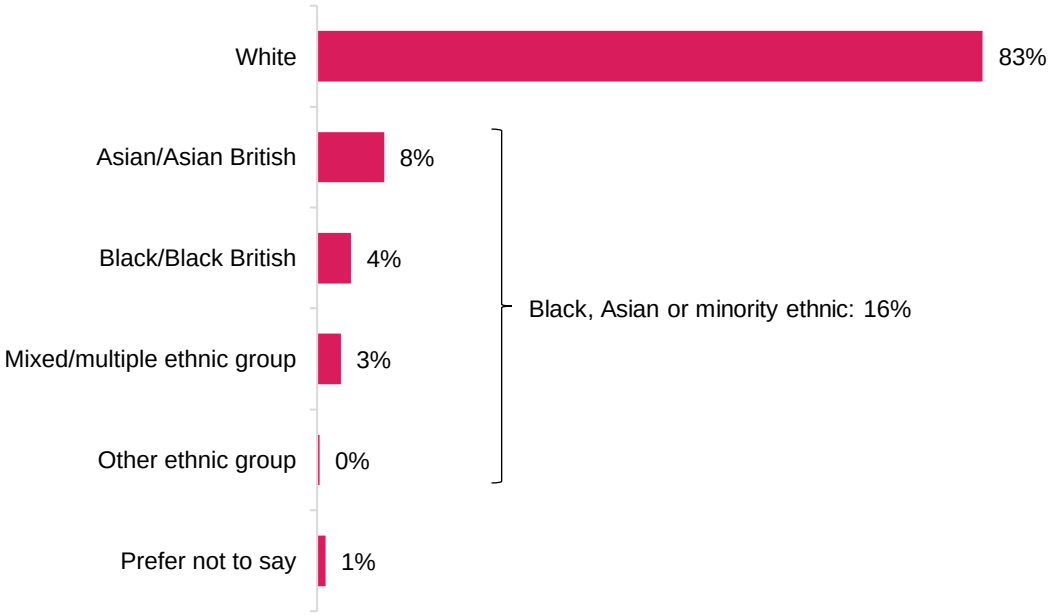
Source: D02. Are you trans or do you have a trans history? **Base:** all respondents (n=1,507).

Figure 41: Nationality



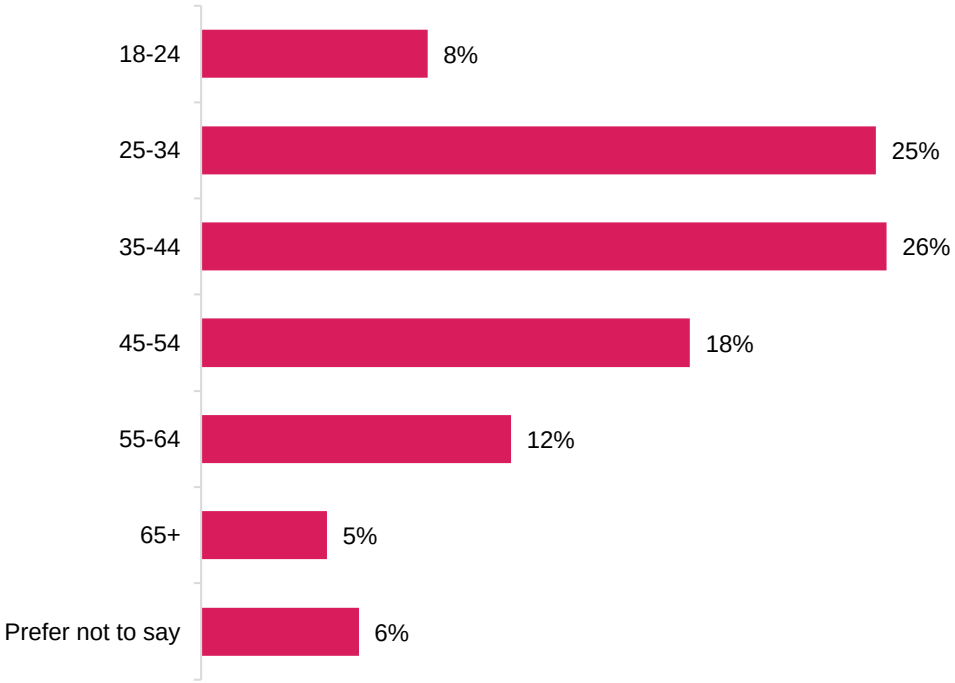
Source: D03. What is your nationality? **Base:** all respondents (n=1,507).

Figure 42: Ethnicity



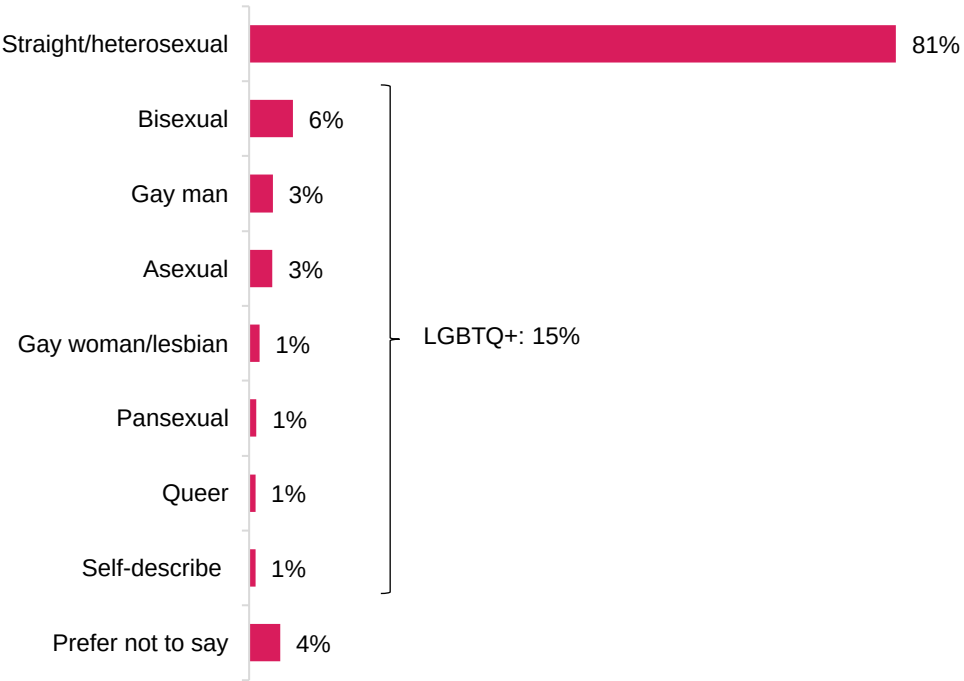
Source: D04A. What is your ethnic group? **Base:** all UK nationals (n=1,352).

