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Are New Career Models for Science Research Emerging?

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ABSTRACT

This paper explores how the traditional gendered model of science excellence impacts on the careers of women scientists. Using an Australian case study, it then examines the following aspects of science careers: what gives scientists job satisfaction; differing perceptions of how to build science careers; how networks, mobility and mentoring are fundamental to research careers; how gender is often a factor in science research careers; and huge generational change underway that is leading to new career models. The paper argues that these new models have the capacity to change the traditional gendered model of science careers.

Keywords: gender, higher education, career paths in science, new career models

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INTRODUCTION

This paper explores how the traditional gendered model of science excellence impacts on the careers of women scientists. Using an Australian case study, it then examines the following aspects of science careers: what gives scientists job satisfaction; differing perceptions of how to build science careers; how networks, mobility and mentoring are fundamental to research careers; how gender is often a factor in science research careers; and the capacity of generational change to lead to new career models.

Elements of what is measured as excellence in science include scientific productivity, citation indexes, peer review, internationalisation of research which requires researchers to be mobile, and membership of influential editorial and committee boards (González Ramos et al., 2013). However, the notion of scientific excellence is socially constructed (van den Brink & Benschop, 2012). Etzkowitz et al. (1994, p. 65) argue that by accepting 'various parochial ways of conceptualising, investigating, and organising the conduct of science, significant sectors of the population have been excluded from full participation', especially women. Moir (2006, p. 8) asserts that a successful scientist is assumed to be male – although this may be questioned in some disciplines such as life sciences and in some countries - and that this construction can result in gender-blind rhetoric that 'presumes the role of professional scientists is virtually immutable given that science is taken to be the very male model of the rational pursuit of objective scientific knowledge that requires dedication to long hours of laboratory work. To try and change this role would be ... almost tantamount to attempting to interfere with the very objective nature of science itself'.

The long-hours work culture, the power of heads of laboratories in making or breaking careers (Stark, 2008; Sekreta, 2006), and a funding model that does not encourage part-time work all make it difficult for young scientists to build their careers. Add to this direct and indirect gender discrimination of women (Bell, 2009; Fouad & Singh, 2011) and it is clear that science research is a challenging career for women. This gender bias is evident in a scientific excellence system that fails to integrate women into scientific networks, lack of gender balance among gatekeepers, and application of different criteria for women (genSET, 2010).
The traditional model of science excellence places great emphasis on networking. One of the key issues for building science research careers is the role networks play in women's and men's promotion in science research institutes (Sabatier et al., 2006; Wroblewski, 2010; Sagebiel et al., 2011), and whether or not women have the same opportunity as male colleagues to be introduced to them. As part of this networking, the mobility of scientists to take advantage of international networking opportunities is critical (Zippel, 2017).

There is little evidence in the literature of change in this traditional model of science research. For example, Caprile's (2012) meta-analysis of gender and science research did not identify any significant change in how younger scientists wished to

do science. However, an AWIS (2012) survey did indicate that generational change in building science careers was an important issue.

METHODOLOGY

This research is a case study of a sample of women and men who were researchers in a large Australian research institute attached to a research-intensive university. It used a purposive sample to identify categories of staff to be interviewed. The categories identified in discussion with the institute Director and the Equality in Science Committee were PhD students in the third year of their candidature, early post docs, mid-career postdocs, and senior principal investigators/lab heads/divisional heads. Within each of these categories a stratified systematic random sample was used in order to ensure the sample was not biased. However, in one sub-category — PIs/lab heads — a higher density of sampling was required in order to understand issues for the career progression and underrepresentation of women at this level. The draft interview schedule was circulated for comment to the members of the institute's Equality in Science Committee who provided valuable feedback that enabled it to be further developed before interviews were conducted. Forty interviews were conducted with male and female research scientists in the institute. A list of employees was provided by human resources. Prospective interviewees were emailed. Less than 30 per cent of those approached declined to participate; these were mostly PhD students and postdocs. Few research fellows declined the invitation. Gender was not a characteristic of those who declined to be interviewed. Once they had agreed to be interviewed, the plain language information statement, consent form and interview schedule (see Appendix 1) were sent to them prior to the interview. Most of the interviews were conducted in meeting rooms at the Institute, but PIs/lab heads preferred to be interviewed in their office.

