Inclusion Matters:
Promoting Equality,
Diversity and Inclusion
in University Spinout
Companies - A Case
for Action

THE SPINOUT JOURNEY:

Barriers and Enablers to Gender Inclusive Innovation

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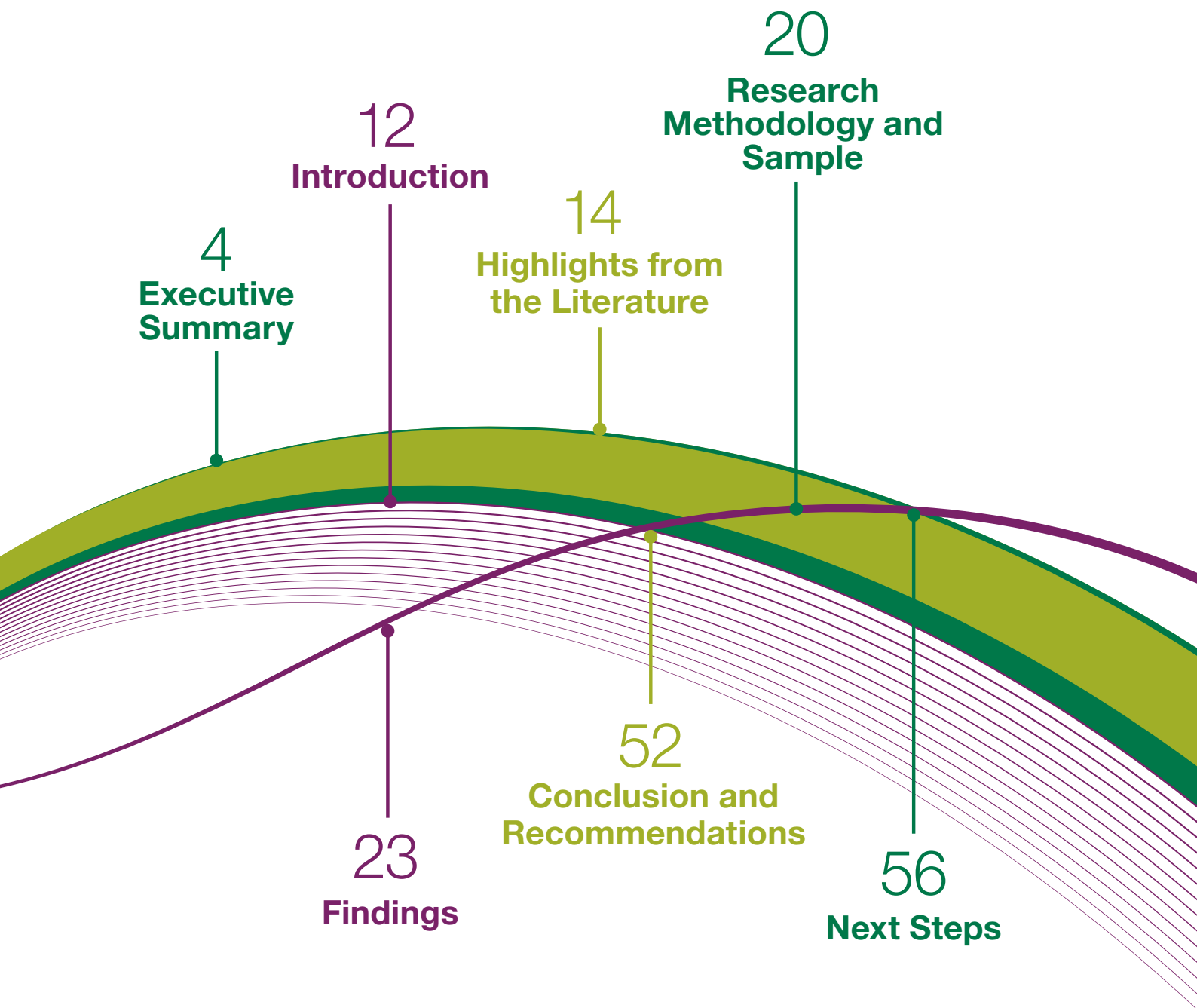
Executive Summary

This report provides an insight into the diverse experiences of women and men researchers who have successfully founded a university spinout company. It is part of a wider project, funded by the EPSRC's Inclusion Matters initiative, looking at the participation of women scientists, engineers and mathematicians in university spinout companies.

As highlighted in our previous report, only 13% of spinout companies across the whole of the UK have a woman founder (Griffiths and Humbert, 2019) which cannot be solely attributed to the underrepresentation of women in professorial roles in STEM disciplines. As this study shows, researchers may spinout at different stages of their careers and the majority of spinout founders in our sample could be classed as early- or mid-career academics.

This research charts founders' spinout journeys from the early days of establishing the company through to developing the spinout and reflecting upon challenges and successes. It compares the experiences of women and men academic founders to better understand where women may be encountering gender bias and have to overcome additional challenges. This approach has enriched empirical knowledge around women's experiences of academic entrepreneurship but also highlighted areas for development that would enhance and improve the spinout experience for all founders. This report cannot provide a blueprint model for institutions on spinouts but provides recommendations that institutions should consider if they aspire to create an inclusive environment to support academic entrepreneurial activities and to develop a more gender inclusive innovation ecosystem.

13% of active UK spinouts are founded or co-founded by a woman or a mixed gender team.

METHODOLOGY AND RESEARCH SAMPLE

This study is based on qualitative data from 35 one-to-one in-depth semi-structured interviews undertaken with spinout founders (20 women and 15 men) and 8 interviews with key informants, including people working in technology transfer, knowledge exchange and commercial law. The spinout companies are all based within the science, technology, engineering and mathematics fields, although many of the businesses utilise cross-disciplinary knowledge in the creation and development of their products or services. Of our sample of women and men founders who volunteered to take part in this project, 77% of the founders' research originated from Russell Group Universities. This reflects the institutional polarisation of the UK spinout landscape, as identified in this project's previous report (Griffiths and Humbert, 2019).

77%

of founders in our sample originated from Russell Group universities.

KEY FINDINGS

The findings from this research have been structured in a way that best represents a typical spinout journey, beginning with establishing a university spinout and concluding with reflections from the perspective of a successful spinout founder.

ESTABLISHING A SPINOUT

MOTIVATION TO SPINOUT

Women and men founders in our sample were similarly motivated by their strong desire for research to have practical applications to address 'real world problems' and benefit individuals and society. They were also driven by the quest for 'freedom and flexibility' which they could not achieve in their academic careers.

Although they acknowledged that managing a business was highly demanding, some women founders reported that the spinout – compared to their academic research – offered them greater flexibility, more autonomy and more control to manage the needs of developing a business alongside their family responsibilities. However, this was also valued by founders without childcare responsibilities, who appreciated more autonomy over their working time and place, albeit for different reasons.

This finding suggests that academic careers are very rigid and institutions need to provide space and opportunities to accommodate inclusive and alternative career pathways, including spinouts, which will accommodate caring responsibilities and other life priorities.

INSTITUTIONAL SUPPORT AND THE ROLE OF TECHNOLOGY TRANSFER OFFICERS (TTOs)

TTOs play a crucial role in helping researchers to create spinouts. Contrary to existing literature (Murray and Graham, 2007; O'Shea, Chugh and Allen, 2008; Abreu and Grinevich, 2013; Stagars, 2015) which suggests women need more support than men from TTOs to commercialise their research, we find that access to support from TTOs was similar for all founders irrespective of gender. The quality of support from TTOs varied across institutions, suggesting a different appetite for supporting these enterprises, evidenced by the degree of spinout activity within a university. This diverse landscape is in alignment with findings from our previous report, which shows a polarisation of the university innovation ecosystem with 70% of spinouts originating from Russell Group universities (Griffiths and Humbert, 2019).

Thus, opportunities for academic researchers to commercialise their research largely depend on the institution they work for. We also find that patenting inventions – a requirement for spinning out – has been reported as a particular barrier to establishing a spinout, by mostly women and especially younger Early Career Researchers (ECRs) who report challenges in convincing institutions to invest in their ideas. This suggests that institutional processes around research commercialisation could do more to recognise these intersectional inequalities and ensure younger, less experienced women researchers are equally supported at the initial stages of enquiry.
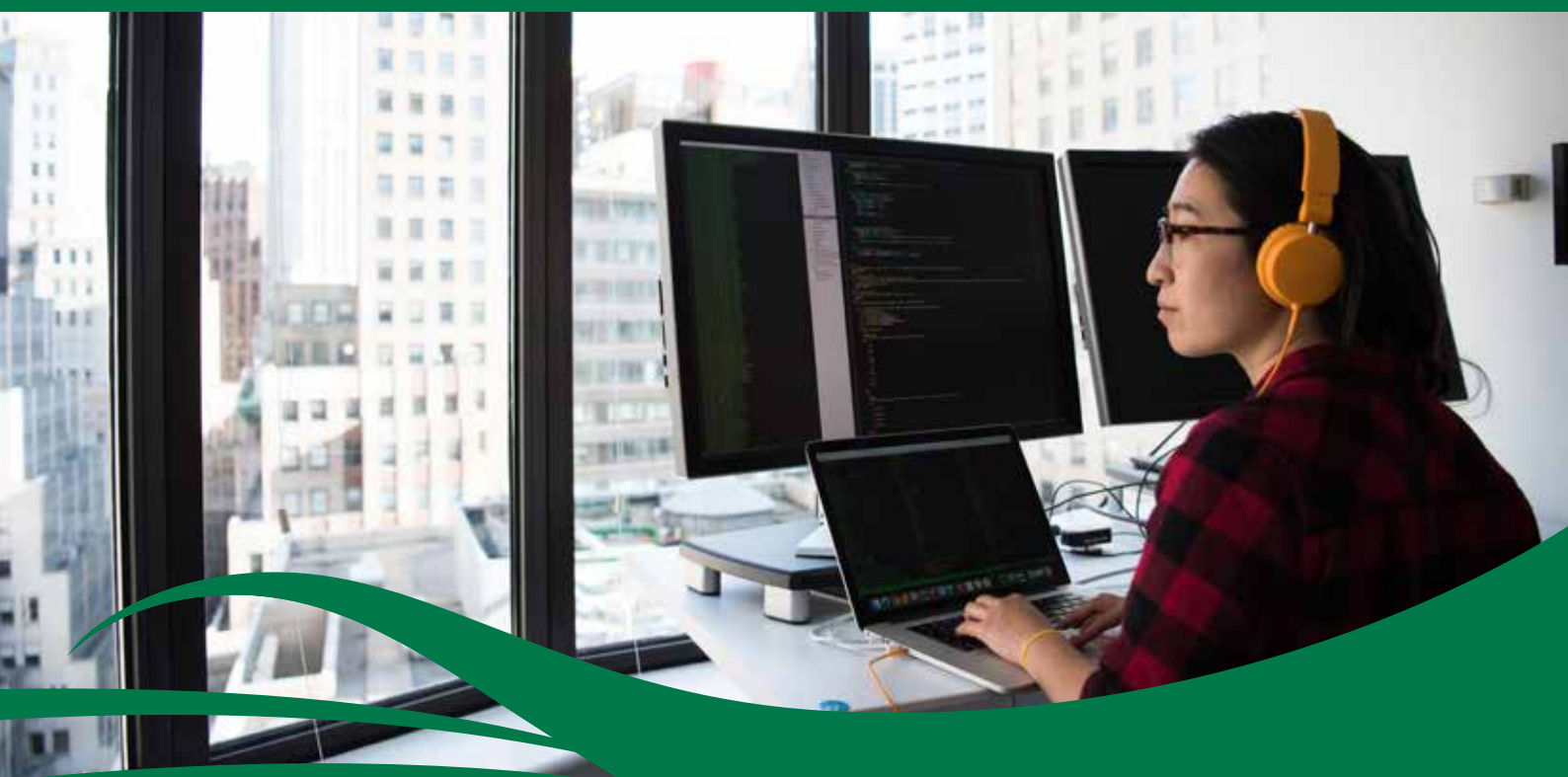
BUSINESS EXPERIENCE, TRAINING AND INCUBATORS

Lack of business experience is a common challenge for all the founders in our project, irrespective of gender, challenging existing literature (Zalevski and Swisczowski, 2009; Abreu and Grinevich, 2013) that frames this as a women-only issue. More senior and experienced women founders felt that the transferable skills they had acquired during their academic career were sometimes underestimated in the business context, with some highlighting the similarities between managing a research group and running a spinout company.

Several founders benefitted from attending incubators and there is evidence of some initiatives actively promoting inclusive spaces for women and ethnic minorities. As well as designated spaces, this can also simply mean ensuring diversity in their role models and mentors. However, some interviewees report that not all incubators feel like inclusive spaces so it is therefore important to share more good practice in this area.

DEVELOPING A SPINOUT

FINDING THE RIGHT PEOPLE AND ESTABLISHING ROLES IN THE COMPANY

Finding the right people to work with was a challenge for both women and men interviewees. Founders agreed that any new senior appointments should have not only commercial expertise but also be trustworthy and share the founder's vision for the company. Ideally, founders and future board members would also share a 'chemistry'.

Connections for finding new team members came from the researchers' own networks but more often, TTOs and senior advisers would suggest potential candidates. However, there is an unconscious bias caveat since trying to find the 'right people' may result in finding 'people like us', rather than creating a team with diverse backgrounds and expertise.

Some women founders noted that as teams and executive boards increased in size, their influence within the spinout company became diluted. The experts brought in to advise and

ultimately lead the spinouts tended to be (older, usually white) men and there were some stories of women feeling side-lined from decision making, a problem that appeared to be amplified by the intersection of gender and age.

FUNDING AND INVESTMENT

Several founders were able to access public funding at the early stages of spinout development, often in preparation for or alongside seed funding. Founders offered examples of how public funding can be used as leverage to promote greater equality and inclusion, such as a recent requirement in UKRI Innovate UK grants where companies demonstrate how they will promote gender equality and social inclusion. These initiatives are to be encouraged but on their own they are not enough to challenge the stereotypes and masculine culture present in the wider innovation and commercialisation ecosystem.

In agreement with the literature, women and men founders identified the investment community as being highly male dominated. Many women founders perceived investment as a gender biased environment with some feeling their gender puts them at a disadvantage. Conversely, we had stories of women who felt gender, particularly when combined with other protected characteristics, actually worked in their favour.

Although no conclusive evidence of gender bias can be drawn from the accounts in this study, these concerns cannot be dismissed; especially when considered in conjunction with studies (Minniti, 2009; Pennington Manches, 2017; Malmstrom et al., 2018; Griffiths and Humbert, 2019) that show women founders getting less funding than men. These findings suggest that the investor community must continue to work towards greater diversity in an effort to ensure inclusive and fair distribution of funds.

SUCCESSFUL SPINOUTS

WHAT MAKES A SUCCESSFUL SPINOUT?

Subtle differences emerged from women and men's discourses about what makes a successful spinout company. Women tended to be more conservative than men in their ambitions with 'survival' being considered a legitimate measure of success. This may be modesty or lower confidence, but could also mean women are more realistic in their expectations having faced more challenges during their spinout journey. Men were more likely to cite success in terms of financial gain but there was a general consensus amongst all interviewees that whilst success can be financial to some degree, seeing their idea make a difference in the world would be a sufficient reward.

There was also general coherence between women and men when asked to describe the attributes of a successful spinout founder. These attributes often took the form of transferable skills, such as good time management and the ability to multitask. Others were framed as competencies that could be learned but were perhaps deemed more inherent, such as having good social skills to network effectively and deal with multiple stakeholders. Women were more likely to identify with words such as 'resilience' and 'determination', which, again, may signal that they have faced more challenges during their spinout journey.

PERCEPTIONS OF RISK

Discussions with interviewees around the theme of risk suggest that perceptions of risk are not necessarily influenced by gender but rather by a range of other factors, including career stage, family influences and other personal circumstances. This offers a more nuanced understanding of academic researchers' approach to risk and challenges literature (Miranda et al., 2017), which positions women as more risk averse.

The nature of risk was found to evolve across the spinout journey. The majority of founders felt that financial risks were greater when establishing a spinout, while more mature spinouts had risks associated with employing staff and increasing the profile of the company. Several founders also commented that they felt there was a certain degree of risk aversion within UK institutions and the wider ecosystem, citing the USA as a much more supportive policy environment for fostering academic entrepreneurship.

GENDER STEREOTYPES

On the whole, women founders did not necessarily see themselves as having encountered gender bias along their spinout journey, but often their narratives

suggested otherwise. Most notably, some women had been subject to sexism and stereotyping, in particular with regard to their appearance and what they should wear. There was also evidence that these gendered stereotypes intersected with racial profiling, exacerbating the issue for women from ethnic backgrounds. These gender stereotypes challenged the legitimacy of women's knowledge, experience and success. There was a collective agreement among women and men founders alike that such stereotypes were not only inaccurate but harmful to future generations of women and girls considering science and entrepreneurship.

WORK-LIFE BALANCE

Women and men founders both acknowledged that the demands of running a spinout company were often incompatible with a comfortable work-life balance. In contrast to pervading narratives within the literature (Rosa and Dawson, 2006; Carrasco, 2014) there were young women spinout founders who simultaneously invested in family life and often remained primary carers for their children. They developed various coping strategies to combine caring responsibilities with their spinout companies and many felt that they had more autonomy over their time than they did in full-time academic positions. There was a sense that these younger

women, and some younger men, were beginning to challenge the established convention that business comes before everything else. In contrast, when older, more senior men founders reflected upon the early days of their spinouts, they reported working extremely long hours, leaving them reliant on their partners for childcare and domestic work.

These findings show how the narrative around the needs of the business taking priority over personal lives has rendered family responsibilities invisible. To increase women's participation in spinout leadership it is important to challenge this typically masculine working culture. Not only would this benefit women and men with caring responsibilities, but it would create a more sustainable work-life balance for everyone.

PERCEIVED LEGITIMACY OF ENTREPRENEURIAL ACTIVITIES WITHIN THE ACADEMY

There was a perception that spinouts, and other forms of academic entrepreneurship, were not valued as highly as more traditional forms of research activity. It was felt that commercialising research is not properly recognised in academic promotion criteria and that researchers engaging in these activities run the risk of undermining their careers.

Founders received mixed messages from their institutions, with some being offered formal part-time positions to manage their time while others relied on colleagues and department heads to 'turn a blind eye' to their spinout activity. Of those who maintained full-time academic roles, there appeared to be an expectation that they run the spinout company over and above their academic responsibilities. Although both the research impact agenda and the Knowledge Exchange Framework (KEF) have brought spinout companies much more into focus, there seems to be a need for institutional culture change to ensure that commercialisation of research is also considered a legitimate intellectual endeavour.

MENTORS AND ROLE MODELS

Founders valued having access to good mentors and many of these were recruited on an informal basis. Informal mentors were praised for offering psychological as well as instrumental support and were often known to the founder or were part of the spinout from the beginning. Formal mentors were usually recruited as part of training initiatives or identified by TTOs. These mentors tended to have significant commercial experience and as such, were likely to be (older) men. There was evidence that these relationships could create unequal power dynamics between mentors and mentees, which was enhanced for young women working with men who may have sexist and outdated views about women.