Figure 43: Age



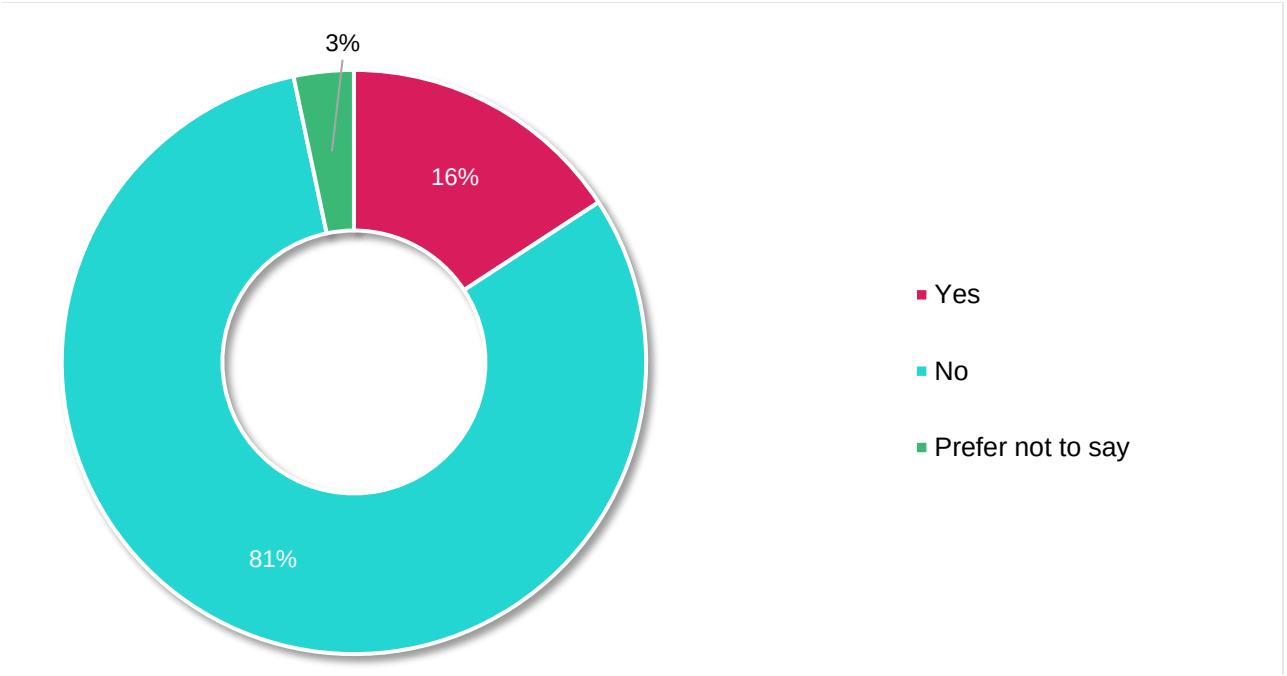
Source: D05. What is your age? **Base:** all respondents (n=1,507).

Figure 44: Sexual orientation



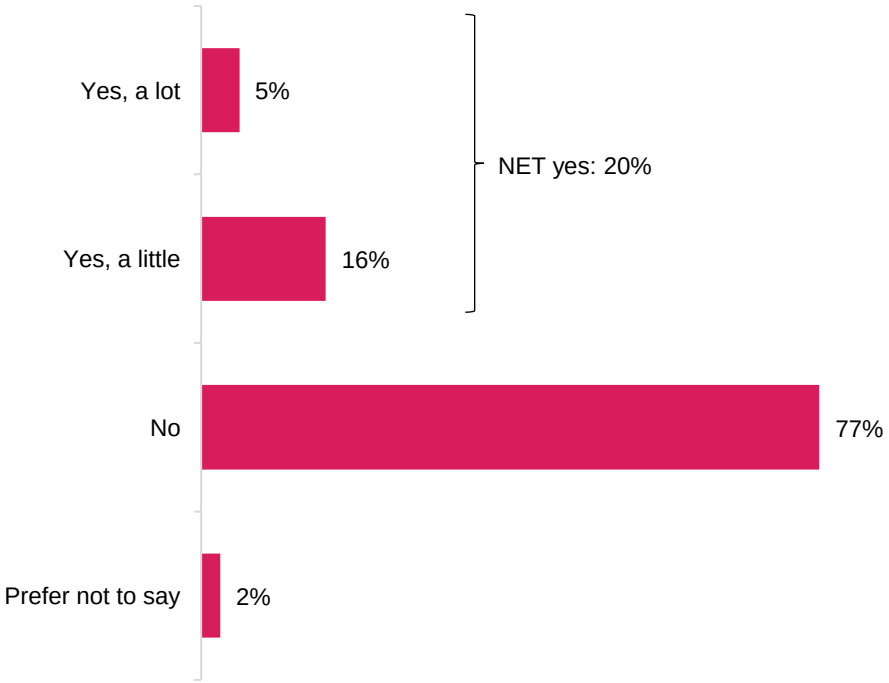
Source: D06. Which of the following best describes your sexual orientation? **Base:** all respondents (n=1,507).