Interviewees were asked what gave them most job satisfaction, what internal and external factors impacted on career progression and how important was financial reward. Other questions looked at the impact of career disruption on career progression, the challenges for building careers for women and men who have family responsibilities or who wish to have children, the perceived and actual barriers to promotion, and how measures of success could be redefined (Caprile, 2012). They were asked if mobility can be more difficult for women in science, as suggested by Ackers (2010) and Zippel (2017), and, given that mentoring can also play a crucial role in building networks (Sagebiel et al., 2011), about their experience of mentoring and being mentored and its relevance to career progression (Dever et al., 2008).

As well, interviewees were asked about strategies required to ensure that women undertaking science PhDs and in the early career research phase had the same mentoring and support as their male colleagues, given this is the time when they are likely to start a family (Caprile, 2012; Cory, 2011), and what would be effective initiatives to improve the position of women in science.

The interviews lasted between half an hour and two hours, with those of more senior staff being longer than those of PhD students and early career postdocs.

They were then transcribed, but information that was repetitive or not relevant to the research focus on career progression and gender was not included. The interviews were analysed using qualitative content analysis. The data was coded into the following pre-determined categories: building science careers, job satisfaction, career progression, mobility, organisational culture, dual careers, work-life balance, career progression of women and disparity of outcomes, strategies to enable women with care responsibilities to stay in science research, and new models for science research careers. During this content analysis it was clear that generational change also needed to be included as a separate category. The data relating to each of the categories was then compared, looking for similarities, patterns and differences (Miles & Huberman, 1994).

KEY FINDINGS

There were five key findings of this research. These findings questioned the traditional gendered model of science excellence, especially its relevance to younger men and women in science research and indicated significant changes in career patterns were underway.

The first finding was that scientists are passionate and single-minded about doing science. Science is one of those professions, similar to a religious vocation, where people demonstrate such extraordinary commitment to what they do. Unlike a *Nature* survey (Russo, 2010), the research scientists in this study did not identify 'guidance received from superiors or co-workers' as the biggest influence overall on satisfaction levels, although they did regard mentoring and being mentored as crucial to building careers. Nor did respondents place much importance on financial reward: 'I don't see financial reward as the be all and end all. In life, you have to do things you are passionate about, and that is my primary aim. I get paid enough', and 'Money was never important to me at all because I really liked the job'. Another respondent whose friends went into financial services said: 'I don't think it is helpful to compare science salaries with city banking salaries'.

Rather, it was the excitement of being at new frontiers of science, at the edge of new discoveries, and in an important scientific field that drove their passion and gave them most satisfaction. Interviewees talked about 'really big questions' that needed to be answered, 'doing things that no one has ever done before', and the thrill of 'seeing the data come through for the first time'. The excitement was also important: 'it is an incredibly exciting time' and there was the 'fun' of getting results. This single-mindedness did at times seem to have a religious edge to it, and this research coined the phrase 'monastic male' to describe the model of the ideal type of scientist favoured by research bodies and funding bodies in Australia. According to some senior researchers, this single-mindedness was absolutely essential for effective career progression in science. One commented: 'I think when you are younger you can be very driven … I see that in my staff and I encourage them to do that, to be competitive and tick all the career point boxes'. Another added: 'the science gives me the greatest satisfaction … the satisfaction of pitching a question, seeing the results come through. I love interacting with my staff and the young people and the motivation that comes from that'.