Networks were mentioned as a valuable way to find mentors and it was felt that institutions and incubators could do more to create and foster networks aimed specifically at academic founders. This would ensure mentors were more 'relatable', which was especially important for women founders who were looking for role models or individuals who could better understand their challenges.

MAKING THE SPINOUTS ECOSYSTEM MORE INCLUSIVE

At the end of each interview, founders were asked for their final thoughts on what universities should do to increase women's representation as founders of university spinout companies. Their suggestions included the need for improving perceptions around commercialisation of research across the academy and for proper recognition of these activities in promotion criteria. Retention of women researchers was also identified as an area where institutions should pay more attention as it was noted that 'at postdoctoral [level] it just falls off a cliff'. The need to promote more science disciplines to girls in schools was also noted. Finally, it was highlighted that STEM is dominated by white men and that universities need to pay more attention to racial inequalities within STEM research.

Recommendations

Based on the findings from this research we offer a set of recommendations to Higher Education Institutions (HEIs) and to the Higher Education (HE) sector as a whole, framed within key factors that influence university spinout performance as identified by Coates (2019). We hope that this approach will help institutions to harness in full the talent of both women and men researchers at different stages of their career and enhance spinout performance, as well as stimulating the development of gender-inclusive academic entrepreneurship.

HUMAN CAPITAL

Support the development of networks of '**relatable mentors**'. Helping women researchers in the process of spinning out – or considering commercialising their research - to **connect with other women who have gone through a similar experience**, either within or outside academia. Entrepreneurial alumni can provide a pool of 'relatable mentors' from the wider business community.

HEIs should facilitate the development of more diverse and gender-balanced spinout teams. TTOs should be encouraged to **foster more diverse networks of expertise** and seek out diverse talent to extend existing pools of advisers and potential board members.

Enhance visibility of women founders as role models, including women from diverse backgrounds who have successfully spun out across different career paths and at different stages of their careers.

ENTREPRENEURIAL ENVIRONMENT

HEIs should take steps to promote a gender-inclusive entrepreneurial environment by: monitoring activities linked to commercialisation of research and innovation, such as consultancies, patent applications and spinout by gender and other equality-related characteristics; giving **greater visibility to diverse role models**. They should also consider how inclusive academic entrepreneurship is promoted across different academic departments.

HEIs should take a lead and work with key stakeholders within local innovation ecosystems to ensure that they **become more gender inclusive**. Institutional and external ecosystems that are highly male dominated, such as investment, can reinforce each other through lack of diversity.

SOCIAL NETWORKS

It is important to provide greater opportunities for researchers, and especially ECRs, to interact with businesses through the development of networks. Draw on entrepreneurial alumni to facilitate connection with businesses and industry.
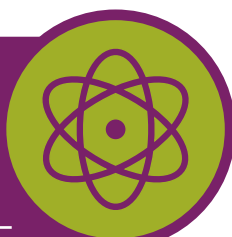
FINANCIAL RESOURCES

HEIs should clearly communicate **different sources of financial support** for academic entrepreneurial activities and spinouts.

HEIs should work with the investment community to **set up specific funding opportunities** aimed at women researchers who wish to set up a spinout company.

ACADEMIC ENTREPRENEURSHIP PROGRAMMES

HEIs should offer **academic entrepreneurship programmes that are gender sensitive** and recognise intersecting inequalities. Women founders have mixed views about women-only programmes, as they are concerned that these are about 'fixing the women' rather than tackling structural barriers. Whatever approach institutions intend to take, it is important that academic entrepreneurship programmes are gender sensitive (e.g. use of diverse images, examples, role models etc.) and are integrated in early- and mid-career development initiatives.

Ensure that the role of Technology Transfer Offices (TTOs) is clearly communicated and features in entrepreneurship programmes. Provide TTOs with equality training, set in the context of academic entrepreneurship and of establishing a spinout company, to explore equality issues within the innovation ecosystem. Be vigilant against bias.

UNIVERSITY MANAGEMENT AND POLICIES

HEIs should review their processes and structures on research commercialisation to ensure that **all individuals have equal opportunities** in accessing and getting support for their ideas, irrespective of age, gender, ethnic identity and other individual characteristics.

HEIs should reflect on the flexibility of available career pathways and provide space and opportunities to accommodate **inclusive and alternative career routes**, including academic entrepreneurship and spinout leadership. They should also consider how academic entrepreneurship and the establishment of spinout companies are properly recognised, valued and rewarded in the academic promotion process.

Commercialisation of research and spinout-related activities should be recognised through appropriate time allocation within an academic work-load. Institutional policies and practices should be developed to allow researchers to **balance an academic career with commercialisation of research** and spinout leadership (e.g. sabbaticals, fellowships at critical times to explore business viability) along with personal life.

Introduction

This is the second report to be published from the EPSRC funded project, *Promoting Equality, Diversity and Inclusion in University Spinout Companies – A Case for Action*, following our quantitative analysis into the geography, governance and growth of university spinouts companies in the UK.

This project is one of several included in the EPSRC's *Inclusion Matters* initiative, which is funding research with an aim to improve equality, diversity and inclusion within engineering and the physical sciences. Our research focuses on the participation of women scientists, engineers and mathematicians in university spinout companies. The broader aim is to achieve a step change in institutional capabilities to increase the participation of women researchers in university spinouts and to mainstream gender in the ecosystem that drives innovation. Specifically, we seek to understand the barriers and enablers that women researchers face across their spinout journey. The knowledge produced will inform and support institutions – within and beyond the academy – to develop more inclusive interventions as part of entrepreneurial career progression programmes and services. All materials and resources developed as part of this project will be freely available to institutions, to support them to do this, through the project website.[1]

Drawing on qualitative evidence collected through interviews with women and men spinout founders, the aim of this report is to gain an insight into their experiences and better understand the reasons why so few women are founding and leading spinouts in the UK. As shown in our previous project report, only 13% of active spinouts in the UK are founded by a woman or a mixed gender team, and women's participation in spinouts is also associated with lower growth and investments (Griffiths and Humbert, 2019). As there is very little research about university spinouts from a gender perspective, it is important to try and understand some possible explanations for these statistics.

Addressing women's underrepresentation in university spinout companies is not only a matter of social justice, but also has an important role in the UK economy. Innovation is at the core of the UK Industrial Strategy, which has set an ambitious goal for the UK to become the most innovative economy by 2030. Yet currently, only one in three entrepreneurs in the UK are women (Rose, 2019). The Higher Education sector can play a significant role in fostering a more inclusive innovation culture, as evidenced by the fact that there is a higher proportion of women inventors associated with patent applications in academia than in companies (Intellectual Property Office, 2019).

1/ www.brookes.ac.uk/women-and-spinouts

'Lack of gender diversity in the innovation ecosystem is not just about missing out on women's talent. As well as limiting the breadth of innovation, it can also have serious social consequences. Londa Schiebinger makes a compelling case about the importance of integrating sex and gender analysis into research and development processes (Schiebinger et al., 2011-2018). Schiebinger uses the example of the three-point seatbelt, which was first developed in 1959; yet it took over four decades for this technology to account for the safety of pregnant women. Finally, in 2002, a female engineer named Laura Thackaray adapted the technology and designed a seatbelt that would avoid crushing an unborn child in the case of an accident: something which no male engineer had considered in the original design.

Higher education institutions are well placed to start this process of transformation through academic entrepreneurial activities and promotion of a more gender inclusive innovation ecosystem through spinouts. The findings of this report provide institutions with a deeper understanding of how best to support academic entrepreneurial activities and develop a more inclusive innovation ecosystem. It presents the findings from a total of 43 interviews, including 35 with women and men spinout founders and 8 key informants representing different facets of the spinouts ecosystem. The report begins with an overview of the key themes emerging from the scant literature on gender and entrepreneurship in the higher education sector, contextualising this in the wide field of women entrepreneurs. This is followed by the findings of the qualitative research, structured in a way that best represents a typical spinout journey, beginning with establishing a university spinout and closing with reflections from the perspective of a successful spinout founder. To conclude, we offer a summary of the findings and make several recommendations for HEIs and those working within the wider spinout ecosystem.

Highlights from the literature: Women and Spinouts

Several recent studies have highlighted how the innovation ecosystem is highly male dominated.

A study by the UK Intellectual Property Office on Global Female Inventorship (2019) shows that although the proportion of women inventors between 1998 and 2017 increased from 7% to 13%, this is still a low proportion, and even slightly lower in the UK at 11%.[2] Research by Atomico (2018) found that 83% of the European tech community is dominated by men, and 46% of the women who took part in their study reported having experienced discrimination. The picture across the rest of the world is very similar and a global survey of start-ups carried out by Unilever (2018) shows that only 17% were founded by women. The same report also found that 39% of women founders experienced sexism and that 42% felt that investors were more reluctant to invest in women's start-ups.

Within university spinout companies, women researchers in STEM are significantly underrepresented as founders or co-founders. Our research shows that across the UK only 13% of active spinouts have at least one woman founder, and that the number of women founders, when controlling for other factors, is negatively associated with receiving a large innovation grant or featuring in a high-growth list

(Griffiths and Humbert, 2019). There is limited research that focuses specifically on women's involvement in university spinouts and their experiences as founders and the aim of this report is to contribute toward addressing this gap. What follows highlights some key findings and arguments from the extant literature on this subject. Given the paucity of studies on women as academic entrepreneurs we have also drawn on literature from the wider field of research into women and entrepreneurship, in order to engage with broader issues of inclusivity within spinouts and start-ups. This body of knowledge focuses on finance and investments, risk and entrepreneurial intention, and the gendered construction of entrepreneurial characteristics, as these provide further insights into women's experiences of academic entrepreneurship.

EXCLUSION AND LACK OF SUPPORT

A dominant narrative in the literature on women's underrepresentation as spinout founders is that many women experience a lack of support. Zalevski and Swisczowski (2009) found that women PhD students often cited insufficient support, information, encouragement and advice

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1/This information is calculated from the proportion of female inventors by declared country of residence, 1998-2017. Original data can be accessed here: **https://www.gov.uk/government/publications/gender-profiles-in-worldwide-patenting-an-analysis-of-female-inventorship-2019-edition**

when assessing potential problems to spinning out. Similarly, Murray and Graham (2007) observed that women academics within STEM felt that they had a limited number of opportunities to commercialise their research and found that 'while their more senior male colleagues were generally collegial and supportive of their scientific work, they nonetheless disregarded them as potential collaborators in their commercial activities', noting feelings of exclusion from 'boy's clubs' at work (Murray and Graham, pp.669-70).

University TTOs are an important source of advice and support for anyone wishing to commercialise their research. Whilst the role of a TTO may vary slightly between institutions, they generally oversee and guide academic entrepreneurs through the process of setting up a spinout, introducing them to investors and bridging the gap between academia and industry. Many authors (O'Shea, Chugh and Allen, 2008; Abreu and Grinevich, 2013; Stagars, 2015) contend that women need more support from TTOs than men to commercialise their research and similarly Murray and Graham (2007) described TTOs as 'hand holding' women through the spinout process (ibid, p.671). However, women report a lack of support from TTOs, such as a dearth of advice and information on spinning out as well as an absence of knowledgeable and imaginative colleagues within the TTOs. These issues can act as obstacles to them spinning out their research (Rosa and Dawson, 2006). Furthermore, Sinell, Müller-Wieland and Muschner (2018) found that women cited licensing and patent agreements as an impediment more frequently than men, despite both women and men perceiving the agreements as often 'non-transparent, strict, or non-consensual' (ibid, p.19).

ABSENCE OF WOMEN ROLE MODELS WITHIN SCIENTIFIC ENTREPRENEURSHIP

Role models can inspire and motivate individuals (Zalevski and Swisczowski, 2009) and are seen as important in encouraging entrepreneurship and spinning out. However, 'men dominate as high-profile entrepreneurial role models' and, consequently, 'women have not featured within the mindset or image of what an entrepreneur is or should be' (Ahl and Marlow, 2012, p.544).

Women are once again excluded from the sphere of entrepreneurship, which associates men with commercialising science (ibid, 2012). Ahl and Marlow observe that when women are included as figures of entrepreneurship, it is usually in a negative light. They cite numerous examples where women entrepreneurs are portrayed as emotional, harsh and 'un-feminine', and highlight how their appearance is too often brought to attention (Ahl, 2007; Ahl and Marlow, 2012). There is also a lack of women role models specifically within scientific entrepreneurship. Notably, a report by Elsevier (2020) on The Researcher Journey has highlighted the low representation of women among patent applicants and inventors and concluded that this may be due to the low proportion of women in the physical sciences, from where the majority of patenting activity arises.

BUSINESS EXPERIENCE

Inexperience in business or entrepreneurship is said to be another factor that limits women's potential for spinning out their research (Abreu and Grinevich, 2013). In their study of patents, Ding, Murray and Stuart (2006) found that many women felt hugely disadvantaged compared to men due to their 'limited experience at the academic-industry boundary' (ibid, p.667). Rosa and Dawson also note that two of the main 'obstacles' for commercialising research, cited by women respondents, are inexperience and a 'lack of credibility' (ibid, 2006, pp. 355-6). Similarly, in interviews with PhD students, it was found that a large number of women reported inexperience as a hurdle that prevents them from developing their research into a business (Zalevski and Swisczowski, 2009). However, DeTienne and Chandler (2007) revealed in their study that men spinout founders described themselves as having significantly more industrial and technical experience than women spinouts founders, despite women and men reporting no difference in the number of years of entrepreneurial or industry experience they had attained (ibid, p.378). Therefore, there is a need to discuss the way that women perceive their level of entrepreneurial expertise and how they convey their level of experience to others.

TIME CONSTRAINTS AND DOMESTIC LABOUR

The nature of the work in academia means that both women and men have to juggle and prioritise responsibilities, including teaching, research, administration and pastoral care for students. In terms of career progression, academics are often committed to writing publications, and forming spinouts is 'not a formal requirement of the professional job description' (Whittington and Smith-Doerr, 2005, p.357). Sinell, Müller-Wieland and Muschner (2018) observed that many interviewees in their study viewed publications as their first priority and commercialisation of research held no incentives for career advancement.

Founding a university spinout company is time-consuming. In addition to their day-to-day work, academics are required to gain knowledge on how to start a spinout, network and recruit members of the new spinout team (Sinell, Müller-Wieland and Muschner, 2018). Research has previously shown that women academics have a greater amount of administrative and pastoral duties than men, leaving women with less time to explore commercialisation opportunities (Rosa and Dawson, 2006). In addition, 'family and childcare constitute[s] a glass ceiling for women innovators that relates to the availability of time' (Carrasco, 2014, p.418). Women are more likely to face the 'double burden' of domestic labour, and a lack of support from partners and others in the home can also hinder women from pursuing spinouts (Rosa and Dawson, 2006). Moreover, the requirements of founding a scientific spinout, such as working long hours and travelling, are often incompatible with family responsibilities (Rosa and Dawson, 2006).

9%

of business angels in the UK are women (British Business Bank, 2019).

NETWORKS AND SOCIAL CAPITAL

Social capital is important for entrepreneurs for a number of reasons. Firstly, social capital gained from networks of industry-related contacts can reduce the amount of time and money spent on gathering knowledge and information about setting up a spinout company. Social capital can also facilitate crucial access to financial resources. The more social capital an entrepreneur has, the better the chances that their business will be successful (Brush, et al., 2002; Moog and Backes-Gellner, 2009).

Social capital tends to mean having access to good networks, yet several studies have found that women face multiple barriers to networking (Rosa and Dawson, 2006; Murray and Graham, 2007; Moog and Backes-Gellner, 2009; Parker et al., 2017). The reasons for this are many, but research has found that men academics have more established networks prior to spinning out, in part because they have more time available to invest in them (Rosa and Dawson, 2006). Murray and Graham (2007) observed that women are frequently excluded from important scientific networks which subsequently 'left [them] unable and unsure of their abilities to sell science' (ibid, p.677). Some studies have also found that where women do have access to networks, these tend to be segregated by gender. Although women-only networks can provide good support, mixed-gender networks offer more opportunities and resources for scientific enterprises (Murray and Graham, 2007; Parker et al., 2017).

FINANCE AND INVESTMENT

When looking at external financing and venture capital options, sex discrimination and difficulty in accessing funding have been suggested as reasons why women's involvement in entrepreneurship is so low (Minniti, 2009). In terms of venture capital, research has shown that women receive a much smaller proportion of private equity and venture capital compared to men (ibid) and, specifically in the UK, the British Business Bank (2019) reported that 83% of UK venture capital deals went to all male teams. With specific regard to spinout companies, a report by Penningtons Manches (2017) highlighted that although women founded 11.3% of spinouts, they only received 9.9% of the total investment available. This is compared to women start-up founders who represent 14.1% of all applicants and receive 14.2% of the overall investment. The authors of the report therefore conclude that 'spinouts with a female founder aren't receiving as much money as their male-founded counterparts' (ibid, 2017, p.27). There is an absence of data on how this translates financially, but this assumption supports the findings of our previous report, which shows that spinout companies with more women founders received lower amounts through fundraising than spinouts founded by men (Griffiths and Humbert, 2019).

The majority of senior members of investment companies and 'business angels'[3] are also likely to be men (Teare and Desmond, 2016; Malmstrom et al., 2018; Jarboe, Grisoni and Manfredi, 2018). Within the 100 top venture firms, only 7% of the partners, or 54 of 755, are women (Teare and Desmond, 2016) and the British Business Bank (2019) reported that only 9% of business angels in the UK are women. Amatucci and Sohl (2004) found that women entrepreneurs faced discrimination from investors, such as a lack of faith in their capabilities due to their sex or having children, and a preference for working with the men in their companies (ibid, pp.187-189). Women entrepreneurs also felt that they asked for the bare minimum amount of money and, on reflection, should have asked for more (ibid, pp.188-189). On a more positive note however, crowdfunding

has been identified as being the more equitable type of investment, with 24% of deals going to women-founded companies. This is followed by Angel investors, with 20% of deals going to businesses founded by women (Beauhurst, 2019).

RISK AND ENTREPRENEURIAL INTENTION

Within entrepreneurial studies more widely, and across the small body of literature on women in university spinouts, women are often perceived as having low entrepreneurial intentions. Entrepreneurial intentions 'signal how intensely one is prepared – and how much effort one is planning to commit – to carrying out entrepreneurial behaviour' (Miranda et al., 2017, p.69). Oftedal, Iakovleva and Foss (2018) report that the largest driver of entrepreneurial intentions is related to personal characteristics, such as risk-taking propensity and the tolerance of ambiguity. In their research, they found that being a man was associated with higher entrepreneurial intentions. Similarly, Miranda et al. (2017) argue that entrepreneurial intention within the academic environment is greater in men than women. These arguments however, seem to ignore the existence of structural barriers and instead explain women's underrepresentation as being purely agential, with women choosing not to become entrepreneurs because they lack the intention or the interest.