Figure 45: Disability 1



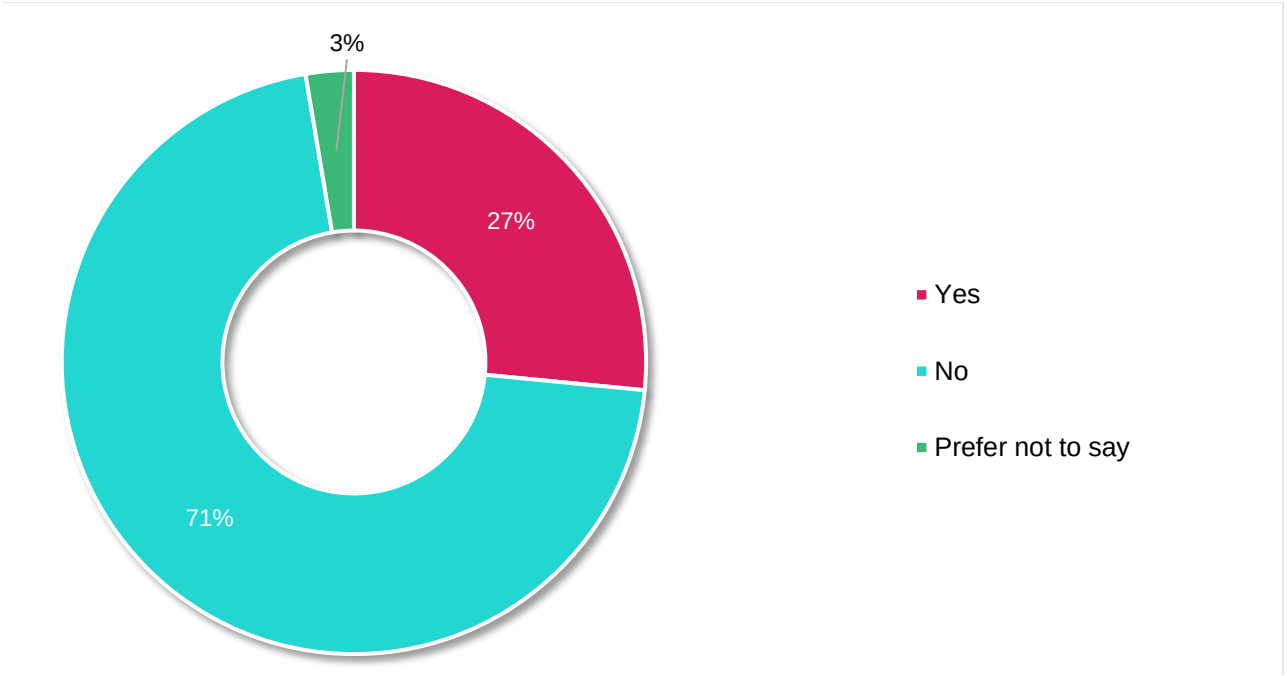
Source: D07. Do you consider yourself to have a disability or do you have a physical or mental health condition lasting or expected to last 12 months or more? **Base:** all respondents (n=1,507).

Figure 46: Disability 2



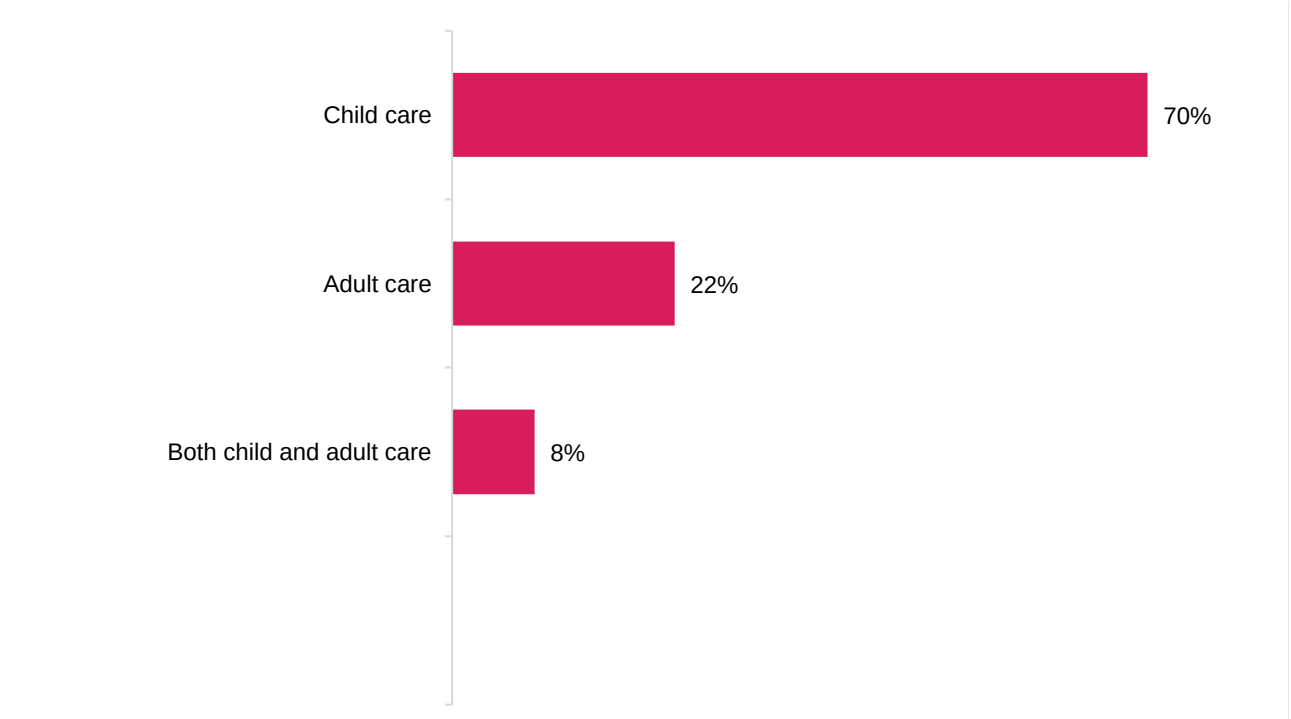
Source: D08. Do you experience barriers or limitations in your day-to-day activities related to any disability, health conditions or impairments? **Base:** all respondents (n=1,507).