But the corollary of the ideal scientist as the monastic male is that scientists are not distracted from doing science and certainly do not have families. Therefore, according to this thinking, scientists exist in a rarefied environment like a religious order with little contact with the outside world. But the model is seriously flawed. Men and women in science research do have families, partners, children, and wide circles of friends who are not scientists. One interviewee spoke of 'all my friends who did not stay in science'. Moreover, the younger men and women in this case study are often in relationships with each other where both parties are trying to push forward with their careers at the same time (cf. Dubach et al., 2012). This model of the ideal scientist produces particular difficulties for women in science. Take, for example, the view of the following younger researcher: "there's definitely a sense of the institute as an old man's club … taking time off for children is obviously a major impact. I know there is an attitude among some of the senior people that you can choose, you can have a career or you can have children but you can't have both'. It was therefore unsurprising that women in the institute with or without interrupted careers often did not experience rates of career progression comparable to male colleagues, similar to Caprile's (2012) findings.

A second finding was that an understanding of how to build science careers largely depended on where scientists were in their career trajectory, and there were some gender differences. PhD students had not considered their future career development; for example: 'At the moment I don't know if it is the preferred career path', while another talked of 'starting to keep my eyes open for different opportunities even though I have not given up on research yet'. In contrast early career researchers demonstrated more awareness of what a science research career entailed, and some were already looking at the next career move, with comments such as 'being a postdoc in a research institute … is definitely my career path', and 'continuing on into my postdoc position was exactly the direction I was wanting to go'. At senior research officer level respondents were on track to becoming independent researchers; one talked about being 'given a bit of independence' while all mentioned strong mentoring and support from supervisors, as well as hard work and long hours, as key to their success. Research fellows had mostly consolidated their career, but uncertain funding remained a concern, with one commenting that further promotion would make it easier for them 'to get money' and another emphasising the importance of funding 'in terms of keeping people on in your team'. There was evidence of generational differences here.

Those research fellows now in their fifties appeared to have reached what Riordan (2011) calls career plateauing, and were content with what they had achieved, whereas younger research fellows felt the heavy weight of their responsibilities and the long hours involved. Moreover, senior women often saw future career development as problematic, citing lack of transparency in processes, especially around promotion, and lack of support for career development, one asserting that younger women 'need to know they are good and have got a voice and that their work is appreciated', reflecting other research about the gendering of academic careers that occurs early on (Dever et al., 2009). Consequently, while there was a high proportion of women as PhD students and post-grads 'it is not translating into

senior appointments', according to one interviewee, which concurs with the findings of Bagilhole and White (2011) in relation to women in university management.

A third finding was that networks, mobility and mentoring were fundamental to building science research careers. Moreover, all three were linked. Building research networks nationally, but more importantly internationally, is essential to becoming an independent researcher. In order to build international networks early career science researchers need to be mobile. Australia's geographic isolation becomes a challenge. In Europe, for example, researchers generally need to take only a short flight to participate in a conference or visit a lab. But for Australian science researchers accessing these networks entails a costly 24-hour flight. Most young researchers in this study needed to go where the top science in their field is carried out—either in the United States or in Europe. Given the large distances involved, it was not possible to take up a post doc in a lab in these countries unless they relocated for several years. However, most were able to use skype and the internet to maintain contact with researchers in other countries. One explained: 'I need a virtual presence. I need my information on the net … I don't know if the "powers that be" appreciate the internet as a virtual space'; another thought that 'the expectation that young scientists go overseas and prove themselves is a bit of an outdated way of thinking. Maybe in the past, before we had email'.

Interviewees agreed that mobility was critical in building international research networks, describing mobility as 'very important' and 'One of the requirements for the fellowship above my level specifically says you have had to work overseas', emphasising the role of funding bodies in this focus on mobility. Senior researchers had usually spent several years overseas in some of the most prestigious labs, developed a number of important international collaborations and then had an accelerated career path on their return to Australia. There were also younger scientists who had come to the institute from Europe as part of their career development.

It was clear that these models of mobility can be highly gendered because they presuppose that an early career researcher is not in a relationship, does not have a partner who also has a career, and has no children. Women in the case study generally had fewer opportunities to take up postdocs overseas because the point at which this became important to career progression often coincided with the time they were in relationships and wished to have children.