Brush and Cooper (2012) have commented on how levels of engagement with risk and entrepreneurial activity are also affected by access to different forms of capital, which can facilitate or impede women's role in enterprise. This suggests that women may not necessarily be risk-averse but that their experience of, and approach to, taking risks is very much guided by their access to these forms of capital as well as their social milieu and personal responsibilities, such as family and childcare (Humbert and Brindley, 2015). Consequently, women's 'perceptions of risk are gendered in their construction, reflecting high levels of inequality in societal norms, attitudes and stereotypes' and ultimately cause business decisions to be 'interwoven with their life course' in their consistent experiences of barriers to capital (ibid, p.18).

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3 /A high net worth individual who provides financial backing for small start-ups or entrepreneurs (Investopedia, 2019)

An opposing argument often used to explain women's underrepresentation within entrepreneurship is that they are characteristically more risk averse. Research undertaken by Zalevski and Swisczowski (2009) supports this theory, as a significant number of women in their study indicated that they would be unlikely to start a business as they saw risk as a significant disadvantage and deterrent for founding a spinout. Humbert and Brindley (2015) suggest, however, that the idea of women being risk-averse may be rooted in the definition of an entrepreneur as 'a person who has taken great personal and financial risks' (ibid, p.2). Such a person is implicitly assumed to be a man, pointing to a highly biased perception of the link between risk taking and gender. They also highlight that while this gendered perception of risk-taking individuals is important to consider, the most significant factor contributing towards entrepreneurial risk is how risk is actually experienced by an individual, regardless of their gender (ibid, p.2). Thus, attitudes towards entrepreneurial risk are likely to be influenced by numerous internal and external factors that are not explicitly related to gender but are rather shaped and formed by numerous influences. These influences, however, can all be seen to be individually affected by gendered structural barriers.

THE GENDERED CONSTRUCTION OF ENTREPRENEURIAL CHARACTERISTICS

Many scholars have discussed how the characteristics and behaviours associated with being a successful entrepreneur are seen as masculine (Ahl, 2003, 2006, 2007; Bruni, Gherardi and Poggio, 2004; Lewis, 2006; Marlow and McAdam, 2010; Ahl and Marlow, 2012; Parker et al., 2017). Helm and Mauroner (2007) provide an extensive list of what they regard as 'typical personality traits of spin-off founders', which includes leadership, control, authority, power and self-confidence (ibid, p.249).

Similarly, Ahl (2006) uses Bem's gender scale to compare words used to describe entrepreneurs and how they come across as overwhelmingly masculine. As femininity is 'mapped onto females' (Marlow and McAdam, 2012, p.657) and 'the masculine discourse informing entrepreneurship is taken as normative', women entrepreneurs are often seen as inadequate and are subsequently 'othered' and barred from the field (Ahl and Marlow 2012, p.544).

Women are often left with no choice but to adopt and pursue an 'honorary man' persona, where masculine behaviours and characteristics are embraced and emphasised (Marlow and McAdam, 2010; Ahl and Marlow, 2012). An example of this is a case study of a women founder of a biotechnology company where the founder tells aspiring women entrepreneurs that they need to 'get tough and think like a man' (Marlow and McAdam, 2010, p.212). However, as argued by Lewis (2006), this can often reproduce gender inequalities between women by rendering femininity invisible or worse, by claiming that femininity has no place within entrepreneurship and must be 'fixed' with masculine behaviours (Ahl and Marlow, 2012).

CONCLUSION

This short review of existing literature suggests that barriers and obstacles that women face when considering commercialising their research are numerous and wide ranging. Many of these barriers are structural and ingrained in the STEM academic environment and the spinout ecosystem, which makes it difficult to challenge them. What is also notable is that some of these barriers can reinforce each other, and an example of this is the gendered construction of entrepreneurial characteristics that can undermine women's credibility as academic entrepreneurs and negatively impact on their opportunities to access to investments.

Research Methodology and Sample

This study is based on qualitative data from 35 interviews undertaken with spinout founders and eight interviews with key informants, including people working in technology transfer, knowledge exchange and commercial law.

The spinout companies are all based within the science, technology, engineering and mathematics fields, although many of the businesses utilise cross-disciplinary knowledge in the creation and development of their products or services. Our founder interview sample is comprised of 20 women founders and 15 men founders who have established spinout companies around the UK. The purposive sample was selected following a period of desk-based research on spinout founders through university websites and press coverage. This was supplemented by snowball sampling from suggestions made by institutions and, occasionally, participants themselves. Rather than size, the key focus for our sample was to enable sufficient breadth of experience to be explored (Bowen, 2008) through contextually rich accounts. Through our small sample size, we have been able to identify common environmental and organisational factors that are particular to our cohort (Alasuutari, 1995; Seale, 1999).

RESEARCH SAMPLE

The average age of women in our sample was 45 and the average age of men was 46. UK wide, the average age of a woman officially incorporating a spinout company is 39 and the average age of a man incorporating a spinout company is 43.[4] The age range of women interviewees was 28 to 73 and for men it was 30 to 77. In total, 31% of interviewees were senior academics (professor or head of department/ faculty) at the time of spinning-out; however, this varies significantly between genders, where 20% (n=4) of women were in these roles compared to 47% of men (n=7). In our sample, 45% (n=9) of women were Early Career Researchers (ECRs) at the time of spinning out, whilst this was true of only 20% (n=3) of men. Of the women interviewed, 50% still retained academic roles (n=10), whereas almost three quarters (73%, n=11) of men interviewed retained their academic jobs. Our sample suggests a trend for men participants to be more senior academics in the initial founding team, co-founding with PhD students or postdoctoral researchers. While some of the women we interviewed also held a senior position within the founding team, the majority co-founded their spinout with an academic further along in their career than they were. Future research could explore whether these gender differences may be observed at a larger scale.

Our sample also reflects the institutional polarisation of the UK spinout landscape.

4/The analysis of men's age at the time of incorporation used a randomised sample of 100 male-founded UK spinout companies from the Beauhurst database and subsequently using the database alongside research through university and company websites to identify the founding members. The dates of incorporation for the spinout companies and dates of birth of founders were located via Companies House.

Of our sample of women and men founders, 77% of the founders' research originated from Russell Group Universities compared to a national average of 70% (Griffiths and Humbert, 2019). Interviewees were taken from multiple disciplines, providing a broad view of experience across different subjects. They also came from varying backgrounds and career paths, with some having left higher education to work in industry or consultancy before returning to academia. This varied sample has enabled us to acknowledge continuity and change across disciplinary and geographical boundaries, pathways to spinout and personal experience. Despite efforts to include underrepresented groups in the sample, the majority of participants were white and disclosed no disabilities or other protected characteristics. From data we were able to attain via Companies House, we found that 33% (n=39) of the 118 women spinout founders in the UK had a nationality other than British; however we have no data regarding further characteristics.[5] This means that our research has limited capacity to explore other forms of diversity within the spinout ecosystem, but the study has highlighted some intersectional issues that would benefit from a deeper focus in future research.

DATA COLLECTION AND ANALYSIS

Interviews were conducted between January 2019 and October 2019, by one or two researchers from the core project team. The research was approved by the Research Ethics Committee at Oxford Brookes University and participants were sent a research information sheet and a copy of the interview questions in advance. The majority (n = 39) of interviews were conducted over the phone with the rest held face-to-face. All interviews were recorded and transcribed verbatim.

The interviews were semi-structured and participants were sent the questions in advance. The interview questions (see Appendix 2) were designed to develop an understanding around the motivations for spinning out: challenges, barriers and enablers that the founders encountered in terms of personal, academic and business relationships; issues relating to funding; and the impact of both the academic environment and role of the TTO on the journey to spinout.

5/The number of spinouts founded by women was calculated from the Spinouts Database provided by Beauhurst.

20 women and 15 men were interviewed.

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31% of interviewees were senior academics at the time of spinning out.

4 women founders

7 men founders

....
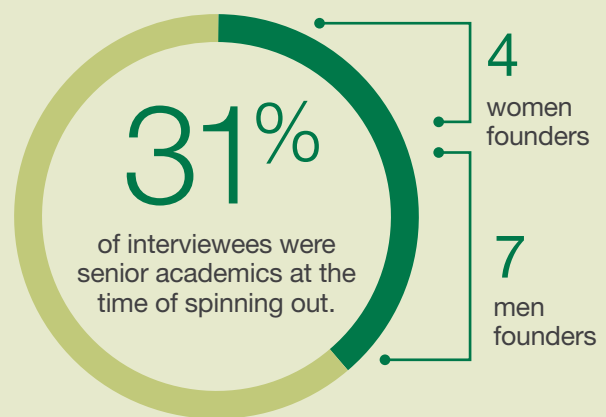
45% of women and 20% of men were Early Career Researchers at the time of spinning out.

The anonymised transcripts of the interviews were coded by several members of the research team and all researchers analysed the first 10 transcripts to ensure continuity and create a mutually agreed coding framework. Analysis was structured around the chronology of the spinout journey, focusing on the key topics identified in the literature review, specific questions explored during the interviews and post-interview reflections.

RESEARCH DESIGN LIMITATIONS

There are limitations in regard to the size of our sample and the inequality between the numbers of women founders interviewed compared to men meaning our sample is imbalanced. However, the project specifically focuses on the experience of women's journey to spinout, in an effort to improve their involvement in innovation, and therefore interviews with women were prioritised in order to align with time constraints. The nature of this research has also meant that intersectional issues have arisen that we have not been able to adequately address within the scope of this project. Despite our best efforts, and exacerbated by our sample size, there was a lack of ethnic diversity in our participants, meaning that there was little acknowledgement of how gender inequality intersected with other forms of inequality within the spinout ecosystem. However, this has also highlighted the paucity of all minority groups within the spinout ecosystem and offers potential areas for future research.

Findings

ESTABLISHING A SPINOUT

The early stages of establishing a spinout company are a particularly demanding time for the founders. At this stage, the Technology Transfer Offices (TTOs) will help founders apply for patents and guide them towards small funding or grants to launch their companies. Whilst applying for funding, founders are also seeking training and networking opportunities, and often maintaining their daily academic responsibilities at the same time. These first few months (or years in some cases) are full of the unknown but most founders were fortunate to have the ongoing support of their TTOs and/or co-founders and some were also able to access incubators tailored to guide them through the process of starting a company as an academic founder. The experience of establishing the spinout company differed across the sample, with some finding it relatively smooth while others found the process to be slow, inflexible and frustrating. This section summarises the most significant issues highlighted by interviewees whilst they were establishing their spinouts.

MOTIVATION TO SPINOUT

The interviewees were asked what motivated them to set up a spinout company. Many reflected back to the beginning of the process, recalling the reasons why they started the company. The majority described starting a spinout as an organic process rather than something that was predetermined. The idea usually arose as they realised that the research they were working on could have a valuable application in the 'real world' and the founders unanimously agreed this was the biggest motivation for starting their spinout companies. There was a shared feeling across all interviewees that spinning out their research meant they would realise a practical application of their work, which in many cases also had a tangible social value.

As one founder exclaimed, *'It's every academic's dream to have your technology applied to products'* [Interviewee 10, woman founder]

A significant number of interviewees referred to the notion of the *'real world'* outside academia. One founder described the process as translating the technology *'from the lab to the real world'* and another said they felt they were addressing *'real world problems'*. The following quote encapsulates the feeling across interviewees that the motivation to impact society through their research had always been there and that creating a spinout was a way to realise this after many years of academic research:

> *'I want to see the research that we are doing have an impact, not just necessarily for REF. When you have been researching so long, it would be a shame that it is just academic impact, papers and so on.'* [Interviewee 21, man founder]

All founders felt that having a spinout company had impact in its truest sense, going beyond the academic agenda and really making a difference. The *'societal benefit'* of commercialising research was positioned in opposition to the notion of the *'ivory tower academic'* who spends the majority of their career in a *'dark old lab'*. One founder said that *'You can only do so much research for research's sake'* [Interviewee 15, man founder]

This motivation was shared by academics at all stages of their career or spinout journey and unified founders across disciplines. This value was so strong for some interviewees that it overshadowed any negotiation about the equity stake they agreed with their institution:

> *'A lot of academics don't like having to give up equity. But you kind of have to if you want to get it off the ground, and for me equity wasn't that big a deal anyway. For me it was all about getting this into humans and seeing whether it actually worked or not.'* [Interviewee 26, woman founder]

This emphasis on tangible results over financial gain is perhaps not surprising, given the majority of founders had committed their careers to working in university research for the public good. However, as these quotes suggest, they did not feel the work they were doing in the universities was ultimately reaching the public and they felt that *'real world'* impact often required a more commercial approach.

Many founders said that their motivation for starting a spinout company was a desire for a sense of freedom and flexibility that they felt unable to realise in their academic positions. This included greater autonomy over their research and also how, where and when they worked. At the same time, they recognised that running a business is not a 9 to 5 job and that it is likely to involve even more hours working on their research. As this self-described *'millennial'* founder explained, typical working hours did not motivate him and he appreciated having more control over his working pattern:

> *'I didn't like the 9-5 environment, I wasn't motivated enough to work for a fixed salary, a monthly salary […] Sometimes, I will work Saturdays, or Sundays, sometimes I want to take Fridays off and travel, so it's really having the flexibility with my time, it seems to really be important to me.'* [Interviewee 33, man founder]

This interviewee represented the younger generation of spinout founders who developed their spinout intellectual property (IP) during their PhD or postdoctoral research and worked full-time for the business. They were a minority in the sample but their presence challenged the myth that spinouts are the preserve of older, senior academics with established research careers. They rejected the prospect of a competitive and demanding academic career and embraced entrepreneurship as an alternative option. As this founder explained, he now has the flexibility to indulge his love of travel and work a pattern that suits and motivates him.

The most common reason for wanting greater flexibility among women founders was to enable them to better manage their responsibilities as both a researcher and a mother. Less than half of women founders said they had children, but those who did spoke openly about how they navigated motherhood and running a business. One founder described how the head of the research group she worked in, and now co-founder of her spinout company, suggested that commercialising her research might offer the flexibility she was craving:

> *'When I came back from maternity leave for the third time I was just really wondering how I was going to juggle everything. I said, 'I'm not sure if I'm going to come back to work. I think maybe I'm going to have a bit of a break for a while.' He said, 'Why don't we think about applying for some funding to look at commercialising the research?' I thought, ok, I could probably manage that if it was more flexible, if I could be at home a bit more and do it a bit more flexibly.'* [Interviewee 1, woman founder]

For this founder, and several other founders with childcare responsibilities in the sample, running a company offered them a type of flexibility that they were unable to achieve as academic researchers. Although they knew starting a business would be demanding, they were seeking more autonomy over when, where and how they worked. Many of these academic founders were lab-based researchers who also had teaching and departmental responsibilities, which were fixed commitments over which they had little control. Running their own business meant that founders with caring responsibilities were more able to structure their working time and space around childcare and continue with the research they loved.

INSTITUTIONAL SUPPORT AND THE ROLE OF TECHNOLOGY TRANSFER OFFICES (TTOs)

Accessing the services of the university TTO is a fundamental step in spinout creation because they advise on and manage the IP and, in many cases, guide the academic through the process of starting, establishing and even scaling-up the spinout company. On the whole, TTOs were praised for their knowledge, commitment and support, and academic founders of both genders expressed gratitude for the help they received, recognising the crucial role the TTO had played in their success. However, there was also an overwhelming consensus that the process was far too slow, putting spinouts at a disadvantage compared to start-ups that faced fewer legal and bureaucratic restrictions. The following extract articulates the multifarious experiences that many founders described:

'I've got mixed feelings about [the TTO], to be honest. Of course, without their support and without their agenda our company wouldn't have moved forward at all, so I have to give them credit for that. But equally, they were very slow in what they're doing. So, the university generally is slow in everything they do, as you probably know as well, compared to the dynamic business world in London. So, had I started my start up in London with a few other investors and co-founders, it would probably have taken me two weeks to get it up and running. With the university spinout it took me nine months. And maybe that's not necessarily bad, it's just the way it works, but I would have liked if the process was a bit faster.' [Interviewee 33, man founder]

This frustration was shared by many founders and a few said that they had missed out on funding or other commercial opportunities because of the slow pace of the TTOs and across the institution. One founder said it took almost eight years between filing the patent and officially spinning out the company.

One key informant, who worked as a Commercialisation Manager in a Russell Group University TTO, explained that *'The actual process of setting up a company isn't a long process'* but rather *'the development process can take*

a hell of a long time.' [Interviewee 9, woman key informant] Part of this development included writing a sound business plan, which another TTO interviewee described as *'a lot of work'*, as well as considering how the spinout will be funded, who will manage it and figuring out how the founder wants to split their time between research and the business [Interviewee 2, woman key informant]. This development process was considered by the TTOs to be the responsibility of the academic founder, and they felt that it was this that took a long time to complete and not necessarily the bureaucracy and paperwork, as many founders thought.

This suggests that expectations about the role of the TTO that are perhaps not always clearly communicated. This may explain why so many founders said that the TTO only offered a basic level of support and advice and were often surprised by the amount of paperwork they had to process themselves. From the perspective of the Commercialisation Manager above, the 'process' of setting up a spinout company is the culmination of a lot of groundwork by the academic founder. For the academic founders, the 'process' included a myriad of tasks, contracts and conversations between themselves, the TTOs and the university. This disconnect may be symptomatic of the knowledge gap between the academic founders and the TTOs about what it means to start a spinout company and what is required to do so.

There was a sense that the level of support received from the TTO depended on the individual adviser. Very often, founders would deal with one particular employee at the TTO and although they found the knowledge and support of these individuals invaluable, several founders commented that levels of support, knowledge and enthusiasm varied depending on who you *'end up in front of'* [Interviewee 26, woman founder] when you first contact the TTO.

As this founder says, the relationship between the academic founder(s) and the university's technology transfer representative can be crucial to the success of the business, a sentiment shared by many founders as they reflected on the challenges they experienced early on in the spinout journey. As one founder explained, a critical factor in their spinout journey was when their university's TTO had a change of personnel:

'What probably changed things significantly was the person who was helping us from the technology transfer bit of the university. The person we were working with was not very helpful at all; he wasn't motivated, he didn't like one of the people on the team and that caused a lot of friction, and as a result he just was not helpful at all. In fact, I would say directly obstructive. He left and we then got somebody who was more senior, much more energetic, much more on board, and things really started to move.' [Interviewee 36, woman founder]

This extract suggests that the institutional support at the micro level, offered by the TTOs, has a secondary layer of resource that can be critically analysed – that of the TTO advisory staff. When asked about 'critical factors' in their success, founders often mentioned individuals from their support network, including from the TTOs, which shows just how much one or two people can influence the founder and ultimately the outcome of the spinout company. There was no evidence that this impacted women and men founders differently, but, as with any process that relies upon the assessment of a sole individual, advice and perceptions of success can be influenced by unconscious bias. As the next section shows, such variances within and across TTOs may impact the types of innovation that are being supported as well as those who are being offered support by the institutions.