Figure 47: Care responsibilities 1



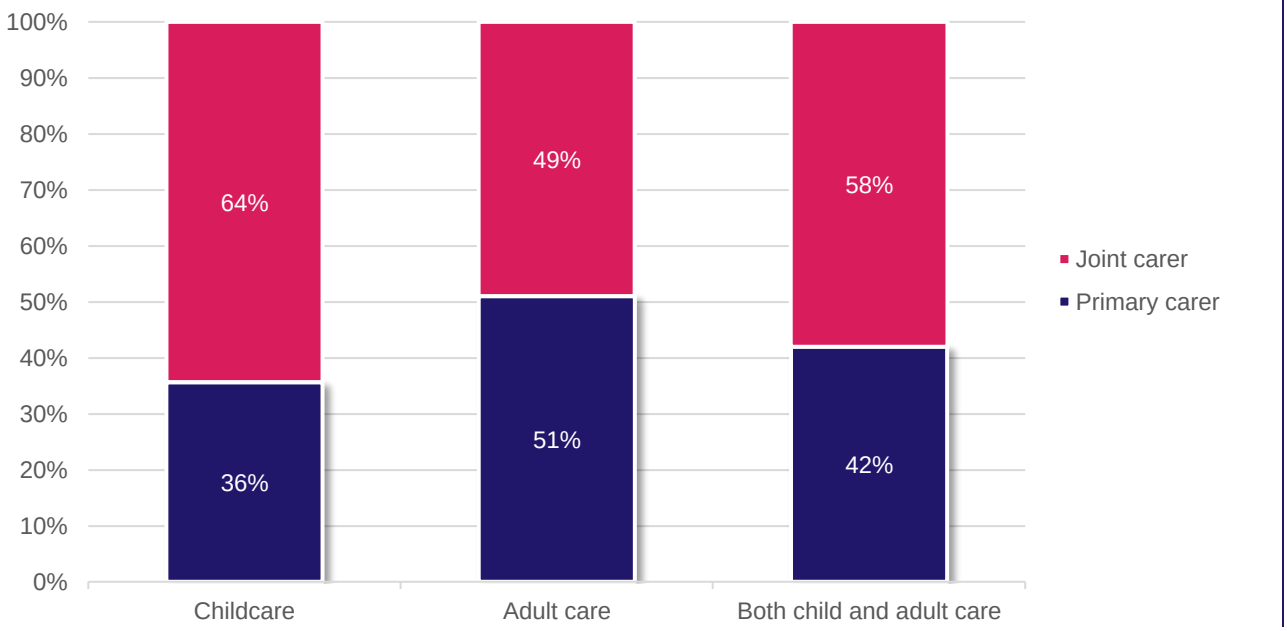
Source: D10. Do you have care responsibilities? **Base:** all respondents (n=1,507).

Figure 48: Care responsibilities 2



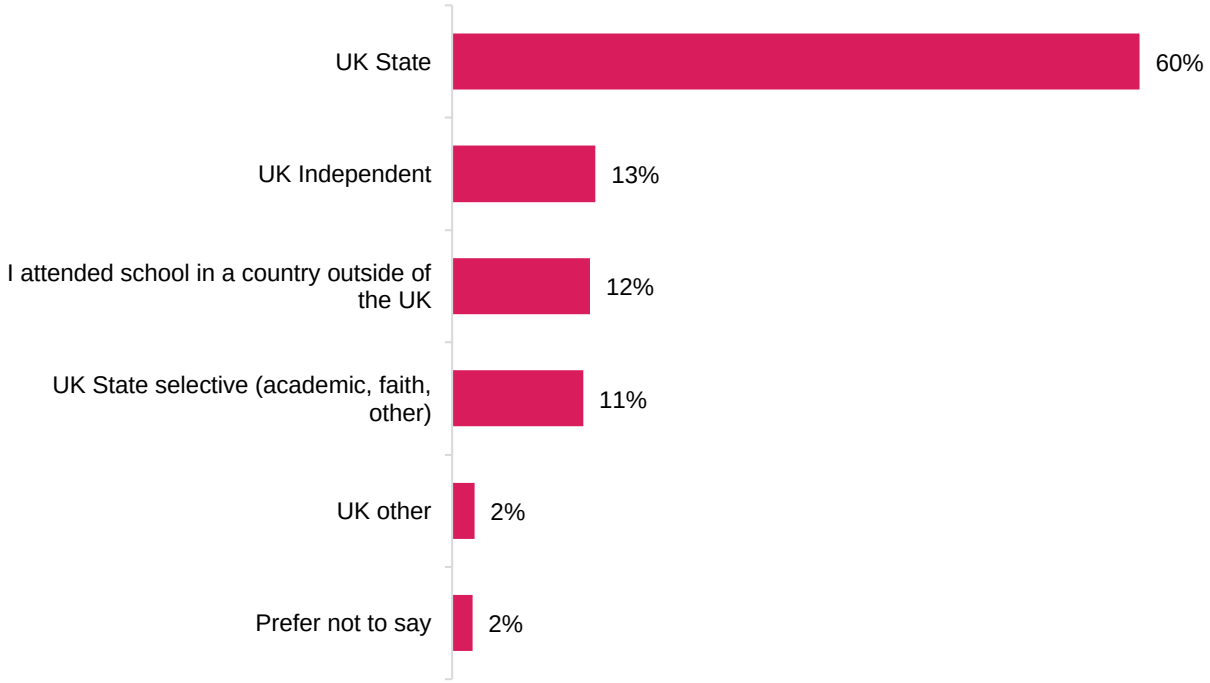
Source: D10A. Who are your care responsibilities for? **Base:** Those with caring responsibilities (n=400).

Figure 49: Care responsibilities 3



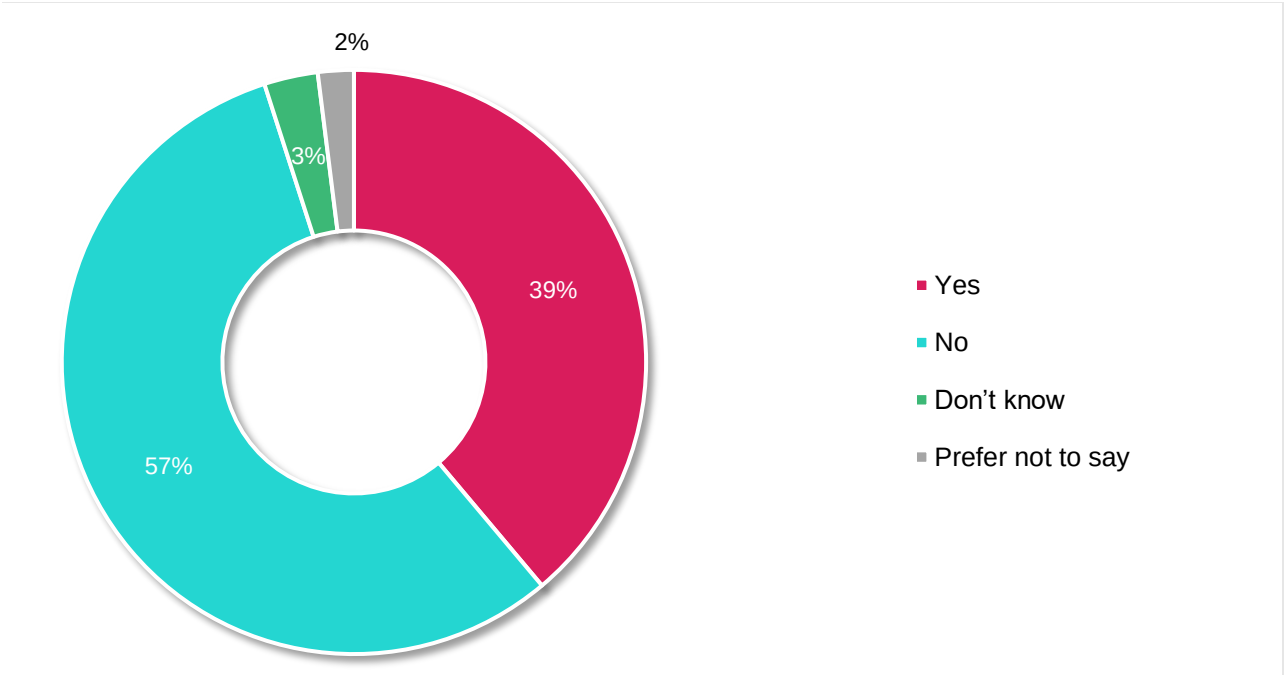
Source: D10B. Are you…? **Base:** Those with caring responsibilities (n=400).