The focus on mobility in this study is important. One interviewee thought mobility 'makes it difficult for a woman in her thirties who is thinking of having a family; you don't necessarily want to shift your life over to the [United] States for five years. If you have got a young family it is even harder'. Several women said that while mobility was critical, it was not possible for them to uproot their family and move to an overseas lab. Some had therefore begun looking at alternative careers in science. Others decided to combine research with clinical practice and some were looking for career opportunities in communicating science, suggesting that institutions need to define, support and equally value new career pathways in science research (Barakat, 2014). However, several women did manage, with

partners and families, to do an overseas post doc and as a result had benefited in their career progression, reflecting Zippel's (2017) findings; for example: 'the effect of me doing a post doc in the US has been more important to others than me … it is like a box has been ticked'. However, other models of mobility were suggested by research fellows that were more flexible and included short assignments—three to six months—in labs overseas developing collaborations or learning new techniques; or attaching a visit to a lab to presenting at an overseas conference.

Mentoring was considered essential at all levels in the institute. Most PhD students and early career researchers believed that they were provided with good mentoring. The students' society conducted an informal mentoring program where PhD students were paired up with postdocs. Several found this mentoring beneficial: 'It was nice to talk with someone about how to structure your career. My mentor really reinforced the importance of going overseas', and: 'I have had a couple of mentors who have been really good and helpful, just in feedback about where I am going and where I am sitting in my PhD, and what to aim for and what is achievable'. While some respondents considered there were no differences in the mentoring men and women received ('I haven't really noticed any difference between the mentoring and support that women and men get in our group'), others thought women needed active mentoring in the early career phase to ensure they did not leave science research. One argued:

> "Given the majority of women are going to want to have children; some active mentorship on that, what to put on their resumes, what they can do to keep the papers ticking over while they are away. There is a distinct lack of women who have had children and come back."

A fourth finding was that gender was often a factor in building career paths in science research. Gender was played out in several ways; for example, some scientists had a tendency to blame the women themselves: 'women tend not to have the confidence in science, particularly when applying for promotions', and women lacked forcefulness. Another strong narrative was around gender and choice. Several senior researchers believed that women had a choice to be a research scientist or to be a mother but could not do both. One argued that women having a career break put 'lead in the saddle' and a second recalled how they had 'heard people say in *this* building from our senior levels of staff that a woman has a choice, she can have a career or she can have a family'.

Gender was most evident in the under-representation of women in senior positions in the institute. Both men and women saw the absence of senior women as relating to an organisational culture that supports homosociability, the tendency to select people like yourself, and homophilous networks – that is, networks promoting those with comparable attributes to themselves (Grummell et al., 2009). This homosociability seemed to be under-pinned by managerialism that increasingly characterises higher education leadership (Lynch et al., 2012). It can be highly gendered (Witz & Savage, 1992) and thus can exclude women from senior positions. Some interviewees noted 'there's definitely a boys/girls' club' and being part of that group 'can help your career'. Another interviewee expanded on this theme:

> "Science is a boy's club, always been a boy's club; hopefully it won't be but it is at the moment. The majority of people in senior positions and even moderately senior positions are men. They have a nature of relating to their students and their juniors which in the end has more to do with a football club rather than most well organised workplaces."

There was little room for career advancement for younger scientists in this boy's club: 'a pretty male dominated little group. You almost have to wait for people to leave or retire, because you can have your own little empire and until that person retires they can largely control their empire'.

The absence of women in senior science research is not just an issue for the institute in this study; it is widespread in science organisations. As Caprile (2012, p.16) asserts: 'women remain more severely underrepresented among research than among other highly qualified professionals'. The absence of senior women at one campus of the institute was noted by several interviewees as an embarrassment; it needed 'some strong senior females who run labs, because you always need people to look up to'. Some women and men questioned the transparency of the institute, particularly in relation to promotions, and did not consider women were always given the encouragement they needed to move to more senior roles. One younger researcher observed: 'I have been here long enough to see women and some men fall through the leaky pipeline. I think male leaders favour people who look like them. Hence, young men are promoted'. The impact of a culture that was extremely competitive and which could at times appear to be discriminatory to women was to produce a sense of fatigue and discouragement for some women trying to consolidate their careers, as one who had young children and worked part-time described: 'the only way I can possibly succeed is to work like a man. I am not going to do that'.