SUPPORT VARIES ACROSS INSTITUTIONS

There was evidence that levels of support varied across institutions, with some seeming proactive, receptive and enthusiastic and others hesitant or generally unhelpful. The vast majority of founders only had experience of one TTO but one woman founder had spun out twice across two different institutions. Of the experience with the TTOs, she said that, *'It's interesting how it varies between universities actually,'* as she had contrasting experiences, both within the golden triangle region. She describes one institution as *'really, really supportive […] very helpful'*, feeling they had *'gone out of their way to make this work'*. In contrast, she said that the second university she spun out from was *'more interested in very quickly extracting money.'* [Interviewee 36, woman founder]

Interviews with key informants highlighted the vastly different attitudes between institutions in their appetite for supporting spinouts, which were reflected in the working practices of the TTOs. The Head of Commercialisation at one Russell Group university explained that across her institution, awareness about opportunities to commercialise research – and thus the very existence of the TTO – was usually generated through word-of-mouth. She explained that her TTO has begun to take a more proactive approach by having a presence at various events across the university:

'We invite ourselves to any meeting that we can, everything from a regular lab, meeting where we'll ask for five minutes just to explain what we do, to a half-day training course which tends to be more focused at early career researchers.' [Interviewee 7, woman key informant].

This institution has a well-established TTO and works closely with a regional incubator that supports many of their spinout companies throughout the process of commercialisation. The university produces a consistent number of spinouts but according to this TTO representative, the institution is keen to exit the companies as soon as possible, freeing up resources in the TTO and generating a one-off income for the university. Not all universities subscribe to this model and not all spinouts at this one institution will be sold, but it demonstrates the various processes institutions engage in throughout the life of a spinout company as well as how they ensure spinout creation continues to (financially) benefit the university.

The majority of spinouts in the UK (70%) come from Russell Group universities (Griffiths and Humbert, 2019) and the following quote from a senior member of a post-1992 university suggests that supporting innovation – especially the spinout model – is considered too much of a risk for smaller, teaching focused institutions:

'I think that if people come with an idea they will get supported, so I don't think there's a negative attitude toward spinouts. I think maybe we're too risk averse perhaps as an institution […] It's to do with the investment and the sustainability of financial risk.' [Interviewee 35, man key informant]

This extends the notion of risk beyond that taken by the founder to recognise that spinout creation also involves the institution taking a financial risk that will extend beyond the immediacy of providing the initial equity for the company. The institution invests in the spinout financially but also in terms of resourcing the TTO; and there is always the risk that all the money spent on the creation of one company can be lost if the spinout is unsuccessful. Such a polarised ecosystem – which privileges wealthier, elite and research-intensive universities – means that having the opportunity to see your research have commercial and 'real world' impact depends on the institution at which you work. Good innovation and promising academic entrepreneurs may never be discovered because they work for an institution which is unable or unwilling to take the financial risks necessary to create a supportive environment for spinning out.

THE PATENTING PROCESS

The majority of interviewees only mentioned their patent in passing, suggesting it was something that did not hamper their progress when establishing their spinout; it was just one requirement out of many. However, the majority of founders who described the patent process as challenging or a barrier to establishing the spinout, were women.

These challenges seemed to arise for a number of reasons. For one founder, a lack of institutional support in the form of a TTO meant she was one of the few founders who had to apply for the patents herself:

> 'In my case, coming from my institute, which has very little tech transfer or a venture seed fund or anything, this was data. I wrote the grants, hired the people, performed the research, published the research, wrote the patents and started the company all by myself. Despite having done all that, I still had to spend a lot of time negotiating with the University for a licence, for something I did everything for.' [Interviewee 23, woman founder]

This founder expressed frustration with the spinout model and the lack of support she received from her institution, but later described these challenges as beneficial because she learnt a lot about the legalities of IP and had a deeper understanding of the process as a result. This example reiterates the vast discrepancies between the amount of support institutions offer spinout founders, meaning that this interviewee was spending time on paperwork rather than market research or sourcing capital.

Another woman founder felt that the first challenge was to convince the institution that the idea was viable, which took *'a long time'* to do:

> 'So, our first thing that we had to do was to file a patent and this can be a barrier because the university pays for this and you have to prove to the university that this is worth doing and it took a long time to convince the university that we had something worth running with. I think once we had convinced them and once we had a patent, then they were very keen to take it forward and make a spinout because they now have a patent that they want to exploit. It was more challenging actually getting the patent in the first place.' [Interviewee 5, woman founder]

This founder was one of the youngest in the sample and one of only a few interviewees who had founded their spinouts shortly after finishing their PhD. Although the research group she was working in had been established for over a decade, her relative age and experience may have also acted as a barrier, as several of the younger early career researchers (both women and men) described a similar challenge in 'convincing' the university that their idea was worthy of spinning out. One key informant explained that this process of *'convincing'* the university of the credibility of the idea is core *'development work',* which includes providing evidence of the research that supports the idea for patenting and recognising the potential to market. They said it is this preparatory work that takes time, not the patenting process itself:

> 'I think if it's going to be a patent then it's generally going to be a longer process, not because of the patent, but because there's development work.' [Interviewee 9, woman key informant]

Although as one woman founder described, producing the evidence for the idea in terms of publications is a *'catch 22'* situation, both for proving the value of the spinout and also in terms of publicising the company and sustaining the volume of publications required as an early career researcher:

'It was something of an uphill struggle to get to the point of filing a patent. Once I was able to convince those who held the purse strings that it should [be patented], things got a lot better, and of course, once you've patented, you can lift the lid on publications. That was quite challenging, as an academic in this environment – if you've got something that has commercial applications, you can't file a patent until you've got enough data to support the patent, but you can't publish before you've submitted a patent, which means you can't get the oxygen of publicity around your research to build more interest in it, so it's a little bit of catch 22 for that period.' [Interviewee 4, woman founder]

The patenting process is not an obvious barrier to women wanting to found a spinout, but it is troubling that only women described the patenting process as such. Several said that it was a challenge to *'convince'* the university to patent their idea in the first place, something not really experienced by men – only those with less established academic careers. This may be because the women in this sample tend to be younger and founding their spinouts at relatively early stages of their academic careers. This may indicate some instances of unconscious bias within the TTOs where women, especially those younger and earlier in their career, are being asked to prove the credibility of their ideas because they do not have a long-established academic career. Recognising the potential for unconscious bias in the patenting process may not only support more women to found spinouts but also increase opportunities for men with less academic experience. It is about challenging the stereotype of a typical spinout founder as someone with an established academic career and strong reputation in their field who, in this sample and in STEM subjects more widely, is typically an older (white) man.

SETsquared

The SETsquared Partnership is a collaborative enterprise between the universities of Bath, Bristol, Exeter, Southampton and Surrey. Led by Southampton University, SETsquared was set-up in 2002 and supported by a £5m Higher Education Innovation Fund (HEIF) grant. It has since been ranked by UBI Global as the global number one university business incubator three years running. Since their inception, SETsquared have supported over 4,000 companies which have raised more than £1.8bn investment between them. SETsquared was originally the home of the ICURe program – which has since been rolled out nationally and offers training programs tailored for academic researchers across disciplines and at different stages of their commercialisation journey.[6]

6/Information and data on SETsquared acquired from **www.setsquared.co.uk/** and accurate as at June 2020.

ATTENDING INCUBATORS AND ACCELERATORS

Several founders had attended business incubators during the early stages of their spinout journey and these typically offered a wide range of support and training initiatives that went beyond what their universities were able to provide. In some of the larger institutions, there seemed to be an overlap between the TTOs and the university incubators, which is perhaps an indicator of the growing emphasis on commercialising research at these institutions. Many founders mentioned one incubator in particular, the SETsquared Partnership (a collaboration between the universities of Bath, Bristol, Exeter, Southampton and Surrey) as being pivotal when setting up their spinouts. This was partly a consequence of using snowball sampling as one method of recruiting participants, but it could also reflect the success of spinouts who have participated in the SETsquared programmes.

Experiences of incubators was mixed and as this interviewee has experienced, not all incubators are inclusive spaces:

> *'I am in an incubator space. I think I might be the first female CEO here, but I try not to make much of it because you enter a type of ghetto world.'* [Interviewee 23, woman founder]

This founder was a senior career academic whose spinout was the culmination of over 20 years of research in a sub-discipline of biology, yet she still found this masculine incubator space unwelcoming. In contrast, two technology transfer employees we interviewed from one university in the Southwest commented on the strength of SETsquared's EDI initiatives and how they have been successful in creating more inclusive spaces for women because they encourage women founders to participate in events as mentors and role models:

> *'They have a much better balance of women founders. They are mostly non-academic founders but they have found that just having the environment, having several of them around in the same place at the same time, you know the buzz with the early stage stuff, it's actually helpful to have several females.'* [Interviewee 7, woman key informant]

> *'SETsquared has programmes around gender diversity and women. They also actually have programmes around ethnic minorities as well and people who have not necessarily been to university from poorer neighbourhoods. They've got quite a lot of programmes around that, so diversity in its broader sense rather than just gender diversity […] there's quite a lot of awareness of it, and I think the more we can raise the awareness of the fact that women need to feel that they're part of the ecosystem, the more we're going to get to a situation where I'm going to go to an investor event in London and not be the only woman there, which is what's happening at the moment!* [Interviewee 9, woman key informant]

As this key informant identifies, creating inclusive innovation spaces is about more than just gender diversity but any diversity initiative has the potential to challenge the deeply entrenched hegemonic masculinity across the innovation ecosystem.

LACK OF BUSINESS EXPERIENCE

The main benefit founders got from engaging with incubators was access to training and support at a time where they felt they needed it most. The majority of interviewees said they had very little or no business knowledge when they first began their spinout companies. As one woman founder described, *'It was a bit like doing things in the dark when we were founding it, we didn't have any sort of idea of how this process happens'* [Interviewee 5, woman founder]. Another man founder said it had been *'a very steep learning curve'*, having to adjust from his academic researcher role to someone who is required to learn a lot about the business and the commercial world. Several founders said they knew nothing about writing a business plan before they started their spinouts, with one founder confessing he did the majority of his first plan using Google. Two founders, one woman and one man, even considered studying toward an MBA to improve their commercial and business awareness, but realised this would have been too great a commitment alongside the spinout and other responsibilities. Some founders commented that it was a shame they were not encouraged to utilise the business expertise already available within the university, instead having to budget for training or consultants within their grants and investments.

'You have to be so many things, these days. More and more you've got to juggle your own finances within your academic group.'

Woman founder

This feeling of being overwhelmed by the unknown was shared by founders across the career spectrum, but those earlier in their career were perhaps more conscious of their general inexperience, a feeling expressed by this woman founder whose spinout was created from her PhD research:

'I think at the time I was the first spin-out from [my university] that had just been done by literally someone coming out of their PhD, so I very much felt like I was thrown in at the deep end and trying to stay afloat.' [Interviewee 20, woman founder]

This interviewee was the only founder to have based her spinout company directly on her PhD research. As detailed in the Methodology, a total of 12 founders in the sample are classified as early career researchers and, of those, 9 were women. This gendered difference with regard to career stage at time of spinout speaks to a number of issues including a trend within our founder sample for the men to be the more senior academic in the initial founding team compared to the women, who were often earlier in their career. These women faced a dual challenge of having relatively little academic and research experience as well knowing nothing about starting a business. This founder described feeling out of her depth when starting her company and although this was a common experience across the sample, as very few had industry or previous commercialisation experience, this may be compounded for women founders, who were more likely to start spinouts slightly younger than men and earlier in their career.

TRANSFERABLE SKILLS

Many founders thought they initially lacked the business knowledge required to run a spinout company and commented on how much they had learnt since they started the process. There was a sense, however, that whilst they may lack business knowledge, as academic researchers they had already acquired many of the transferable skills required to run a company. As one woman founder expressed, there are many similarities between running a commercial business and an academic research group:

'I think because, as an academic you have to be used to multitasking all the time. You've got to balance your research group on the one hand, your teaching, your administrative commitments. You have to be so many things, these days. More and more you've got to juggle your own finances within your academic group, you have to be planning a year ahead, you have to be planning five years ahead, and all of those things are totally relevant to the sorts of skills that you need to bring to bear on a commercial project. […] I think people in an academic setting probably, very often, underestimate how transferable those things are to a business setting.' [Interviewee 8, woman founder]

This underestimation of the transferable skills that academics possess may explain why so many felt they lacked knowledge at the start of their spinout journey. As the previous interviewee suggests, it may be that academics have many of the same skills as those in business, but they are unable to recognise it because the language is different. This interviewee refers to running a research group as good preparation for spinning out, but not all of those in our sample were far enough along in their careers to have this opportunity and, as we have seen, the majority of those with less experience were women. Encouraging academics, women and men, to recognise the transferability of their skills could encourage more researchers to consider commercialising their research and improve their confidence in doing so once they get there.

DEVELOPING THE SPINOUT

As the companies grew, the founders' networks of experts also grew. Some of these expert advisors remained on the fringes of the company as mentors or consultants, but others were actively sought out to join the companies as board members and executives. This meant that many founders were eventually able to pass responsibility for the commercial side of the business to more experienced CEOs so they could focus on the scientific and technical expertise. For some founders this was a welcome relief, but others found it very difficult to relinquish control of something in which they had invested so much and about which they felt so passionate. This may explain why so many founders agreed it was imperative to find the right people to work with.

FINDING THE 'RIGHT' PEOPLE

Finding the right people to work with was one of the biggest challenges for several founders. Many founders explained that it took a while to find the right team to lead to spinout and a few had stories of soured relationships and challenging colleagues. Although many founders said that building a good team was crucial, they offered few examples of how this happened in practice. Generally, whilst spinouts were being established, TTOs would recommend people from their networks or more experienced co-founders would have someone in mind who they had worked with previously. As the spinout grew, investors and venture capitalists were also recruited to the board as they tended to have experience in spinouts or research-based start-ups. Founders would also utilise their own contacts; senior academics would often know people outside the academy but a few early career researchers were also able to recruit board members using their own networks or serendipitous meetings. These instances were few and far between, and tended to be influenced by location. The most fruitful example involved a founder in Oxford whose primary investor was also a supplier and decided to back the company after being intrigued by how the technology was being used and, being based locally, deciding to try the product out for himself.

Initially, finding the right people meant recruiting board members but as companies grew this also included employees. The majority of companies in the sample were very small, with many only having a few board members and a handful of employees, so finding the right people was about trust and reliability:

'I think the basis of the company is people, a very small number, you trust, you believe in them, you trust what they're doing is going to work.' [Interviewee 14, woman founder]

'You do rely on the expertise of your colleagues and honesty and trustworthiness, and if you're working for a common goal, the common good of the company or the common good of the research group or whatever it is, it's vital that you can trust in each other and if one's away you know the other people will keep things going. I think people are at the basis of a sound research group or a small company like ours.' [Interviewee 14, woman founder]

This idea of a *'common goal'* or *'shared vision'* was very much part of the narrative of trust and many interviewees agreed it was important to work with people who believed in the principals of the company. This can be interpreted in several ways. In many cases, the notion of a shared vision seemed to mean people who shared the founder's motivation, whether that be altruism or testing the concept outside academia. It meant founders finding people they felt comfortable delegating important tasks to or allowing to make decisions in their absence. As this second interview extract suggests, this often means someone with 'expertise' but also someone who can be present, commit to the company and work independently. Many of these qualities reflect the competencies of academic researchers, but these apparently gender-neutral competencies can hide implicit biases toward certain types of workers. As we will explore later, expertise in science and business often translates to meaning older men, and the ability to *'keep things going'* can mean putting the needs of the business above all else, something women may be less willing or able to do.

Some founders also identified that there was an element of happenstance when it came to finding the right people. As this founder explained, it was actually more about having the right people available when necessary, depending on the needs of the business:

'I think building a business team and engaging people that truly buy into your vision is absolutely critical to success. And then of course they've got to be the right people, and the right people at the right time.' [Interviewee 8, woman founder]

Although the interviewees described the right people as being trustworthy and sharing their motivations for the company, those working in the TTOs described it more as finding 'chemistry' between the founders and those brought in to support them. This was also recognised as a challenge from the TTO's perspective, as this Head of Investment explained:

'Finding the management and getting the right commercial team in place. That always takes us forever because it is not just about finding the right skill set to add, it is also about finding the people chemistry.' [Interviewee 25, woman key informant]

Many founders agreed that the relationship between co-founders – and, later, board members – was a critical factor in the success of the spinout company. They had to want the same thing for the company but they also had to get along and like each other. When team members meet each other through their own personal networks, likeability and 'chemistry' can be assessed organically, but when TTOs make the connections there is potential for unconscious bias to creep in. This can have implications for inclusion and diversity as selections are more likely to be made based on shared characteristics, such as gender and ethnicity, rather than personality. If chemistry and relationships are a key factor in recruiting board members and employees in small spinout companies, it may mean that 'finding the right people' becomes more about 'finding people *like us'.*

Finding the right people was an important and difficult challenge for these founders. The right people had to be trustworthy and believe in the ethos of the company and the motivations of the founder. They also had to come along at the right time and be compatible with the founder

and the rest of the team. This is a tough set of requirements, especially as each one can be interpreted differently. A 'shared vision' can be viewed as believing in the altruistic motives of the founder and the purpose of the company; it could also be translated into corporate speak as a willingness to work incredibly hard to ensure the company is successful and valuing the company as much as the founders do. A good 'chemistry' could mean all of the above plus a shared sense of humour or similar background i.e. finding someone 'like us'. These alternative meanings have the potential to disadvantage women, who may not be able to commit everything to the company and who do not look like the rest of those in charge.

ESTABLISHING ROLES IN THE COMPANY

Key informants also said that spinout companies usually stood a better chance of success if the academic recognised the limitations of their expertise. As this Corporate Finance Partner from a large law firm explained, academic founders are experts in their area of research but they know very little about business and commercialisation:

'They are incredibly intelligent in their own field, but they've got to recognise that in order to commercially exploit it, they've got to go into a different world and they've got to recognise the fact that they are not experts in that bit. So they have to understand they can only take it so far, and then let others take it forward that have the commercial acumen to exploit it further.' [Interviewee 39, woman key informant]

This Investment and Commercialisation Manager extends this narrative to say that academics who do not recognise this may be jeopardising the success of their business:

'The ones that are less successful are the ones who try to do it themselves. There are exceptions, some of the academics are fabulous when they jump into companies, but in many cases they aren't; they try and do it themselves, they try and tell the CEO of the company what to do, and they think they know it and they're often not team players. They're academics, they're experts in their field, they're running a research group; it's very different to running a company.' [Interviewee 9, woman key informant]

The views of this TTO employee appear to contradict the idea posited by some academic founders that running a business is similar to running a research group. This suggests that academic researchers are able to develop some of the transferable skills needed to run a spinout but as the business grows, the inevitable gap in their skills and knowledge means they may need to hand over the leadership to someone with more commercial experience.