Figure 50: School attended



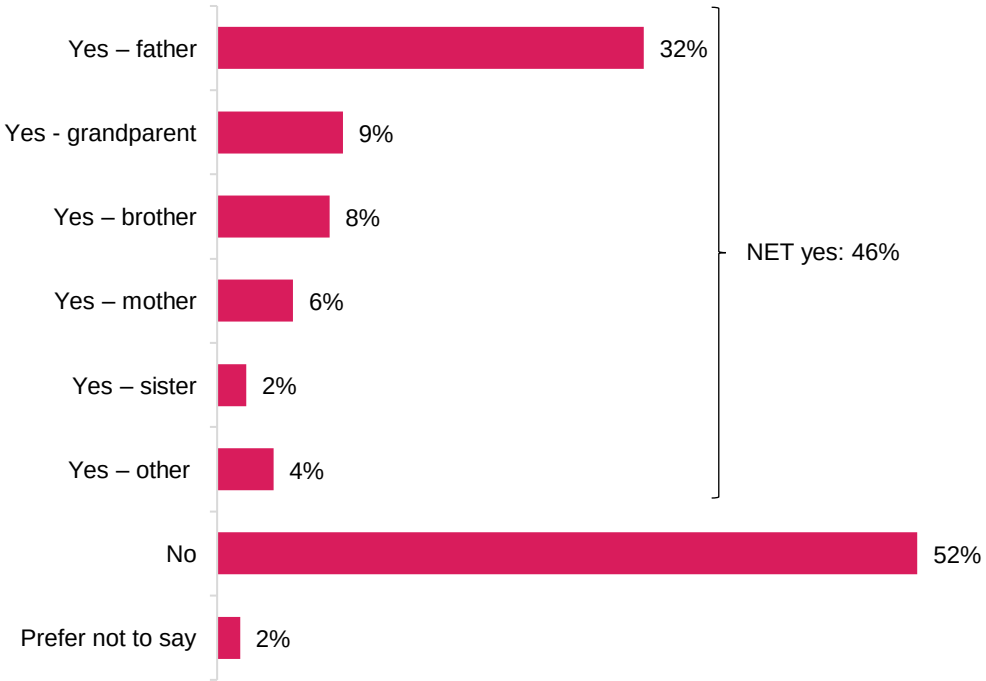
Source: D11. What type of school did you attend for the majority of your time between the ages of 11 and 16?
Base: all respondents (n=1,507).

Figure 51: Parent's qualifications



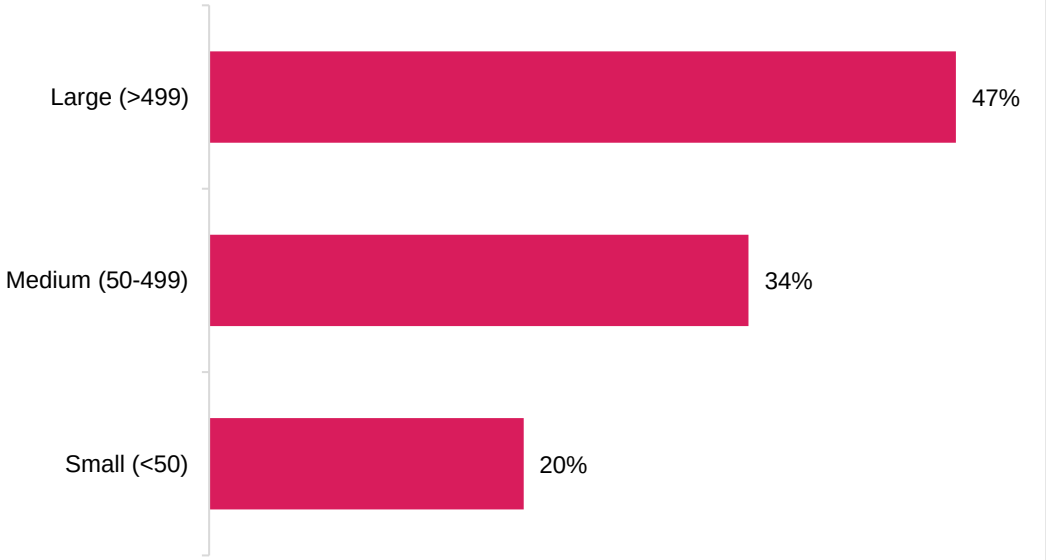
Source: D12. When you were 18, had any of your parents or guardians completed a university degree course or equivalent (for example BA, BSc or higher)? **Base:** all respondents (n=1,507).