While supervisors were aware of the adverse impact of interrupted careers for women—and men—on career progression, they maintained that the funding model and extreme competitiveness it created limited their effectiveness in helping women to plan for and return from maternity leave. But senior researchers did actively mentor women who took maternity leave; their frustration was that 'the best co-managed plan will not necessarily succeed' when 'any gaps in track record are used to whittle down the field' in applying for grants and fellowships, while another explained that 'those who have the drive and the intellect and can manage thinking for themselves, and can write grants etc., then obviously there is going to be a frustration point when they are dropping behind (their peers) depending on the number of children they have or the amount of maternity leave they take'. Nevertheless, some argued strongly that the institute needed to be creative in developing strategies to retain women scientists. For example, one suggested that the institute should set aside funding 'so that these particular women don't fall through the cracks'.

The most significant finding was the huge generational change that is underway in science research. In the present study younger research scientists wished to

debunk the myth of the monastic male scientist as out-dated and incompatible with how they wish to do science. The myth was initially based on the premise that the successful male scientist had no other responsibilities. Rather, doing science was akin to a vocation. The myth was then adjusted to the male who had a supportive partner who sacrificed her career for his career. That female partner either did not work or worked in jobs that allowed them to take most of the responsibility for home and family, so that the primary breadwinner could work 14-hour days, travel overseas, and have little responsibility for family life. But this traditional model of the science researcher is now an anachronism. Instead, as Moir (2006, p.8) argues: 'in the discourse of scientific practice, we need to re-calibrate the work-life balance scales by first recognising the ways in which the normative male model of scientific work practice is held in place … It is not that work-life balance is the problematic issue for women in science but rather the very ground upon which the scales stand'. Younger men and women simply rejected this traditional science construct of masculinity.

In its place, much more fluid roles for men and women in science research were emerging, as Gen X and Gen Y challenged the Baby Boomers who were still in leadership positions at the institute. Younger female and male researchers rejected any simplistic dichotomy of career or children, and argued that the discussion needed to change from choices and work-life balance as a personal issue, to questioning scientific practice and the assumption that a successful scientist is a monastic male: younger scientists 'want to have more balance in their lives and be more involved with their family' but encountered the expectations of older researchers 'that they should be doing it the way it has always been done'. An interviewee described the problem as: 'balancing the respect for people wanting to create a family with the pressures of an institution that creates a product that has to be continually output', while another observed that there was:

> "… a generational shift which does make it tough, because the lab head says: "I did it". My generation was brought up a lot luckier … You can't stop a person wanting to work fourteen-hour days. You can imagine that the top 20 per cent who are getting all that support are very driven. Then there are the 80 per cent who want lifestyle and not getting too stressed and who will fail because there is not enough money around. I think that it is changing."

The younger male scientists often wished to have more flexibility in their working lives but were too afraid to explore new models for fear of jeopardising their careers. Part-time was not an option; it was like 'shooting yourself in the foot' in building an independent career. But others had taken the risk of pushing out the boundaries of the established model of doing research by working full-time over a four-day week, to free up one day for them to be at home caring for their children: 'I would rather work at .8 even given less money than fulltime', and another squeezed five day's work into four adding 'four days a week at work is okay'. The difficulty here was that their salary came from grants which presumed that all research staff on the grant would work full-time. While the McKeon Review (2013) of Australian medical research recommended the introduction of part-time grants,

and also five-year grants to replace the current three-year grants, the government's response is not clear.
Younger men were prepared to push the boundaries mostly because they wished to be active parents and/or because they were in relationships where they and their partners were juggling dual careers. In fact, several had partners who earned more than they did. So, the variation of the monastic male who had a supportive, often stay at home wife, does not necessarily apply in dual career relationships. This present generation of men considered that their female partner's career was just as important as theirs. Moreover, they were empathetic to female colleagues who were trying to juggle career and family: 'For a mother it must be much harder. But for me I know how hard it was going from "I can work whenever I want", to now "I have to do everything between these two blocks of time"', and therefore argued that the funding model needed to change, and women should be assessed on productivity relative to opportunity.