At the stage of interviewing, 10 interviewees (28%) were CEOs and 7 of those were women. In the majority of cases this was because the businesses were at an early stage of development and several of these women said they intend to pass the role of CEO over to someone with more commercial experience once the company grows and has the financial capacity to do so. As one woman founder confessed, *'I don't particularly enjoy doing all the fundraising and being responsible in the end for everything'* [Interviewee 34, woman founder]. Most founders felt most comfortable in roles such as Chief Technology Officer (CTO) or Chief Scientific Officer (CSO), where they were still pivotal in the business but focused on the science and technology rather than commercial decisions. One founder described stepping *'back'* into the role of CSO as returning to her *'sweet spot'* and somewhere she felt she could add real value to the business by *'develop[ing] more interesting science, to form a pipeline for the company'* [Interviewee 26, woman founder]

In the majority of cases, founders who were CEOs appreciated taking a step away from commercial responsibilities of running the business, but these transitions were not always smooth or successful. Women interviewees provided several different examples of inappropriate and inexperienced board members and CEOs being recruited by TTOs or investors, including one with no experience pitching and another as a result of nepotism on the part of a venture capitalist. One older woman who had co-founded her spinout with another woman researcher said that when they employed a commercially focused CEO she felt pushed out of the business and subsequently lost control over significant decisions. The new CEO simplified the product to ensure the business was sustainable, and

'I like the fact that my name doesn't give away if I'm a man or a woman so by default they expect a man coming to talk about oil and gas.'

Woman founder

although this interviewee ultimately agreed with this new direction, she felt it signalled the start of her and her co-founder being squeezed out:

'I started to lose the influence in the company because this chap had come in from outside, he didn't know me, he didn't really know what I knew, he thought he knew what he was doing, and my advice was becoming less useful. And although I stayed on the board, and was able to keep things on a reasonable track, I wasn't really leading the science anymore.' [Interviewee 13, woman founder]

This founder blamed this on the mentality of the venture capitalists, in particular an overwhelming desire to make a return on investment and exit *'sooner rather than later'*. She felt that she and the other directors had *'very little leverage'* against this as they were hostage to the need to raise capital to maintain the company. This woman was in her mid-fifties when the spinouts was incorporated so her experience may speak to the intersecting social inequalities of age and gender, where older women can be discriminated against in the workplace and their skills and experiences dismissed.

Founders and TTO employees tend to agree that those with more commercial experience are better placed to lead spinout companies than the academic founders. These women appreciated the opportunity to lead for a while but recognised they should eventually step aside as the business develops. However, as the company grows, women's influence over the direction of the business, as well as day-to-day decisions, may become diluted as men with greater scientific and commercial experience take the lead.

FUNDING AND INVESTMENT

Investment was a source of residual anxiety for many founders, as finding funding and investment is an ongoing process which starts as soon as the company is established – in some cases earlier, for ICURe and similar grants. Many founders said that this perpetual need to find and secure investment was one of the biggest challenges when running a business, and even those who felt they had been 'lucky' with funding were always thinking about the next investment round.

Often in the earlier stages of business development, founders would apply for research and enterprise grants as well as, or instead of, seeking private investment. These initial sources of funding required the type of grant applications the researchers were familiar with, but many also incorporated a pitching element to get founders used to the experience. As such, interviewees at all stages of spinout company evolution said they had lots of experience pitching for investment or funding. Founders expressed mixed feelings about pitching. Some described it as a positive experience and a few investors said they quite enjoyed it. Others described it as *'surreal'* [Interviewee 36, woman founder], or *'nerve wracking'* [Interviewee 21, man founder], and one woman founder went so far as to say it was *'horrendous'* [Interviewee 19, woman founder] as it took her completely out of her comfort zone. One woman likened pitching to teaching and said that as teachers, academics definitely have transferable skills to support them in this area. This founder admitted she still found pitching *'challenging'* but said that *'if you've taught for any length of time […] it's not as unfamiliar as you might first think'*. She explained that, *'It's not an alien experience to have to stand in front of a room of people and be concise, but also convincing and, to some degree, charismatic'* [Interviewee 4, woman founder]

Generally, founders of both genders said it was not something they particularly enjoyed but recognised it was a vital part of founding and sustaining their business and, as one founder explained, *'I don't mind doing it but I wouldn't say I enjoy it […] I think if given the choice, I would still choose not to'* [Interviewee 34, woman founder]. The majority of founders had pitched at a variety of events and in front of many different investors, but what united these experiences was that the investment community was dominated by men, something that did not go unnoticed by women and men founders alike. One woman founder described it as entering a *'very male biased […] world'* [Interviewee 23, woman founder] and another described investment events as *'predominantly men pitching to men'* [Interviewee 8, woman founder]. Women founders reported that as scientists they were often used to being in the minority but the absence of women in these spaces was stark nonetheless. Despite this, several women felt this might actually work to their advantage, but their explanations as to why varied significantly.

One woman founder said that having two women founders pitching was quite a novelty and she felt that investors were more likely to want to help and *'nurture'* them as a result:

> *'I think sometimes it helps being a woman. I think there were times when the men we were pitching to saw us as two women pitching to a group of men, they would see us as people they could take under their arm and nurture… in a professional way I mean! So I think there's an element where you can play to that, which is … use the advantages you have.'* [Interviewee 13, woman founder]

Another woman founder, from an Asian background, said it was the element of surprise that made her memorable and intriguing to investors who, in her experience, were always men:

> *'I like the fact that my name doesn't give away if I'm a man or a woman so by default they expect a man coming to talk about oil and gas...and a woman comes. So, I take that as a good thing because they will remember me. And I find myself, in many cases I'm the only one, or one of very few women pitching, if it's a pitching event.'* [Interviewee 32, woman founder]

This founder took advantage of the unconscious bias of the all male investment panel, who would expect to see a man *'by default'*. The experience of this founder is also a reminder of the intersection between race and gender that often goes unmentioned by many founders as they are predominantly white. This founder does not explicitly mention her ethnic background as part of her story, but the fact she knows her name confuses and surprises investors suggests she is aware that she is marked as different.

'One of the guys in the first pitch actually sent a Tweet whilst I was pitching […] it was taking the mickey out of what I was doing and it was just so rude.'

Woman founder

Whilst several women founders felt all -male panels put them at an advantage, the majority expressed indifference, even if they did acknowledge they were the minority. Not all women had positive experiences though, and one woman founder reflected back to her first time pitching, where she felt her gender put her at a disadvantage as she was not taken seriously by the investors. This extended extract paraphrases her story:

'They were all men - there were a couple of women in the room but they were doing the administrative roles, so they were keeping minutes and they weren't the actual people who were making the decisions. […] When I walked in [the investors] were just on their phones, they didn't even look up. They didn't introduce themselves, it was just a really bad experience from start to finish […]. I had my confidence knocked by how dismissive they were when I came into the room, and then the first question was, 'Why are you even here?' I could just feel myself [deflate], and after that I just couldn't seem to pull myself out of it to give decent answers, I really had my confidence knocked. […] One of the guys in the first pitch actually sent a Tweet whilst I was pitching […] it was taking the mickey out of what I was doing and it was just so rude.' [Interviewee 1, woman founder]

This founder was eventually able to overcome this *'bad experience'* and went on to secure the funding she needed elsewhere. Whilst it is difficult to prove these behaviours are a result of gender inequality, it is an example of the unequal power dynamic between investors and company founders, a dynamic that becomes even less equal if the founder is a woman and all the investors are men. A founder interviewee who worked as a corporate finance lawyer and partner felt that the investment community was *'definitely changing'* and it was an *'exciting'* time as the increase in women entrepreneurs was fuelling a change in the *'dynamics'* of the investor community [Interviewee 39, woman founder]. Yet spinout investors are often required to have both business and scientific experience, combining two areas of knowledge that continue to be dominated by men. As one woman founder put it, *'I don't think I've ever spoken to a female investor who was also technical.'* [Interviewee 34, woman founder]

Several founders commented that Innovate UK have recently developed gender inclusive policies and initiatives, including increasing the visibility of women entrepreneurs through the Women in Innovation award – of which one interviewee was a recent winner. One man founder said that his current Innovate UK grant required the company to demonstrate *'gender equality and social inclusion'* and as such, he pledged that *'all*

ICURe

The ICURe Innovation to Commercialisation programme provides up to £35k of funding from Innovate UK for university researchers at early career stage with commercially-promising ideas to 'get out of the lab' and validate their ideas in the marketplace. After a successful pilot with SETsquared Partnership universities, ICURe has been rolled out across the UK, helping establish over 90 new companies across 60 universities and research establishments. Of those who apply for the scheme, just under a third (31%) of the Early Career Researcher (ECR) Entrepreneurial Leads are women.

Funding is available over three months and provides a salary and travel budget for an ECR. Funding recipients are encouraged to travel and are given a target of holding 100 conversations around the world with potential customers, regulators, suppliers, partners and

£35K

funding provided by Innovate UK for university researchers to validate their ideas.

competitors to assess the commercial viability of their research. To support them, researchers are offered a 3-day intensive training bootcamp alongside bi-monthly contact and coaching sessions. Upon completion of the scheme, participants are expected to have developed a market-ready business model, and teams that have demonstrated the most promising market potential will be invited to apply for further Innovate UK grants to develop the business further.

See **https://www.setsquared.co.uk/programme/icure-programme-2/** for further information. Data correct as of February 2020.

of the people that we'll train to utilise and work with will be representative' [Interviewee 15, man founder]. Only a small minority of founders gave examples of Innovate UK's EDI initiatives, which suggests that awareness is not widespread and is only reaching those who have benefitted from the initiatives; in this case mostly women founders. Whilst this is commendable, it may mean that these initiatives are not yet challenging the stereotypes and masculine norms which would lead to real systemic change. As our previous report shows, spinouts founded and led by women are less likely to receive large innovation grants than spinouts founded by all-male teams (Griffiths and Humbert, 2019).

REFLECTING UPON CHALLENGES AND SUCCESSES

ATTRIBUTES OF SUCCESSFUL FOUNDERS

When asked about the desirable characteristics in an academic spinout founder there was little difference in the responses between women and men. One woman founder, who was conscious of gender equality issues, summarises the feelings of many founders in the sample by saying, *'I don't think there is a gender element to entrepreneur skills itself […] because, particularly in my area, it is knowledge based'* [Interviewee 23, woman founder]. Whilst several founders did quote technical knowledge as an important characteristic, the majority focused on personal attributes, with determination and resilience the most common responses. The following extract typifies the response of several founders when asked what they thought were the most important characteristics of an academic founder:

> *'Resilience! Because it's not going to be easy. You're going to get told no a lot! And often it won't be your fault or anything to do with the quality of what you're doing. So resilience and persistence.'* [Interviewee 36, woman founder]

Whilst this type of statement was made by women and men, it was only women who prioritised resilience above all other attributes, with three women giving this as an immediate one-word answer to the question. This may mean women are overcoming more challenges than their male counterparts or it may be symptomatic of the different vocabulary women and men use to describe themselves and their experiences.

Many interviewees made a connection between their motivations for starting a spinout by saying that a spinout founder has to be passionate about what they are doing. This also links to the discourse of academic research as a vocational career where passion for the subject is believed to be necessary for success as well as for overcoming adversity. One woman founder articulated this in the context of founding a spinout by expressing that resilience is born out of passion and that *'you need drive and motivation, which then gives you that resilience to overcome challenges and then also find new ways to move forward'* [Interviewee 27, woman founder]

Several founders also commented that it is important to be able to work well in a team and in many cases be a good manager too. A few founders mentioned that having good social skills was important because of the amount of communication that was involved, in particular building networks and working with people across the supply chain, from the institution's TTOs to suppliers and customers.

Many founders said that good time management was important, as was being well organised and able to multitask. Although some founders were working with their spinouts full-time, the majority were continuing with their academic jobs and, as this man founder explained: *'You have to be able to multitask. You have to be able to jump between your teaching, research and administration for the university and then the company thing'* [Interviewee 21, man founder]. This narrative of managing or balancing time will be continued later in this section, but it is interesting to note that multitasking and time management, qualities often associated with femininity, are considered, by both women and men founders, to be a key characteristic of a successful founder.

WHAT MAKES A SUCCESSFUL SPINOUT COMPANY?

In answering the question, 'What makes a successful spinout company?', most founders mentioned money at some point in their answer, but this was rivalled by the ability to make a difference in the world, echoing their earlier

'I know [my institution] would say a successful spinout is floated on the stock exchange, that's success, isn't it? But to me, I think it's also about making a difference in the world.'

Woman founder

motivations for starting the company. There was little difference between the genders although men tended to be more open or explicit about the desire to make money eventually. This ranged from the modest response of, *'to have cash coming into the company'* [Interviewee 17, man founder] to the more ambitious, *'It becomes a unicorn and gets a billion-dollar valuation!'* [Interviewee 21, man founder]. This second founder went on to say that a successful spinout would be one that is *'self-sustaining, has a revenue and an income stream that allows it to grow'* until it reaches a *'massive valuation'* and has *'an IPO or trade sale down the line'* [Interviewee 21, man founder]. Contrastingly, it was women who tended to be more conservative in their ambitions, with one stating that merely *'survival'* [Interviewee 26, woman founder] was a measure of success, a feeling echoed by another woman founder who said that, *'If you get past the first year it is a big milestone'* [Interviewee 1, woman founder]. The responses of the women founders seem to lack confidence compared to those of the men, but it may be that women are more realistic about the challenges they will face. In contrast, the ambitious attitudes of these men founders may reflect their experience of operating within an innovation ecosystem that is dominated by successful role models who look just like them.

Several founders identified a disconnect between the desire to have a positive impact on society and their ambition to profit from their success. As one woman founder put it, *'What's important to you and important to the company tend to be different things'* [Interviewee 3, woman founder].

What is important to the company is often what is important to the shareholders too, and one woman founder explained that she and her institution have a different definition of what makes a spinout successful:

> *'I know [my institution] would say a successful spinout is floated on the stock exchange, that's success, isn't it? But to me, I think it's also about making a difference in the world.'* [Interviewee 19, woman founder]

Founders are balancing many competing expectations on their way to success, including the expectations of investors and the competing ambitions within themselves. They were motivated by a desire to see the application of their research doing good in the world, but would still like to see their hard work pay off one day. Some men seemed a little more comfortable with this notion than the majority of women, but it is unclear what is driving this.

PERCEPTIONS OF RISK

The interviewees' narratives revealed different perceptions of risk associated with setting up and running a spinout company. These perceptions appeared to be influenced by a number of factors, such as career stage, when the spinout was established, family responsibilities, having an entrepreneurial parent or other personal circumstances.

Women and men founders who created a spinout while already established in their academic career felt that there was little risk involved in spinning out, as their academic job provided a guaranteed income and a safety net. As this man founder, who was a spinout founder and Dean, said:

> *'In a sense being an academic is the safest form of entrepreneurship that you can undertake, because you are paid a salary, and you can go and be entrepreneurial [...] you haven't got to give up a job.'* [Interviewee 29, man founder]

Those who founded a spinout shortly after having completed their doctorate and were at the very early stages of their academic career also thought that the risk was limited. As they had not embarked on a proper academic career, or any other career yet, they felt that they did not have much to lose. This was not the case though for women at the early stages of their

career with family responsibilities. They seemed to be acutely aware of how the risk involved in establishing a spinout could have had a negative financial impact on them and their family. As one of them said, *'I felt the risk was on me personally'* [Interviewee 1, woman founder]

Having an entrepreneurial parent was also mentioned by two women founders as a mitigating influence on their perception of risk with one woman citing her father as a valuable source of advice when she started her own business. Conversely, one man founder felt that risk was something to embrace, as he explained that he and his co-founder used their own money to start the spinout as they wanted to *'own the risk'* and therefore also reap the *'rewards that would come if the company was successful'* [Interviewee 31, man founder]

Most founders talked about risk as most significant at the point of setting up their spinout. One woman founder, however, whose company has been very successful and became a public company, talked about the risk associated with increased company visibility, saying, *'It is a public company and it is very public and if you fail you're going to fail big style'* [Interviewee 26, woman founder]. Discussions around risk also emerged in relation to job creation as founders felt responsible for their employees. One man founder talked about the difficulty of getting experienced people to leave their current post in a company and join a spinout in its early stages, as this could be seen as a risk. Conversely, he mentioned that it was much easier to get students who had completed their doctoral studies to join a spinout as *'they've*

generally got no risks, no obligations, they're not leaving a job' [Interviewee 29, man founder]

As well as individual perceptions of risk, a few interviewees talked about the UK being more risk averse compared to the US, as well as institutional risk aversion. The latter was seen as a barrier to spinning out and even if individual academics were ready to take the risk associated with setting up a spinout they were held back by their own institutions. Another important point about risk was raised by a man founder who has created a few spinouts and is currently in a senior academic role, as he reflected on the need to ensure that academics are made aware about the risks linked to spinouts but also encouraged to take these risks and embark on entrepreneurial activities.

GENDER STEREOTYPES

A small number of women in the sample described instances of gender stereotyping during their spinout journey. These stereotypes were considered frustrating rather than debilitating, but their presence suggests there are still outdated notions of women's social and economic roles within the innovation ecosystem. The following extract shows how pervasive the stereotypical image of a woman in STEM can be and that women can be subject to other people's perceptions of how a woman in science should look. This interviewee was pleased to have her work selected by the university for a promotions webpage but felt she was made to *'fit the stereotype'* so people would 'believe you are a scientist':

'He drew me in like a dark colour with a slightly hairy leg, a very weird leg, and I look kind of fat with a lab coat and nerdy pens in a pocket.'

Woman founder

'I'd blow dried my hair and I was wearing lipstick and a nice top and they literally said to me, 'Could you put laser goggles on and could you tie up your hair and do you have like a jumper and could you wipe off your lipstick?' [Interviewee 12, woman founder]

The same interviewee also experienced the intersection of gendered and racial stereotypes when the magazine for a national newspaper published an article on her company. Having not seen an image of this founder, the illustrator constructed a caricature that this interviewee describes as, *'hilarious'*, *'nerdy'* and *'un-sexy'*:

'He drew me in like a dark colour with a slightly hairy leg, a very weird leg and I look kind of fat with a lab coat and nerdy pens in a pocket, like it's just a stereotype and the idea of what a female scientist is meant to look like.' [Interviewee 12, woman founder]

This founder felt that these types of images pose a *'big problem'* as science still has the *'stigma of being a nerdy, un-cool thing'* and this perception impacts the choices girls make at school. Some men also identified how pervasive gender stereotypes were in STEM, and one man interviewee commented on the *'stereotypical view that [engineering] is a man's domain'* [Interviewee 15, man founder] that starts when children are young.

Gender stereotypes also pervade notions of success and achievement, where women are sometimes thought to have *'cheated'* when they succeed in their careers. These degrading stereotypes were illustrated by a woman founder describing a conversation during a meeting of research fellows on a prestigious fellowship scheme for STEM entrepreneurs:

'In a sense being an academic is the safest form of entrepreneurship that you can undertake.'

Man founder

'There was fourteen of us and there were five women, and we were discussing about how women are perceived in business, and we did a straw poll of all the fellows and said put your hand up if you've been accused of sleeping with somebody to get to your position of CEO. Every single woman put their hand up.' [Interviewee 3, woman founder]

The above extracts suggest that women in the spinout arena struggle against multi-layered stereotypes based on gender, race and ethnicity, and which also challenge the legitimacy of their knowledge, experience and success. These stereotypes are imposed upon them and are often out of their control. As the second quote demonstrates, sometimes women are not given the opportunity to challenge the way they are portrayed, despite knowing how harmful these stereotypes can be. Women interviewees would talk about gender stereotypes in a light-hearted way but these small, albeit persistent, instances accumulate to create additional challenges for women across their spinout journey.