Figure 52: Family members in engineering



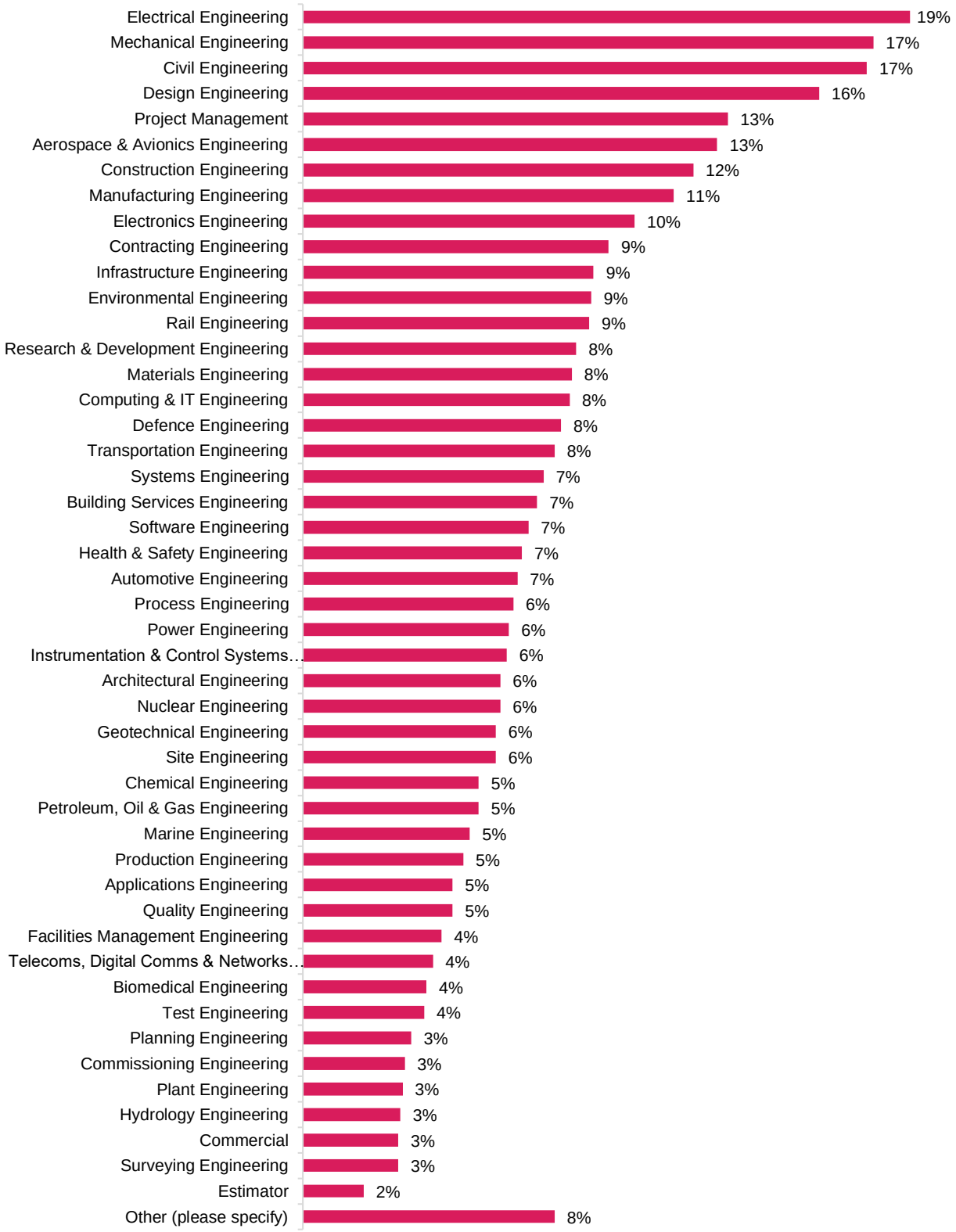
Source: D13. Did / do any of your parents or close family work in the engineering profession? **Base:** all respondents (n=1,507).

Figure 53: Number of employees



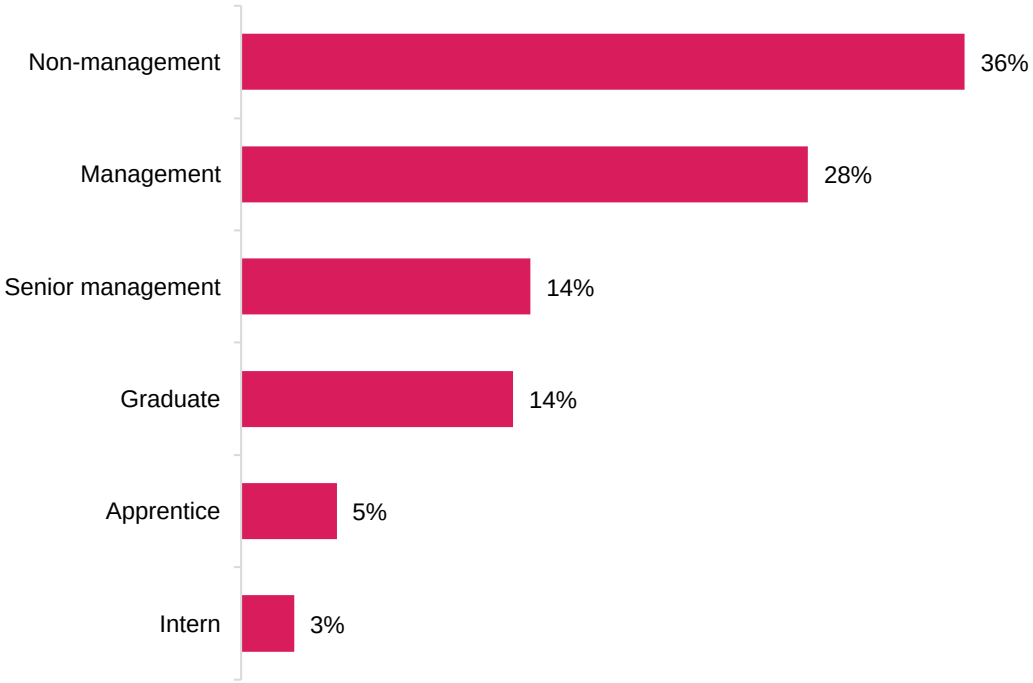
Source: D14. Please indicate the number of employees in your organisation. **Base:** all respondents (n=1,507).