Male science researchers who did not currently have children indicated that when they became fathers they would like to work less hours. One had been influenced by male colleagues with children who had taken a day off each week and so when he had children he 'would like to do that'. Another described how he watched his lab head often 'work fourteen-hour days ... but I would like to have kids and I would like to spend time with them'. The ideal working week was: '.8 ... I don't have the drive to work fourteen-hour days'. This suggests that for Gen X and Gen Ys more traditional notions of work and family do not apply (see Riordan, 2011). In addition, some younger scientists questioned the intense competition in science research careers and described it as 'nasty, aggressive and unpleasant', which might explain why younger scientists were looking for more flexibility. They believed it was possible to have a successful career without being monastic and being in the top five or even 20 per cent in their field.

Younger women were just as vocal as their male colleagues in calling for change. Some were struggling to balance all the parts of their lives. Those who had delayed having children until they were more senior in the institute had more options for determining how to keep on track with research. Others had had children when they were postdocs and chose to come back part-time so that they could achieve a balance between work and family that suited their circumstances. One young woman asserted that the main Australian funding body needed to introduce a separate scheme 'for people who are unable for whatever reason to work fulltime' and another argued that there was 'a significant problem with people who have career interruptions and people who work part-time' and she had decided to 'make a political gesture … I make it clear when people ask me that I work part-time'. These findings echo Cidlinská and Linková's (2013) research that demonstrated women and men were equally critical of the dominant ideas of the scientific profession as a vocation, the normalised academic path (that includes working fulltime) and the associated normalised ideas of success in science. New models of doing science research demonstrated that a broad spectrum of research scientists across the institute was committed to exploring how to keep younger men and, especially, women who have children in science research. Various models for combining work and family and for women transitioning back to work after

maternity leave and for the institute to raise funds for a start-up package for women returning from maternity leave were examined.

One interviewee described an impressive model developed with her supervisor about how to keep engaged with research before and during maternity leave and when transitioning back to work. This involved the supervisor and woman developing a model for ensuring that the research would continue while she was on maternity leave, engaging a research assistant to do the hands-on work, communication with the research assistant and supervisor while on maternity leave, with flexibility to come into the workplace for occasional meetings. The woman was encouraged to keep up her scientific networks and went to two international conferences while she was pregnant. The plan for transitioning back to work was set in place well before she went on maternity leave. She initially returned three days a week and then worked four days a week and there was agreement that if she needed to leave early or work from home that would be accommodated because the supervisor knew she would do the work from home if required.

DISCUSSION AND CONCLUSION

This paper has explored the traditional – and gendered – model of science excellence and has argued that it is based on the myth that really successful researchers are akin to 'monastic' males; that is, men who devote their entire life to the pursuit of science. Focussing on an Australian case study it uncovered how notions of job satisfaction align with a single mindedness which almost implied a religious fervour that was necessary to succeed in science. This traditional model is underpinned by intense competition (Charlesworth et al., 1989) which is reinforced by the funding model for science research. However, the case study found that some women were more interested in communicating science research than engaging in experiments, consistent with Palicin et al.'s (2013) findings.
The women in this study indicated that they were often most aware of discrimination in the workplace when they wished to combine careers with having children and/or when seeking promotion to senior positions. Some interviewees considered women did not receive enough encouragement early on in their careers; others argued that gatekeeping by research leaders and a 'nasty' organisational culture made career progression difficult, reflecting other research (van den Brink, 2009; Bagilhole & White, 2011; Morley, 2014).

Networks, mobility and mentoring were found to be critical to building science research careers and are often gendered. There was evidence in this study, confirming other research (Benschop, 2009; Sagebiel et al., 2011), that some women had more difficulty accessing vital international networks. This often resulted from male dominance of particular fields of science and male patterns of social behaviour that can exclude women and reflects Ely and Meyerson's (2000) observation about the difficulty of disrupting the imbalance in social relations between men and women. Women in this case study demonstrated how gendered funding models emphasised mobility as vital in building careers, (HOC, 2014). This is consistent with Zippel's (2017) findings that international research and collaborations are elite activities, and that universities and funding bodies are crucial gate keepers in the process, while Gonzalez Ramos and Verges (2012)

assert that international mobility is *the* new challenge for women scientists who have to carefully plan long and short-term decisions with regard to balancing family and work.