WORK-LIFE BALANCE

Greater freedom and flexibility around how, where and when they worked was one motivation considered by several founders, especially women with children. Yet for many, that freedom and flexibility often meant long working hours and difficulties in managing time across their various responsibilities. Many said that managing their time was one of the biggest challenges they faced as a founder. Interviewees were candid about the amount of time it takes to start a spinout company and how this impacts work/life balance. As one man founder put it, *'A 9-5 doesn't cut it for being an entrepreneur,'* and if you are retaining your role as academic at the same time *'you have to accept that you are not going to have the work/life balance that you might want, at least for the period that you are trying to get set up'* [Interviewee 21, man founder]. A few men founders stated that they often worked 80-100 hours a week, especially during the early years of setting up the spinout companies, describing it as a passion or, in one case, an *'obsession'* [Interviewee 11, man founder]

Of the women founders interviewed, 50% (n=10) were also working as academics, either full-time or part-time, and almost three quarters, 73% (n=11)

of men interviewed retained their academic status. One possible explanation for this was that women in the sample were also more likely to be primary or shared caregivers to their children whereas more men were identifiable as breadwinners. The following extract typifies the experience of several older, more established men founders who credited some of their success to their wives who looked after the family and home whilst they worked:

> *'I had a wife who was terribly understanding and I think this is very old fashioned but extremely important for me. So my wife was not in paid employment; she brought up the kids while I did this and if I hadn't have had her doing that, as a man with a family, I would not have been able to do the spinout […] I was easily doing 100 hours a week because I had two jobs. And that was a horrendous workload which was only possible a) because I was 20 years younger and b) because I could just do it because [my wife] gave me the flexibility to go and empowered me to do it in a sense.'* [Interviewee 29, man founder]

This founder, and several others in his position, recognised that the privilege of having a wife at home full-time *'empowered'* him to have a successful career and spinout company – something that may be less available to younger founders, both men and women. Younger men founders were more likely to be in dual career relationships, but as one interviewee said, it was still *'crucial'* to *'get your partner on board'*, because the spinout will consume so much time, which can *'get pretty tedious for your partner'* [Interviewee 41, man founder]. This founder did not expand on what he meant by *'tedious'* but described spending many weekends in the lab and working lots of late nights, particularly in the early days of founding the business, leaving little time for physical or emotional care of others. Women founders also praised their husbands and partners for their emotional support and *'help at home'* [Interviewee 14, woman founder] but they were in a more challenging situation. They were part of a dual career household which meant that women founders with children often relied upon their parents to provide day-care when they were working long hours or travelling.

Men founders did talk about their families but for women interviewees who were mothers, their children – and the care of them – was much more central to their conversation around work-life balance and managing their time, suggesting that childcare was predominantly their responsibility. This may also reflect the sample distribution where women founders with children tended to be in the younger demographic but men with children tended to be older. One man founder explained that he started his spinout company when his children were older and recalled spending *'a lot of time with my kids'* when he and they were younger, taking them into his office where they *'would play there all day'*. He said that for academics to be able to have a family and start a spinout company, *'the university or the company or the society in general have to provide a lot more help to people'* [Interviewee 11, man founder]. As one single, child-free woman founder exclaimed, *'I cannot imagine doing what I do now and having children at the same time,'* saying that if she *'had met Prince Charming'* after her PhD, *'I probably wouldn't be here doing this'* [Interviewee 12, woman founder]

Women who did have children often talked about demarcating time to spend with them, as this founder describes:

> *'I try and really schedule my time, so I have four days where I'm really focussed on work and then three days where I'm more focussed on the children, or at least in their waking hours, and maybe do a bit of extra work … but not so it affects them, just trying to get a good balance.'* [Interviewee 28, woman founder]

Founders generally agreed that managing their time and responsibilities was a delicate balance, and for many this was something they had to continually revisit and refine as the spinout progressed. The founder quoted above was in the very early stages of spinning out, so had different demands on her time than some of her counterparts. One woman founder described her balance as running a business *'working around'* her children and having them *'at my feet'* [Interviewee 20, woman founder] the whole time. For this founder, starting the spinout meant she could continue to look after her children herself without having to resort to other childcare arrangements, something which was very important to her.

One woman founder with children described how she actively created the balance between her work and family, but it came with the risk of upsetting important company stakeholders:

'For a number of people in the spinout community – from some of the people who are in spinouts, some of the investors, some of the authorities – there is an element that the business comes before everything else. And that other things you might be involved with, your children, your family, you can deal with them later […] That's really off-putting and at first I was too scared to challenge that, and then I was just like you know what? I don't have to do this. I don't have to spend three hours of an entire evening on the phone on a conference call; I would rather put my daughter to bed.' [Interviewee 3, woman founder]

The sentiment that *'the business comes before everything else'* reflects the discourse that running a spinout is a passion that can turn into an *'obsession'*. This comes with an expectation from the 'spinout community' that it should be the founder's main priority. This founder, and several other women with children, were beginning to challenge this narrative, but as the interviewee quoted above found, it was very difficult to *'stand up and say no, I'm not doing this'* and was grateful that her co-founder *'understood about putting your kids first'*. Women founders, especially those with young children, were a minority in the masculine working environments they were part of, in both science and the commercial world. In many ways they accepted the working practices that came with this, but when it came to work-life balance they were beginning to challenge these hegemonic (masculine) working cultures. By prioritising family over their spinouts and refusing to accept that the business comes first, these women were engaging in small but powerful acts of resistance against accepted expectations which were previously accepted as the norm.

PERCEIVED LEGITIMACY OF ENTREPRENEURIAL ACTIVITIES WITHIN THE ACADEMY

There was a sense amongst some founders that getting involved in spinout companies was not perceived by their colleagues as a legitimate academic activity and consequently not properly recognised in the promotion process. One man founder felt that this was a significant barrier as he commented that, *'Colleagues immediately associated that [spinout] with my research not being fundamental research, which wasn't actually true'* [Interviewee 17, man founder]. Several founders suggested that including research commercialisation in promotion criteria and personal development reviews (PDRs) may improve the perception of commercialisation across the academy. There was a feeling that *'a lot more people would do this if it was better recognised in promotions'* [Interviewee 26, woman founder]. Moreover, academics may then see starting a spinout as less of a risk to their academic career advancement.

Some founders extended this to say that bigger structural changes are required alongside this and the institutions had a significant role to play in this. In particular, reviewing and reorganising *'time, allocation of resources and tasks'* and how these *'relate to the income that you bring into the university'* [Interviewee 23, woman founder]. The experience of this mid-career researcher was repeated across the sample, with many interviewees calling for better recognition of commercial activity in their workload allocation and planning:

'One thing I would say about universities with spinouts is that they don't take into account that you've got to do all your other jobs […] I'm fulltime with the university, you're just having to squeeze it in where you can.' [Interviewee 15, man founder]

As already discussed, spinouts have a significant impact on the work-life balance of academic researchers and many founders felt that institutions have a responsibility to at least recognise this and engage with the problem. As one senior academic founder articulated, research institutions *'need to empower people'* and *'celebrate'* commercialisation but be aware that they also *'have a duty of care'* [Interviewee 29, man founder]

Some founders, particularly those who established their company several years ago, noted how the introduction of research 'impact' in the Research Excellence Framework (REF) in 2014,

'A lot more people would do this if it was better recognised in promotions.'

Woman founder

which requires academics to demonstrate the societal benefits of research beyond academia, has led to a change of attitudes towards spinouts within the academic community. As one older woman founder explains:

'It was kind of viewed as almost being a little bit grubby, not quite academic enough, not really what we do. I had a lot of that from the generation of academics above me, but things have changed, I think because of cash and the impact agenda more than anything. Suddenly I'm completely in vogue!' [Interviewee 26, woman founder]

As this interviewee suggested, it was not just the REF that facilitated this shift but the income generated as well. Several academics shared REF success stories and this academic explained that the institution really started paying attention once the financial 'benefits' became clear:

'We're a case study for the REF, Innovate UK have used us as a case study, we've just put the university in the top ten universities for Innovate UK income by spinouts, so suddenly they can start to see some of the benefits.' [Interviewee 27, woman founder]

The pool of key informant interviewees tended to agree that there had been a slow but defined cultural attitudinal surge in favour of spinouts since the inception of REF and the 'impact agenda'. One Tech Transfer Officer said this is what fuels some of the enquiries they have from academics, but another said they were actually *'very selective'* about the spinouts they enter into the REF cycle so commercialising IP via this route is not a guarantee of measurable academic impact. One key informant who had recently left her TTO role to work in an incubator made the connection between the mainstreaming of the impact agenda in higher education and the increase in young academics seeking to start their own companies:

'We did begin to see younger academics developing much more of an awareness of enterprise, because I think the older, established academics were very much of the school of thought that in general you're there to research and teach. It's only as the impact agenda has really taken hold, and the general mood towards providing entrepreneurship training and so on, that we did begin to see younger-stage academics coming forward, saying "I would like to do this."' [Interviewee 2, woman key informant]

This may offer one explanation for why younger academics are considering spinning out at earlier stages of their careers than their predecessors. As this key informant explains, some institutions are now offering entrepreneurship training which encourages students and early career researchers to consider commercialisation as a viable option. She considers this to be a direct result of the need to demonstrate impact and knowledge exchange, but suggests that some *'older, established academics'* may be resisting this culture change. Although the future introduction of the Knowledge Exchange Framework (KEF) was not expressly mentioned, as spinouts will be part of the metric used by KEF, this may further help with culture change, and help academic entrepreneurial activities, like spinouts, to gain full legitimacy within the academy. As one man founder with experience of setting up multiple spinouts put it, *'There is as much intellectual endeavour in growing the business as there is in doing the science'* [Interviewee 29, man founder]

MENTORS AND ROLE MODELS

Women and men founders both talked about the value of a good mentor, but experiences of the mentor/mentee relationships were mixed. There was a general consensus among interviewees that

finding the right mentor for the individual is key. For many women founders, the right mentor is one they can relate to and call upon for help and advice when needed. Some women wanted support with practical, business-related challenges, whereas others wanted someone they could call upon for more general advice when they were feeling overwhelmed, as this woman founder explained:

'The person I referred to as my mentor earlier, is not in any kind of formalised way. She's someone that, we click as human beings and I know I can call her up on a Sunday afternoon. Say, "Hi. Help […], I don't know what I'm doing."' [Interviewee 4, woman founder]

This founder's mentor was the Head of Commercialisation for her institution's TTO but this was not a formal mentor/mentee relationship. Rather it was about finding someone she felt comfortable with who also had the necessary experience. This echoes the earlier finding that it is critical to get the right people for the business, who are not only knowledgeable but also have *'chemistry'* with the founders. Several other women also said they had found mentors informally, often through networks in their institutions or further afield. These mentors were described as *'fantastic support'* and *'critical'*, especially in the early days of starting the business. Some women said it was important to them to find mentors who had faced similar experiences and preferably someone who was *'just to be a few years ahead'* rather than someone who had *'sold their company for billions of pounds'* [Interviewee 4, woman founder]

There was a feeling amongst some women founders that their institution or incubator could create better networks for academic spinout founders, so that those with less experience could more easily find suitable mentors. As one woman founder described, finding mentors through existing networks was not always easy and their own set of *'blind dates'* with potential mentors resulted in them meeting *'retired gentlemen in pubs who were trying to help us, none of whom were any use whatsoever'* [Interviewee 13, woman founder]. For many women, the gender of their mentor was not an issue and a significant number of founders considered themselves to be mentees of their men co-founders. Several also said that members of their institution's TTOs could also act as mentors

as many of them were involved in the business anyway. In many cases, founders did not label these individuals as mentors but rather someone who was critical in the spinout journey and able to offer support and guidance when needed.

Some women had experience of formal mentoring schemes, including those offered through funding programmes or incubators. Although these mentors knew a lot about commercialising science, they were not always the best fit for the founders themselves. One founder relayed an alarming story of some advice she received from her mentor, who was an older man, about pitching for investment:

'The mentor that I was assigned was male and I liked him, but he was very old school. He said to me when I went to do the pitch that I should wear my tartiest dress to give the pitch. He was like a different generation, he was much older than me and he treated me like a kind of, like a bit of a silly sort of daughter.' [Interviewee 1, woman founder]

This overt example of sexist and discriminatory behaviour shows that outdated views of women are still present in the modern spinouts ecosystem. Whilst this founder said she *'liked'* her mentor, she felt they were a generation apart, something which created an unequal power dynamic between the two. Whilst this age and experience gap is perhaps considered natural in mentor/mentee roles, this relationship could be considered detrimental to the less experienced woman founder. Whilst a mentor must be experienced, it is also important that those who arrange these relationships consider who is right for the individual.

Several women in the sample had also become mentors themselves, despite being relatively new to the world of commercialisation. These mentor/mentee relationships tended to be informal as younger academics (and in some cases students) sought out these women academic founders after seeing them at events or hearing about their work through networks. As the next generation of spinout founders, they were considered role models by those less experienced than themselves and some women interviewees talked about their passion for supporting those who will follow in their footsteps. Despite this, women

founders were unlikely to refer to themselves as mentors or credible role models. One woman said that because she did not have children, she was *'not necessarily what young women want to see as a role model'* [Interviewee 14, woman founder]. However, evidence from across the sample suggests that for many founders, a mentor was simply someone who offered regular help and advice, so it is very likely many more women were fulfilling this mentor role without necessarily identifying as such.

HOW COULD THE SPINOUT ECOSYSTEM CHANGE TO BE MORE INCLUSIVE?

Toward the end of each interview, founders were asked what they felt institutions could do to improve women's representation in university spinouts. Several said that women founders, and others working in the spinouts ecosystem, should be more visible. This included visibility at events and within the institutions to act as role models and mentors to other women:

'Visibility and making role models more visible for other women can be important. When I go to meetings with investors, if everyone's in their fifties, male, white and wearing a suit, I feel quite alien.' [Interview 34, woman founder]

'I think that what probably needs to be done is to get as many female entrepreneurs to act as mentors, maybe even coming to give talks about, you know, thinking about this as a career option.' [Interviewee 40, man founder]

The concept of women as role models and available mentors was a theme that ran across many interviews and seemed to be important for many women founders. While making women more visible is a measure that universities can easily adopt, it also places additional responsibility onto women founders (and other women within the ecosystem) and risks compounding the time challenges they face when already juggling their spinout work alongside research, teaching and the rest of life. Furthermore, the majority of institutions only have a limited number of women founders (Griffiths and Humbert, 2019) meaning the burden of 'visibility' will fall on the same few individuals.

Additionally, whilst they were making themselves visible at events or mentoring younger women innovators, their male counterparts would be able to use this time to focus on furthering their research or developing their spinout company.

Another suggestion posited by several founders was that of developing more women-only spaces for training, networking and knowledge sharing. However, feelings toward women-only initiatives were mixed. Several women described positive experiences from events they had attended, but others felt that the idea of offering women separate forums only reinforced the idea that women needed additional support because they were not good enough:

'When men look at female networks they go, "Well, of course they've got to stay together, haven't they, because they've got to help each other because they need that extra support," and that absolutely grates on me.' [Interviewee 39, woman founder]

Many women founders felt their gender had not hampered their career progress and were proud of this, but recognised that there was a 'problem' and it would take more than women-only spaces to change that. As this founder articulated, women *'need a groundswell of support'* [Interviewee 14, woman founder] from everyone and women supporting women will not be enough to foster meaningful cultural change.

Because women interviewees felt they were as capable as their male counterparts, many felt that raising awareness of commercialisation opportunities within the institution could help improve the gender balance of spinout founders. As one woman founder put it, *'knowledge is key'* [Interviewee 20, woman founder], and there was a general agreement that *'the university could make people more aware that this is an option and particularly helping early career researchers to be involved'* [Interviewee 5, woman founder].

Founders agreed that it would be most helpful to learn about commercialising research at the beginning of a research career, so they were aware of it as an option to them as they progressed with their research.

An overwhelming number of founders believed that the problem is a lack of women working in STEM, an issue which begins from a young age. Women and men founders shared this view but men tended to rely on this explanation above all others, whereas women were often more nuanced in their response. To reflect this, the majority of extracts used here are taken from interviews with men. There was a sense that to understand the lack of women in spinouts, *'you need to go right back to the very beginning'* and as this senior engineering academic puts it, *'promote engineering as a subject for everybody, not just men'* [Interviewee 15, man founder]
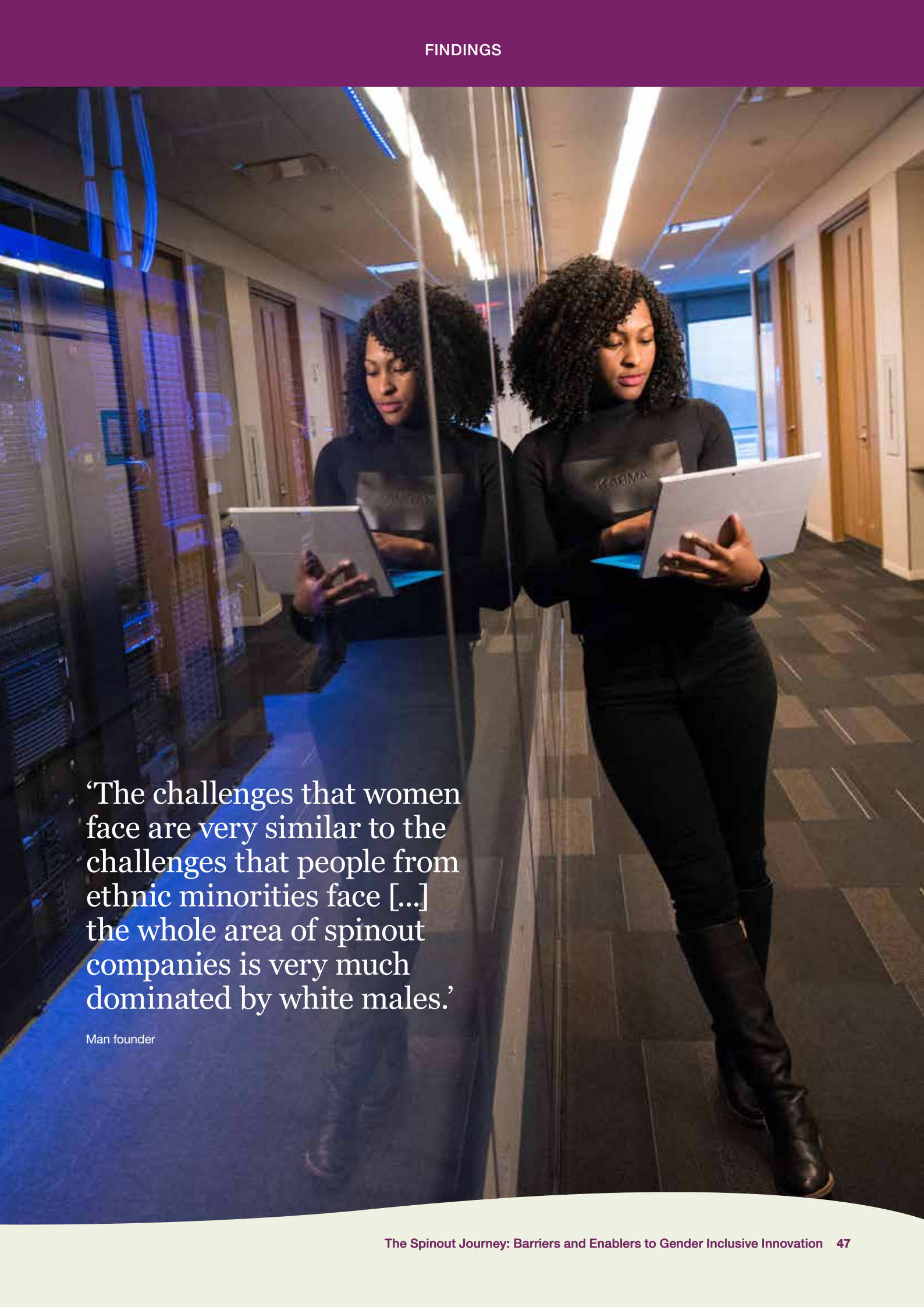
There was a recognition that the numbers of women studying STEM subjects at university was actually fairly good, considering this gendering of subjects in the early years, but at *'postdoctoral [level] it just falls off a cliff'* [Interviewee 31, man founder]. A few founders attributed this to a women's biology or *'physiology'* [Interviewee 41, man founder], whereas others stated that there is more social pressure on women to have, and look after, a family. As one older interviewee suggested, women face the dual challenge of a highly competitive academic job market combined with the social pressure to *'maintain a family life'* [Interviewee 11, man founder]. A few men suggested women should receive more support from institutions, organisations and the state to enable them to better manage work and childcare, such as funded nursery places

for children. However, many founders were at a loss to suggest concrete structural changes that institutions could make to encourage women to stay in STEM research. This may be because there was a sense across all founders that women and men have received equal opportunities in their fields, and meritocracy will ultimately achieve equality.