Figure 54: Discipline of engineering



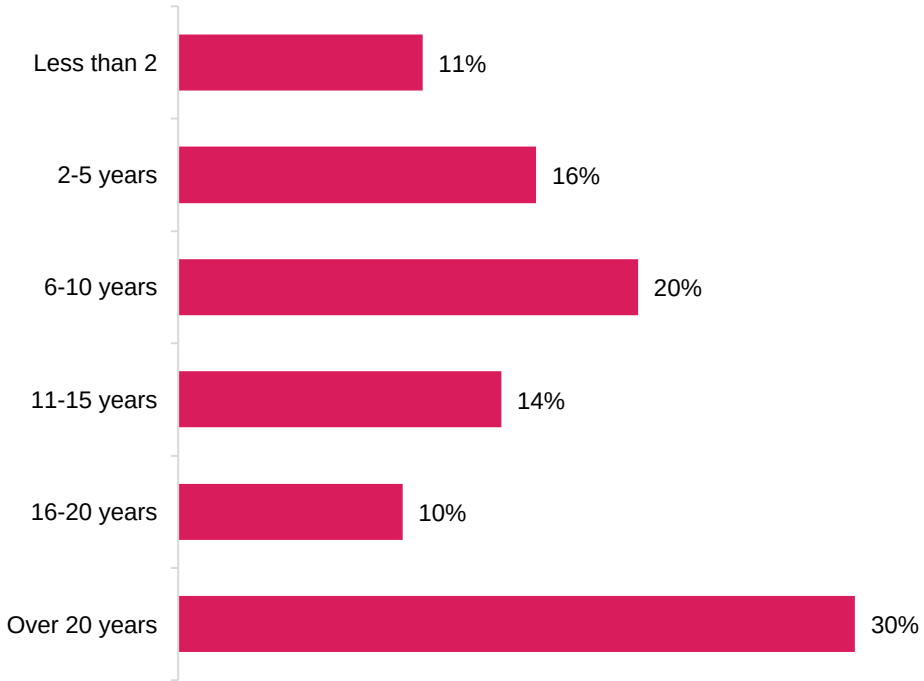
Source: D15. Which field/discipline of engineering do you currently work in/is your company involved in?
Base: all respondents (n=1,507).

Figure 55: Job grade



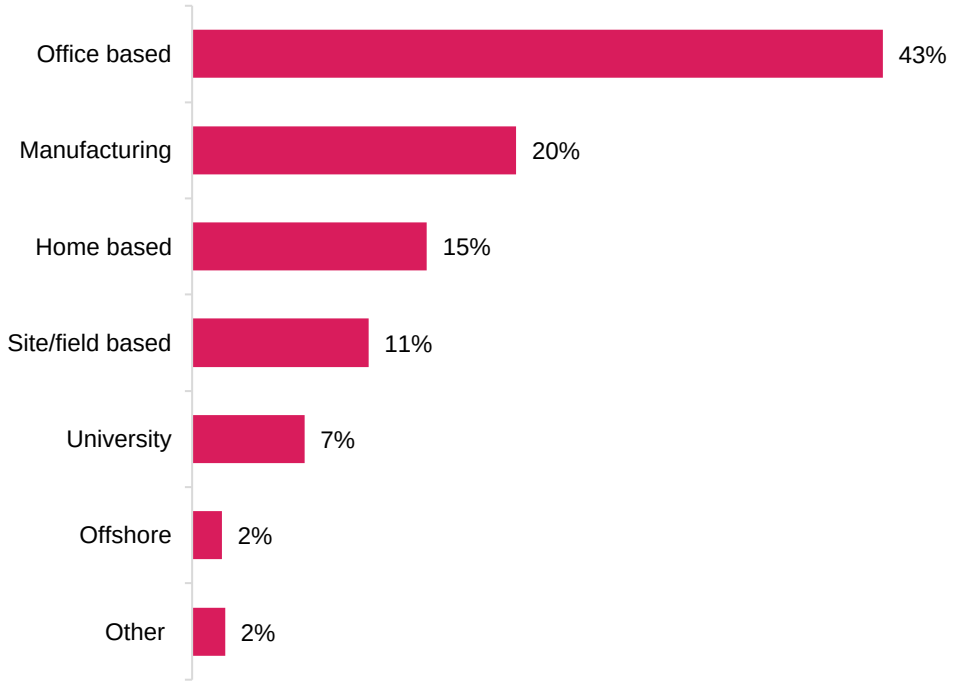
Source: D16. Which of the following best describes your job level/grade? **Base:** all respondents (n=1,507).

Figure 56: Years of experience



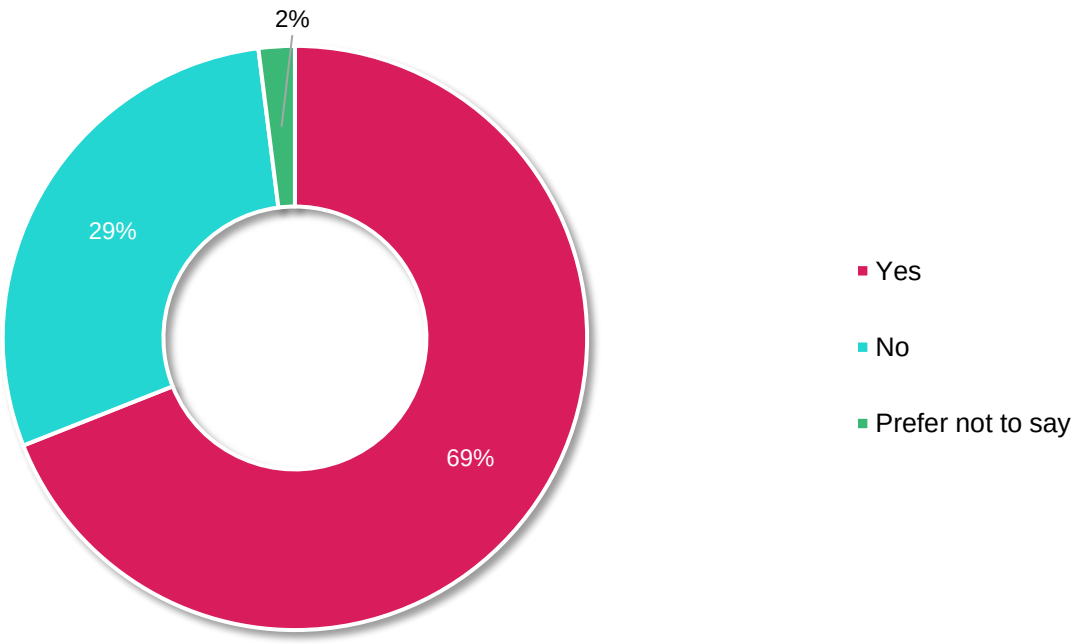
Source: D17. How many years post qualification experience do you have? **Base:** all respondents (n=1,507).