Women had more difficulty in relocating overseas to further their careers and therefore in building vital international networks, even though a third of Australian SET postgrads go overseas to secure employment (Giles et al., 2009). This confirms Caprile's (2012) observation about how the model of the ideal scientist or what she called the 'myth of total availability in the scientific lifestyle' penalises parents 'but also women as potential mothers'. The result is that: 'Many young women end up believing that science is incompatible with family life and feeling that they have to leave academia if they wish to have a family'. She concluded that 'family related mobility and time constraints may act as a filter in early selection procedures' (Caprile 2012, p.18). There was an implied link between the tendency of the institute's leaders to often regard work life balance as only an issue for women, and mobility as one of the significant 'filtering' or gate-keeping processes that encourage women to leave science research. Nevertheless, these leaders were now reviewing the traditional male model of mobility and considered shorter assignments that did not require researchers to relocate to another country could be just as effective for career development, as Ackers (2012) has argued.

The case study found that gender was a factor in building science research careers. Women were often blamed for their under-performance, and the narrative about gender and choice was strong, with some older researchers arguing women could be top scientists and work long hours or they could have children. It was evident in the narratives of younger researchers that this either/or paradigm needed to be abandoned and the concept of excellence and scientific merit needed to move beyond elite male scientists being considered one of the boys and women as 'other', and beyond the patriarchal logic about choice (González Ramos and Benavente 2017). Younger men and women at the institute strongly challenged the view that this discriminatory career pattern of only working fulltime could not be altered (see O'Connor, 2014). The generational change in attitudes to science research careers demonstrated in this research indicates that if Australia is to maintain an internationally competitive economy it cannot afford to lose young scientists. As the top science funding body, the National Health and Medical Research Council, acknowledges 'we cannot afford to waste any Australian talent' (Billiards, 2014). Moreover, science institutes need to reverse the 'precipitous drop off' (Cory, 2011) when women in their early thirties try to juggle family and career.

This research also indicates that younger women and men will chose other science careers or leave science altogether if institutes do not recognise the needs of dual career couples and provide greater job flexibility. There was evidence that the incongruity between an outdated funding model and supervisors trying to manage staff within this framework on the one hand, and the needs of younger research scientists on the other, could lead to increased stress and work-life conflict, confirming the findings of another Australian study (Herbert et al., 2014), as well as an AWIS (2012) report that found, for example, those in medicine and allied health were most likely to report conflict of work and life demands at least weekly.

Younger men and women in the study strongly rejected traditional models. They wanted more flexible work options and were prepared to work for less money and forego being top science researchers. Younger men were determined to be active parents and share parenting with their partners and several were working compressed working weeks or working four days a week; while younger women often wished to work part time when returning from maternity leave and while their children were young. These findings reflect the European Commission's (2005) call for human resources development to consider how men and women in science can reconcile their work and family responsibilities and have fulfilling careers and underlined how family-friendly HR policies are often at odds with the expectations of organisations that employees either focus on their careers or are less career orientated and wish to participate in the family life (von Alemann & Beaufays, 2014).

This research therefore concludes that scientists are passionate about research, and that this commitment increases throughout their careers. Networks, mobility and mentoring are critical to building research careers and are often gendered. Moreover, gender can be a factor in career development. The most significant finding is that the traditional masculine career model (the monastic male) has been rejected by younger men and women in science and has been replaced by more fluid models that have the capacity to change science careers. However, it is not clear if the underlying organisational culture has adapted sufficiently to support these newer models. While managerialism perpetuates a masculinist culture in higher education it may not be possible for younger men and women research scientists to achieve sustainable change and the flexibility they demand in their working lives.

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