Yet this sex-based rationale cannot explain why researchers with other protected characteristics are underrepresented in STEM. As described in the methodology, our sample was not as diverse as we would have liked, but one man founder from a Black, Asian, and Minority Ethnic background (BAME) made a connection between the experiences of women in STEM and those from ethnic minorities:

> *'I think the challenges that women face are very similar to the challenges that people from ethnic minorities face […] The whole area of spinout companies is very much dominated by white males […] The ethnicity imbalance is worse but it's not talked about as much in statistics. Gender imbalance isn't as bad as ethnicity imbalance within STEM.'* [Interview 17, man founder]

This founder extends the narrative of STEM being dominated by men to say it is dominated by white men and he argues that more attention needs to be paid to racial inequalities within STEM research. Here gender inequality is compared to racial inequality, but it is also important to consider how the two inequalities intersect to create multiple layers of inequality for women of colour in STEM research. This quote is a reminder that more research is needed to explore the representation of BAME staff as founders of spinouts and how this experience intersects with gender and other protected characteristics.

'The challenges that women face are very similar to the challenges that people from ethnic minorities face [...] the whole area of spinout companies is very much dominated by white males.'

Man founder

Pathways to Spinout

Our findings show that there can be different pathways to spinning out a company from university research.

The journey often starts with a patent, but not in all cases. There might be intermediate steps to commercialisation such as consultancy and licensing. Public funding, such as grants provided by Innovate UK, can offer a helpful financial springboard at the early stages of the process. From the experiences of women and men founders that we have both directly interviewed and undertaken background research on, we have identified a few examples, outlined below, and highlighted key steps which illustrate such diversity.

PATHWAY 1

From university consultancy to spinout

1 Worked with the university to file a patent.

3 Having developed an in-house, well-established university consultancy, she began to set up a spinout. Having a ready-made business helped to get the spinout off the ground.

WOMAN FOUNDER

At the time of spinning out she was a fulltime academic in mid career with young children. She is currently in a full-time university executive role and company director.

2 Established a university consultancy which generated an annual turnover of approximately £250K.

4 Existing staff in the university consultancy business were transferred to the spinout company; an initial small investment was secured from a business angel, which was complemented by a revenue stream from royalties and a licence deal.

PATHWAY 2

ICURe funding: a springboard to spinout

1 Awarded funding to join the ICURe programme, which provided three months of her salary to explore potential for commercialising the research and building up the business case.

3 Left academia to become the company's full-time CEO.
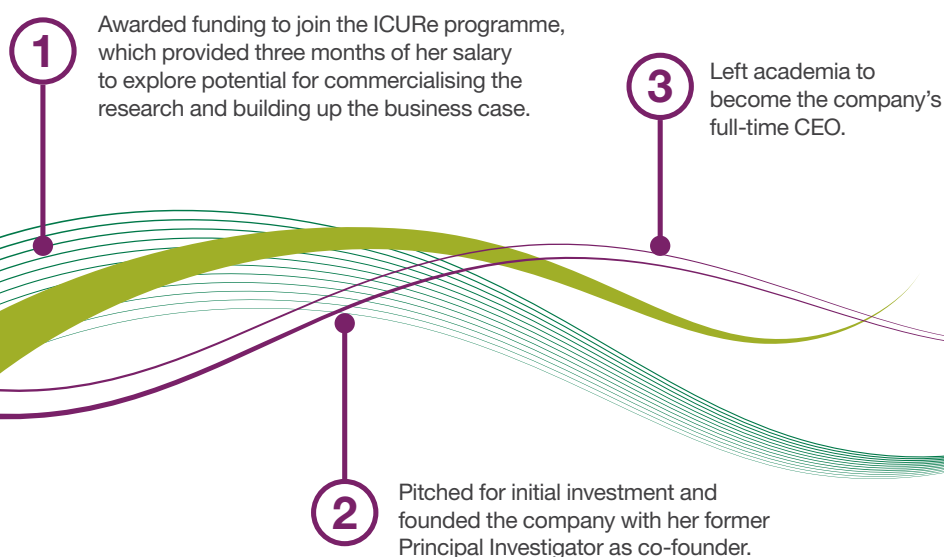
WOMAN FOUNDER

She is full-time CEO of the company, which is now in profit.

2 Pitched for initial investment and founded the company with her former Principal Investigator as co-founder.

PATHWAY 3

Working alongside a part-time CEO with experience of working with academics

1 Worked with the university to file a patent.

3 The team won a grant from Innovate UK that helped to kick-start the spinout. This was set up as a shell company for about a year while pitching to investors for about a year and a half.
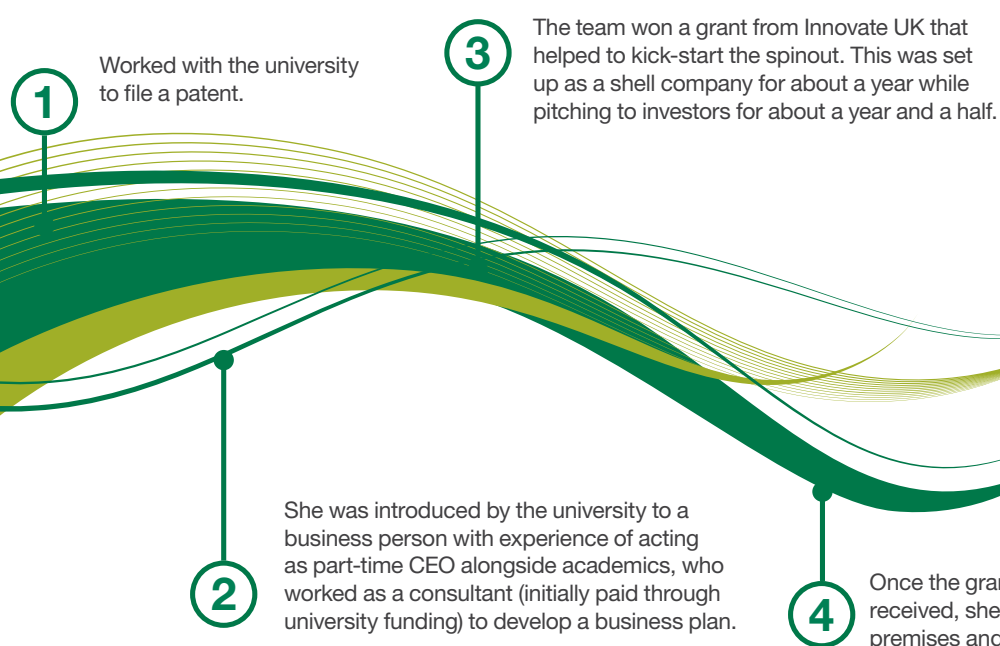
WOMAN FOUNDER

She is still a full-time academic, spending approximately half of her time in the company.

2 She was introduced by the university to a business person with experience of acting as part-time CEO alongside academics, who worked as a consultant (initially paid through university funding) to develop a business plan.

4 Once the grant and investments were received, she was able to start looking for premises and staff for the new company.

PATHWAY 4

From PhD research to spinout

1 The founder undertook courses and summer schools on the topic of entrepreneurship during her PhD and began exploring alternative career paths. She began to learn more about commercialisation from colleagues who had filed patents and her supervisor.

3 When she finished her PhD, she decided to incorporate the spinout with her co-founders, who were two senior academics from her University.

WOMAN FOUNDER

She is full-time with the spinout and is the CEO.

2 Started applying for and participating in pitching and start-up competitions, and gathered prize money.

4 Currently looking for investor offers.

PATHWAY 5

Spinning out from postdoc position

1 Worked as a Postdoctoral Researcher on an interdisciplinary project exploring multiple uses for a specific piece of scientific equipment.

3 Employed the services of a specialist consultancy firm to help with funding proposals, resulting in successfully winning a competitive industry grant.

5 Won an Innovate UK grant to set up the company, which was match-funded by the university's enterprise fund. A person who was involved in this grant application became the company CEO.

WOMAN FOUNDER

She is full-time with the spinout and is the CTO.

2 She undertook the ICURe programme to explore the market potential.

4 Undertook courses on entrepreneurial and business skills happening throughout the university.

6 Filed for a patent. Looked for further funding and received money from angel investors and research grants. Currently in their second investment round, looking for further funding. Plan to sell the company within five years.

PATHWAY 6

Spinning out from a Master's degree[7]

1 While studying for an innovation and design focused Master's, she had the initial idea for a product.

3 Raised seed investment from UK Angels for £350K and £113K social grant funding.

5 Approached the private sector for distributors and charities who may be interested in the product.

WOMAN FOUNDER

She is full-time with the spinout and is the CEO.

2 Applied for an Enterprise Fellowship after being mentored by a senior professor with experience of industry collaboration.

4 Collaborated with public services and manufacturing companies to set up production for the product and undertake testing and clinical feedback.

6 Undertook a full commercial launch alongside several trials in progress around the country. Currently exploring new markets.

7/This example was created from desk-based research of UK women founder biographies and therefore has been adapted from third party information.

Conclusion and Recommendations

The original scope of this project was to deepen our understanding of why women are underrepresented as university spinout founders, but in doing so we have inevitably come to learn more about how the spinout ecosystem serves all spinout founders.

Our conclusions and recommendations highlight inequalities within the spinout journey but also identify gaps in support that affect women and men founders alike. It is important to address these gaps in a way that is also inclusive, so that women and men have a more equal chance of success and perhaps face less challenges along the way.

An inclusive approach is critical for overcoming the instances of intersectional inequality highlighted in this report. While the scope of this project was to focus on comparing experiences of spinout founders by gender, it soon became evident that gender intersects with age and ethnicity in making sense of these accounts. Women were working against ingrained stereotypes of women in science having to look a certain way or only achieving success through virtue of their gender. There is evidence that the impact of these stereotypes is exacerbated by intersecting inequalities, with some women founders feeling misrepresented or discriminated against because of their gender and race or age. These accounts are not ubiquitous,

nor are they an everyday occurrence, but these incidents create 'accumulated disadvantage' for women and present an additional challenge for women to overcome along their spinout journey.

Upon establishing their spinouts, women and men reported similar motivations for founding a spinout, driven by their desire to address 'real world problems' and benefit individuals and society. Interestingly, women founders highlighted how the spinout – compared to their academic job – offered greater flexibility, autonomy and control to manage the needs of developing a business with their care responsibilities. This autonomy over working time and place was also appreciated by founders without childcare, suggesting that the spinout can provide an alternative and, in some cases, more inclusive career pathway that allows founders to conduct research beyond the rigidity of academic careers. This is also demonstrated in how women challenged the perception of 24-7 availability as a business necessity, and instead created alternative ways of working that enabled them to combine the spinout with other caring responsibilities.

Irrespective of gender, spinout founders cited their lack of business experience as a common challenge and discussed how valuable it was to have advisors with commercial expertise to support them throughout their spinout journey. As commercial experts tended to be men, some women commented on a lack of 'relatable mentors', calling on TTOs and the wider innovation ecosystem to review the diversity of business experts and mentors. Similarly, some women expressed concerns about bias due to their limited representation in the male-dominated investor community. They felt this affected not only their likelihood of being successful but also the amount of investment they received. This dearth of women business experts and investors meant that women's influence over their spinout companies became gradually more diluted as their companies grew. This may also explain why so few successful spinouts are led by women.

We find a more nuanced approach to perceptions of risk than the essentialist interpretation that women are simply more risk averse (Miranda et al., 2017; Oftedal, Iakovleva and Foss, 2018). Our findings suggest that perceptions of risk are influenced by a range of factors, such as career stage, family influences and personal circumstances. We also highlight that there is a dynamic, constantly changing perception of risk in the process of a spinout company. Age and career stage also seemed to be a potential barrier for younger, less experienced researchers to spinout, with TTOs seeming to value research profile and credibility as a precondition for starting a company.

Overall, the current state of academic commercialisation seems to be far from inclusive, not only in terms of the lived experiences of individuals but also in terms of the wider structures and ecosystems, where commercialisation is supposed to be nurtured. As highlighted in our previous report, the university innovation ecosystem is polarised, with 70% of spinouts originating from Russell Group Universities, primarily in the so-called 'golden triangle' of Oxford, Cambridge and London Universities

(Griffiths and Humbert, 2019). This is creating an adverse culture within the university sector as there is very little consistency across and within HEIs. There is further evidence of this inequality in this study, with founders having mixed experiences of institutional support, and policies and practices varying across time and place. Whilst this was a similar finding for women and men, women in this sample did report more challenges when patenting their research than men.

Perhaps as a consequence of these inconsistent support frameworks, we also found that spinout activity is not always recognised formally by institutions or academic colleagues, suggesting that the discourse of the spinout as a valuable activity has not been embedded in academic culture and institutional structures. There were stories of the research being produced in spinouts not being considered as legitimate as research conducted within the academy, and many early- and mid-career researchers were frustrated that their spinout activity was not being recognised within promotion criteria.

There is evidence of positive change and examples of inclusive behaviour. Founders cited public funding grants that were conditional upon the company demonstrating their equality, diversity and inclusion initiatives. There are also some areas of good practice within business incubators, with some paying special attention to creating more inclusive spaces for women and ethnic minority groups; for example, by ensuring diversity of role models and mentors who have been reported to be key in the spinout journey. There was less evidence of diversity and inclusion initiatives at institutional level and the following recommendations aim to address this by advising and supporting HEIs to adopt more inclusive policies and practices around spinning out and commercialisation of research more generally.
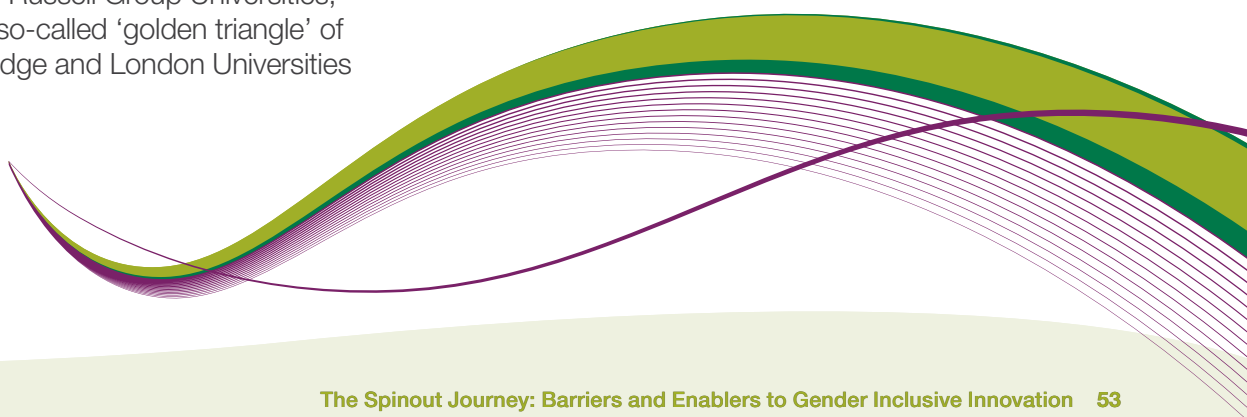
RECOMMENDATIONS

We have framed our recommendations for Higher Education Institutions within key factors that influence university spinout performance as identified by Coates (2019) and based on the work of Hayter et al (2018). These include: *academic entrepreneurship programmes, human capital, university management and policies, entrepreneurial environment, social networks* and *financial resources*. We hope that this approach will help institutions to harness in full the talent of both men and women researchers at different stages of their career, and enhance spinout performance as well as stimulating the development of gender inclusive academic entrepreneurship.

ACADEMIC ENTREPRENEURSHIP PROGRAMMES

HEIs should offer academic entrepreneurship programmes which are gender sensitive and recognise intersecting inequalities. Women founders have mixed views about women-only programmes, as they are concerned that these are about 'fixing the women' rather than tackling structural barriers. Whatever approach institutions intend to take, it is important that academic entrepreneurship programmes are gender sensitive (e.g. use of diverse images, examples, role models etc.) and are integrated in early- and mid-career development initiatives.

Ensure that the role of Technology Transfer Offices (TTOs) is clearly communicated and featured in entrepreneurship programmes. Provide TTOs with equality training set in the context of academic entrepreneurship and of establishing a spinout company, to explore equality issues within the innovation ecosystem. Be vigilant against bias.

HUMAN CAPITAL

Support the development of networks of 'relatable mentors'. Helping women researchers in the process of spinning out – or considering commercialising their research – to connect with other women who have gone through a similar experience, either within or outside academia. Entrepreneurial alumni can provide a pool of 'relatable mentors' from the wider business community.

HEIs should facilitate the development of more diverse and gender balanced spinout teams. TTOs should be encouraged to foster more diverse networks of expertise and seek out emerging talent to extend existing pools of advisers and potential board members.

Enhance visibility of women founders as role models, including women from diverse backgrounds who have successfully spun out across different career paths and at different stages of their careers.

UNIVERSITY MANAGEMENT AND POLICIES

HEIs should review their processes and structures on research commercialisation to ensure that all individuals have equal opportunities in accessing and getting support for their ideas, irrespective of age, gender, ethnic identity and other individual characteristics.

HEIs should reflect on the flexibility of available career pathways and provide space and opportunities to accommodate inclusive and alternative career routes, including academic entrepreneurship and spinout leadership. They should also consider how academic entrepreneurship and the establishment of spinout companies are properly recognised, valued and rewarded in the academic promotion process.