Figure 57: Main job location



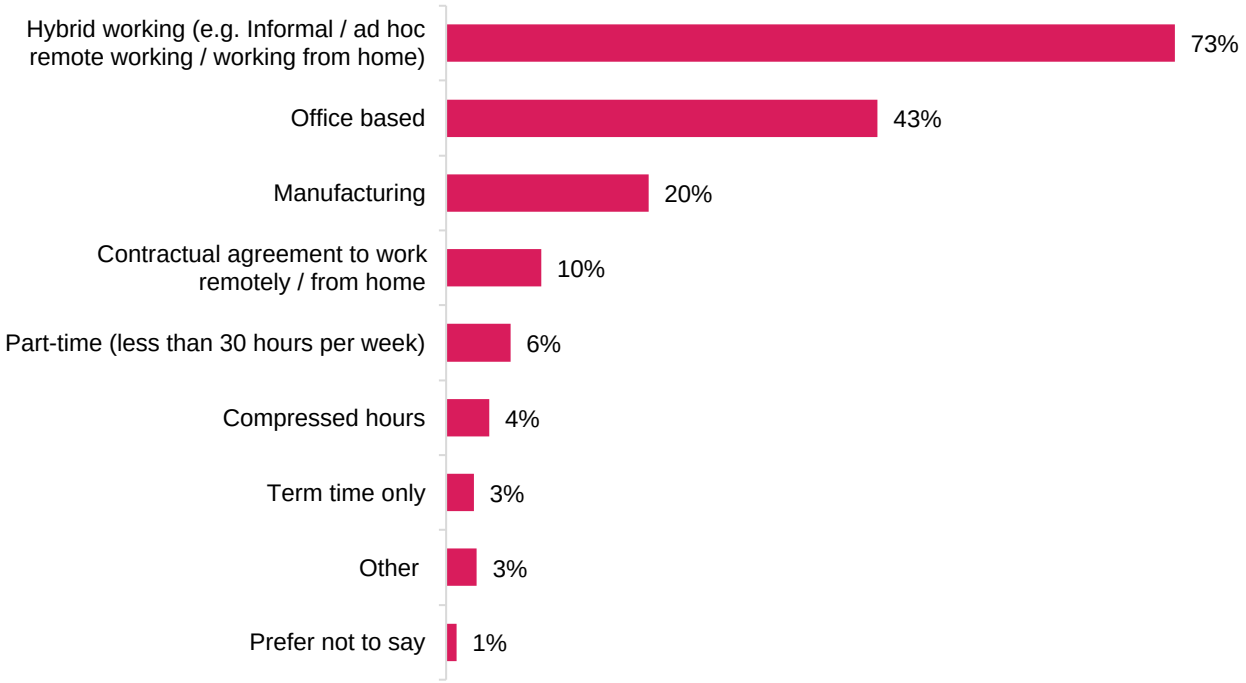
Source: D18. What is your main job location? **Base:** all respondents (n=1,507).

Figure 58: Flexible working



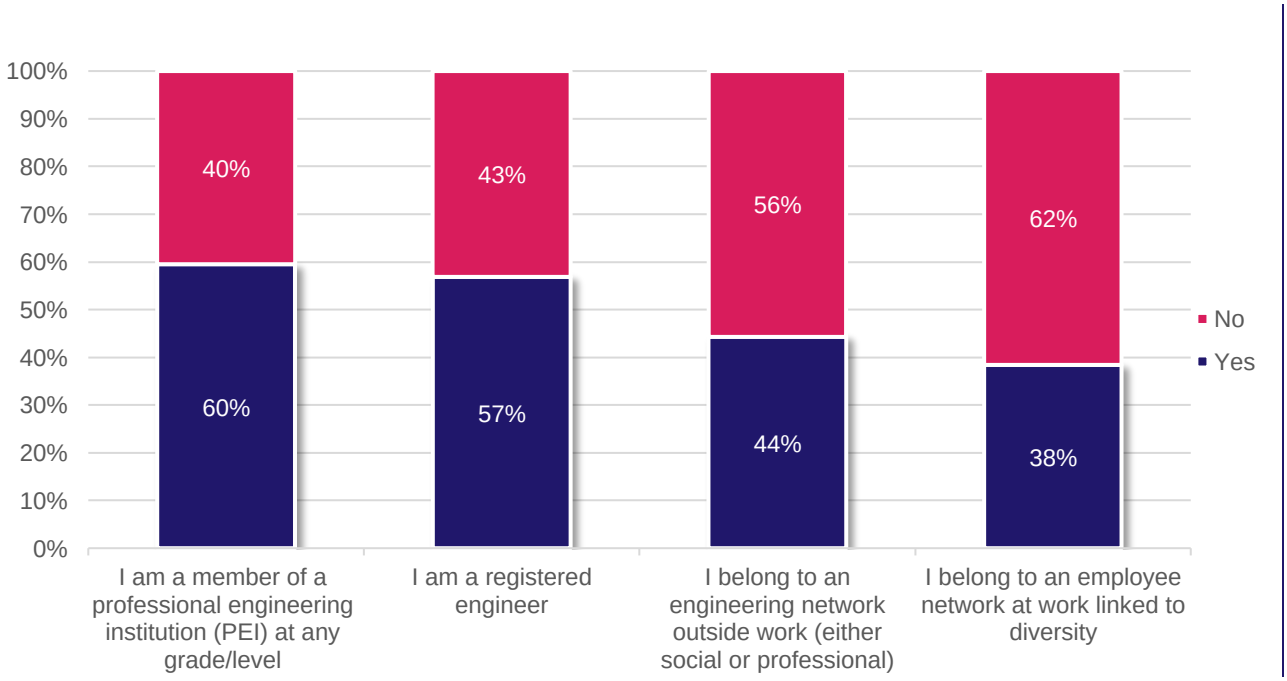
Source: D19. Do you work flexibly, either formally or informally? **Base:** all respondents (n=1,507).

Figure 59: Flexible working arrangements



Source: D19A. Which of the following best describes your flexible working arrangement? **Base:** Those who work flexibly (n=1,041).

Figure 60: Memberships and networks



Source: D20. Please answer yes or no to the following statements. **Base:** all respondents (n=1,507).

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13 CIOB (2022) “Our Charter on Diversity and Inclusion” Available: https://www.ciob.org/specialreport/charter/diversityandinclusion (Accessed 08 September 2022)

14 Institute of Physics (2021) “The importance of equality, diversity and inclusion in physics” Available: https://www.iop.org/sites/default/files/2021-11/IOP-Case-for-EDI-English.pdf (Accessed 08 September 2022)

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