Commercialisation of research and spinout-related activities should be recognised through appropriate time allocation within an academic workload. Institutional policies and practices should be developed to allow researchers to balance an academic career with commercialisation of research and spinout leadership (e.g. sabbaticals, fellowships at critical times to explore business viability) along with personal life.

ENTREPRENEURIAL ENVIRONMENT

HEIs should take steps to promote a gender-inclusive entrepreneurial environment by: monitoring activities linked to commercialisation of research and innovation, such as consultancies, patent applications, spinout by gender and other equality-related characteristics; giving greater visibility to diverse role models. They should also consider how inclusive academic entrepreneurship is promoted across different departments.

HEIs should take a lead and work with key stakeholders within local innovation ecosystems to ensure that they become more gender inclusive. Institutional and external ecosystems, such as investment, that are highly male dominated can reinforce each other through lack of diversity.

SOCIAL NETWORKS

It is important to provide greater opportunities for researchers, and especially ECRs, to interact with businesses through the development of networks. Draw on entrepreneurial alumni to facilitate connection with businesses and industry.

FINANCIAL RESOURCES

HEIs should clearly communicate different sources of financial support for academic entrepreneurial activities and spinouts.

HEIs should work with the investment community to set up specific funding opportunities aimed at women researchers who wish to set up a spinout company.
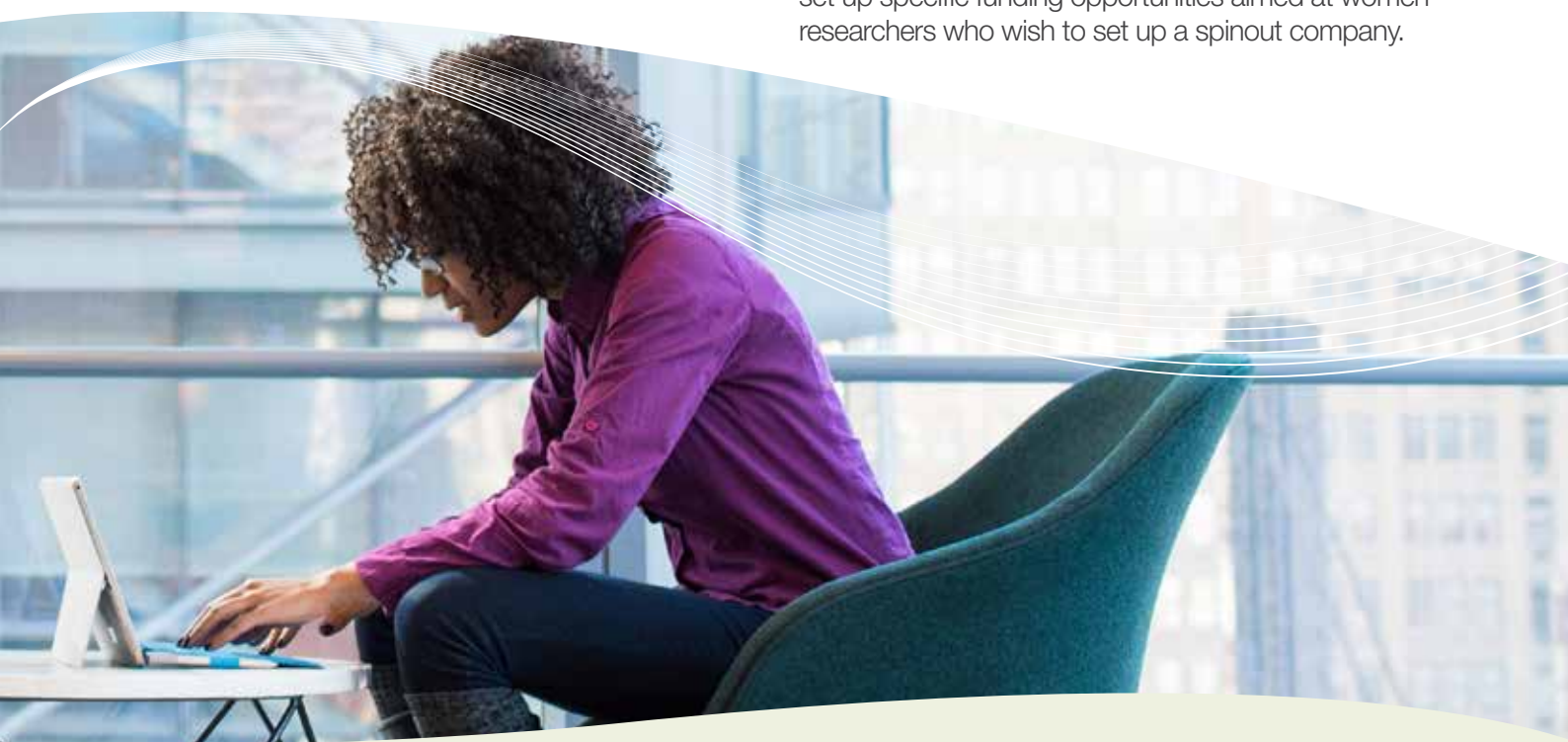
Next Steps

This report summarises the second phase of this mixed methods research project, funded by the EPSRC and conducted by The Centre for Diversity Policy Research and Practice at Oxford Brookes University, in collaboration with the University of Oxford.

This report is the second in a series of three reports in which we have aimed to provide a holistic view of the spinout landscape in the UK from the perspectives of women and men within the spinout pipeline.

The findings and learnings from both reports will inform the final stage of data analysis in which focus groups have been undertaken in universities across the UK. These focus groups consisted largely of Early Career Researchers, with input from mid-career academics, with a view to understanding the barriers and enablers to spinning out, from the perspective of STEM researchers who are considering the commercialisation of their research but may not yet be ready to do so. Through this analysis, we aim to gauge the level of awareness and knowledge dissemination that exists about spinouts and explore how research commercialisation is perceived by researchers at varying stages of their career. Findings from the focus-groups will supplement the recommendations made in this report to further support HEIs and external stakeholders to create a more inclusive spinouts ecosystem. This complete set of recommendations will aim to increase the level of engagement with spinouts from academics at all levels by ensuring there is greater knowledge exchange, reduced uncertainty surrounding the process of research commercialisation and an increase in inclusive initiatives to garner further interest in developing spinout companies.

In the final phase of the project, a competencies framework will be developed as part of a set of interventions designed to build institutional capabilities. Rather than focus on the skills and personal attributes spinout founders may need to cultivate, the framework will emphasise areas where institutions can support founders in their spinout journey and, vitally, how they can encourage more women into the spinout ecosystem and increase diversity.

The project has a dedicated webpage[8] where the project outputs can be found, including reports, profiles of and insights from inspiring women founders, podcasts and videos providing tips for developing a spinout company and blogs about key topics and events in the field of research commercialisation.

Ultimately, this project hopes to promote academic entrepreneurialism at the institutional level by encouraging senior leaders and key stakeholders to foster an inclusive environment for enterprise. The recommendations from each report aim to not only improve the underrepresentation of women in spinouts but also aid institutions to ensure women spinout founders are supported to grow their business by reviewing commercialisation policies and practices through the lens of gender.

8/www.brookes.ac.uk/women-and-spinouts

Women interviewees

Interview number	Sex	Age in 2019	Education	Sector (as per HESA groupings)	Spinout University-Russell Group or other mission groups	Role in spinout	Year of incorp-oration	Age at time of incorp-oration	Still academic or full-time spinout?	Career stage at time of spinout[9]
Interview 1	W	44	PhD in Molecular Biology	Biology, Maths and physical sciences	Russell Group	Co-founder and CEO	2015	40	Full-time spinout	Early career
Interview 3	W	33	PhD in Medicinal Chemistry and Biomaterials	Biology, Maths and physical sciences/Engineering and technology/Medicine, dentistry and health	Russell Group	CSO and co-founder	2017	31	Still academic	Early career
Interview 4	W	43	PhD in Biomaterial Sciences	Biology, Maths and physical sciences/Engineering and technology/Medicine, dentistry and health	Russell Group	CEO and Founder	2015	39	Still academic	Mid-career
Interview 5	W	29	PhD in Physics	Biology, Maths and physical sciences/Medicine, dentistry and health	Russell Group	CTO and co-founder	2018	28	Full-time spinout	Early career
Interview 8	W	41	PhD in Organic Chemistry	Biology, Maths and physical sciences/Medicine, dentistry and health	Russell Group	Co-founder	2011	33	Still academic	Early career
Interview 10	W	46	PhD in Pharmaceutics	Medicine, dentistry and health	Other mission group	Founder	2016	43	Still academic	Mid-career
Interview 12	W	36	PhD in Physics	Biology, Maths and physical sciences/Engineering and technology	Russell Group	Founder and CEO	2015	32	Full-time spinout	Working outside of academia returned to former university for collaboration
Interview 13	W	70	PhD in Biochemistry	Medicine, dentistry and health	Other mission group	Co-founder	2003	54	Still academic	Senior academic
Interview 14	W	74	PhD in Chemistry	Engineering and technology	Russell Group	Founder and Chairperson	2010	65	Still academic	Senior academic
Interview 19	W	52	PhD in Structural Engineering	Engineering and technology	Russell Group	Co-founder	2007	40	Still academic	Mid-career
Interview 20	W	36	PhD in Biomechanics	Engineering and technology/Medicine, dentistry and health	Russell Group	Founder and Director	2012	29	Full-time spinout	Early career
Interview 23	W	62	PhD in Virology	Biology, Maths and physical sciences	Other mission group	Co-founder	2017	60	Full-time spinout	Senior academic
Interview 24	W	30	PhD in Biochemistry	Biology, Maths and physical sciences	Russell Group	CEO and co-founder	2016	27	Full-time spinout	Early career
Interview 26	W	53	PhD in Biochemistry	Biology, Maths and physical sciences/Medicine, dentistry and health	Russell Group	Co-founder and CSO	2015	49	Still academic	Mid-career
Interview 27	W	60	PhD in Molecular Virology	Biology, Maths and physical sciences	Other mission group	Board member and founder	2006	47	Still academic	Mid-career
Interview 28	W	42	PhD in Physics	Biology, Maths and physical sciences	Russell Group	Co-founder and Director	2012		Spinout located within the university-collaborative	Early career
Interview 32	W	43	PhD in Mechanical Engineering	Engineering and technology	Other mission group	Co-founder and CEO	2017	41	Full-time spinout	Working in innovation consultancy
Interview 34	W	28	PhD in Chemical Engineering	Biology, Maths and physical sciences	Russell Group	Co-founder and CEO	2017	26	Full-time spinout	Early career
Interview 36	W	40	PhD in Mechanical Engineering	Engineering and technology/Medicine, dentistry and health	Russell Group	Co-founder	2011	32	Still academic	Mid-career
Interview 37	W	48	PhD in Immunology	Medicine, dentistry and health	Other mission group	Founder, CEO and CSO	2004	33	Full-time spinout	Early career

[9] Early career researcher (ECR) is defined here as anyone undertaking a PhD or post PhD position, mid-career is defined as lecturer, senior lecturer, reader positions or associate professors and senior academics are defined as full professors, and heads of department/faculties.

Men interviewees

Interview number	Sex	Age in 2019	Education	Sector (as per HESA groupings)	Spinout University-Russell Group or other mission groups	Role in spinout	Year of incorp-oration	Age at time of incorp-oration	Still academic or full-time spinout?	Career stage at time of spinout[10]
Interview 6	M	77	PhD in Physics	Biology, Maths and physical sciences/Engineering and technology	Russell Group	Founder and Scientific Advisor	2005/2011	63/69	Full-time spinout/retired	Senior academic
Interview 11	M	68	PhD in Chemistry	Biology, Maths and physical sciences	Russell Group	Founder	2005	54	Still academic	Senior academic
Interview 15	M	49	PhD in Solar Energy Research	Biology, Maths and physical sciences/Engineering and technology	Other mission group	Co-founder	2013	43	Still academic	Mid-career
Interview 16	M	45	PhD in Large Scale Information Integration	Engineering and technology	Russell Group	Chief Innovation Officer, Co-Founder and Director	2012	38	Full-time spinout	Founder/Director of another spinout company
Interview 17	M	55	PhD in Surface Science	Biology, Maths and physical sciences/Engineering and technology	Russell Group	Founder	2001	37	Still academic	Mid-career
Interview 21	M	39	PhD in Intelligent Signal Processing	Engineering and technology/Medicine, dentistry and health	Other mission group	Founder and CEO	2016	36	Still academic	Senior academic
Interview 29	M	59	PhD in Electrochemical Engineering	Biology, Maths and physical sciences/Engineering and technology	Russell Group	Founder	2001	41	Still academic	Senior academic
Interview 30	M	49	PhD in Coal Combustion	Biology, Maths and physical sciences/Engineering and technology	Russell Group	Founder	2007	37	Still academic	Senior academic
Interview 31	M	31	PhD Physics	Biology, Maths and physical sciences	Russell Group	Managing director and co-founder	2018	30	Still academic	Early career
Interview 33	M	27	PhD Nanoscience Engineering	Engineering and technology	Russell Group	Founder and CEO	2018	26	Full-time spinout	Working outside of academia construction consultancy[11]
Interview 38	M	41	PhD in Medical Devices	Engineering and technology/Medicine, dentistry and health	Russell Group	Co-founder and CEO	2015	37	Full-time spinout	Early career
Interview 40	M	53	PhD in Electrical & Electronic Engineering	Engineering and technology, Biology	Russell Group	Non-Executive Director/Founder	2008	42	Still an academic	Mid-career
Interview 41	M	74	PhD Electrical Engineering	Engineering and technology, Biology, Medicine, dentistry and health	Russell Group	Chairman/Founder	2006	61	Still an academic	Senior academic
Interview 42	M	50	PhD Engineering Physics/Applied Physics	Engineering and technology/Maths and physical sciences	Russell Group	Founder/non-executive director	2005/2017	36/48	Still an academic	Senior academic
Interview 43	M	32	PhD in Composite Materials	Engineering and technology, Maths and physical sciences	Russell Group	CTO	2018	31	Still an academic	Early career

Key informant interviewees

Interview number	Sex	Capacity/Function/Responsibility	Sector (as per HESA groupings)
Interview 2	W	Operations Manager	Business Incubator
Interview 7	W	Head of Commercialisation	University
Interview 9	W	Investment and Commercialisation Manager	University
Interview 18	M	Commercialisation and Knowledge Exchange	University
Interview 22	W	Project Officer	Regulating body
Interview 25	W	Head of Investment	University Technology Transfer Office
Interview 35	M	Associate Dean of Research and Knowledge Exchange	University
Interview 39	W	Partner – Corporate Finance	Law firm

[10] Early career researcher (ECR) is defined here as anyone undertaking a PhD or post PhD position; mid-career is defined as lecturer, senior lecturer, reader positions or associate professors; and senior academics are defined as full professors, and heads of department/faculties.

[11] This participant was previously involved in the ICURe programme during their PhD and returned to the university to spinout once the idea became more viable.

Successful spinout interview questions

YOUR PROFESSIONAL BACKGROUND

1. Can you tell us about yourself, your background and career history (qualifications, employment etc.)?

THE JOURNEY TO SPINOUT

2. What is your spinout company about?

3. Can you tell us about your journey to founding/governing your spinout?

4. What has been your motivation to found or co-found a spinout?

5. What would you say have been critical factors and/or people (e.g. colleagues, relatives, role models, networks) to your success?

6. And the biggest challenges that you have faced? How did you overcome them?

7. As an entrepreneur, what do you believe are the most important characteristics that an entrepreneur must have?

8. How would you characterise a successful spinout?

INSTITUTIONAL/STRUCTURAL CONTEXT

9. Have you faced any institutional barriers along your journey to founding/governing a spinout?

10. What has your experience with TTOs (university technology transfer offices) been like?

11. In your experience, what are the most important relationship(s) that you have had that have helped you with founding or governing your spinout company?

12. In your view, are there any relationships that you didn't have that you believe would have helped you at the time?

13. What has your access to funding been like and at what stage did investors get involved in the process of founding your company?

14. Have you had any experience with venture capital companies?

15. Women scientists, engineers and mathematicians are currently under-represented among founders or co-founders of spinout companies. In your view, what can universities can do to increase women's representation among founders/co-founders of spinout companies?

YOUR SPINOUT TODAY

16. Do you have an active role currently in the company? Or if not now, did you at first? If yes – what is/was it?

17. Could you tell us a bit about the directors in your spinout; who they are, background and what they do?

18. What are the future plans for your spinout?

CONCLUSION

19. What would be your message to fellow academics about founding a spinout?

20. Is there anything else that you would like to add that you think would be relevant to this study?

Key informants interview questions (Technology Transfer Officers or senior academics with knowledge of knowledge exchange)

BACKGROUND

1. Can you tell us a bit about your role and what you do?

SPINOUT PROCESS

2. Can you tell us what process an academic would typically go through to found a spinout company?

3. How do you support academics with setting up their spinout companies?

4. At what stage of an academic career do people tend to commercialise their research? (apply for patents and/or set up a spinout)?

THE ENTREPRENEURS

5. In your experience have you observed any significant differences in the number of men and women setting up spinouts?

6. In your experience, do women and men founders differ in terms of their backgrounds and career history? If yes, in what ways?

7. In your experience do women and men founders tend to have similar levels of grant funding?

8. What do you think motivates academics to spinout?

9. How would you describe a successful spinout founder? In your view what characteristics/ behaviours do they tend to have?

10. What, in your opinion, are the biggest challenges for founding spinout companies?

11. Do you think that women and men academics face these challenges equally?

12. Research suggests that in general economy, men setting up businesses are more likely to attract higher levels of investments; based on your experience do you think that this is true of spinout companies?

SOLUTIONS

13. Do TTOs/ universities/[insert other job area of interviewee] gender proof their policies and procedures, for example monitor for unconscious bias and monitor outcomes relating to the commercialisation of research by gender?

14. What do you think universities can do to increase women's representation among founders/co-founders of spinout companies?

CONCLUSION

15. Is there anything else that you would like to add that you think would be relevant to this study?

Key informants interview questions (investors)

BACKGROUND

1. Can you tell us a bit about your role and what you do?

SPINOUT PROCESS

2. Can you tell us what process an academic would typically go through to apply for and gain funding?

3. How do you support academics with setting up their spinout companies or achieving their business objectives?

4. In your experience, at what stage of an academic career do people tend to commercialise their research?

THE ENTREPRENEURS

5. What characteristics do you look for in an academic founder with no track record of business?

6. Initial findings suggest that women and men founders tend to ask for different levels of grant funding and/or other forms of investment – have you seen any differences?

7. What do you think motivates academics to spinout?

8. What, in your opinion, are the biggest challenges for founding spinout companies?

9. Do you think that women and men academics face these challenges equally?

10. Research suggests that in general economy men setting up businesses are more likely to attract higher levels of investments; based on your experience do you think that this is true of spinout companies?

SOLUTIONS

11. Do TTOs/universities/investors gender proof their policies and procedures, for example monitor for unconscious bias and monitor outcomes relating to the commercialisation of research by gender?

12. What do you think universities and/or investors can do to increase women's representation among founders/co-founders of spinout companies?

CONCLUSION

13. Is there anything else that you would like to add that you think would be relevant to this study?

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