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Do men and women perform academic work differently?

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Why is the gender gap so large in researchers' career progression? Do men and women have different priorities in their academic careers? This study explores men's and women's academic work to shed light on the strategies of male and female researchers. The online survey collected data on Andalusian researchers to determine possible differences in academic work that may explain the gender gap in the higher ranks of academia. The results reveal that men's and women's research performance mainly follows the same patterns, but they do differ in the diversity of women's priorities, goals and working styles. This may explain women's vulnerability that leads to their minority presence at the top. These results underline the importance of incorporating new approaches in academic careers based on non-linear trajectories departing from the ideal concept of career paths based on masculine hegemony.

Keywords: academic work; research performance; career trajectories; non-linear careers; merit evaluation

Introduction

The situation of women in academia has been extensively discussed in recent decades, producing a large body of evidence on the inequalities of male and female researchers (Ceci, Ginther, Kahn, & Williams, 2014; European Commission, 2012; O'Neil, Hopkins, & Bilimoria, 2008; Valian, 1998; Xie & Shauman, 2003). From equal footing during studies, female numbers then slowly dwindle during and after postdoctoral stages, and are significantly under-represented in senior positions and with high levels of responsibility. The reasons that may explain these weaknesses are usually linked to personal and institutional barriers, which Evetts (2000) termed cultural, structural and action dimensions. Women face institutional and cultural barriers to a greater extent than men as a consequence of the gender stereotypes and social roles attributed to women, which influence gatekeepers' decisions. Non-friendly environments also place women in a marginalized position, which leads to slow female progression and career dropouts (Bagilhole & Goode, 2001; Bailyn, 2003; Buzzanell & Goldzwig, 1991; Fox & Xiao, 2013; Kuijpers & Scheerens, 2006; Lyon & Woodward, 2004). Women's trajectories also involve more complex decisions because personal and professional milestones intertwine and influence each other (González Ramos, Navarrete Cortés, & Cabrera Moreno, 2015; O'Neil & Bilimoria, 2005; Powell & Mainero, 1992). Therefore, low expectations of promotion and having to juggle the work–family balance may influence women's decisions about taking on responsibility in academia.

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The aim of this paper is to explore the work performance of Andalusian men and women researchers to discover if they develop convergent strategies in their academic careers that might influence their success. Despite ample evidence on how unbalanced men's and women's career trajectories actually are (European Commission, 2012), the actual causes remain unclear. This work attempts to identify new explanations and shed light on the relevant factors in men's and women's advancement in research careers.

A gender perspective on women in science

Beyond the supposed neutrality of the evaluation process and progression in research careers, a large body of evidence underlines the importance of social influence in the construction of science (Harding, 1991; Longino, 1990; Van den Brink & Benschop, 2011). Academia is replete with explicit and implicit rules that determine the selection and recruitment of candidates, where a male hegemony shapes multiple conditions of these decisions (Ackers, 1989; Benschop & Brouns, 2003; Bozeman, Dietz, & Gaughan, 2001; Krefting, 2003; Laudel & Gläser, 2008). Literature suggests that old boys' clubs and 'invisible colleges' (Crane, 1972; de Solla Price, 1965; Kanter, 1977) play an essential role in defining hot topics, what excellence means and which merits are most relevant (Gibbons et al., 1994). The gatekeepers decide which outcomes are rewarded within their discipline, and which candidates are excellent and deserve promotion (Bozeman et al., 2001; Connell & Wood, 2002; Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012). Successful careers strongly depend on these informal networks and the subjective decisions of peer reviewers (Becher & Trowler, 2001; Kuijpers & Scheerens, 2006; Laudel & Gläser, 2008). The collective action of senior faculty legitimates the recruitment process in laboratories and departments through socialization and mentoring of young candidates. Subjective decisions and cultural prejudices bias the 'objective' decisions made by gatekeepers in research (policy-makers, peer reviewers, members of committee boards, evaluators of research-funding panels and senior faculty).

Despite women's ever-increasing enrolment at university, their representation remains segregated across disciplines, types of institutions and academic ranks (European Commission, 2012; Valian, 1998). Women face organizational barriers because institutions were historically composed of and accessed by male researchers. As a consequence, the design of research careers corresponds with a universal idea that only one model is possible. The white male researcher moving up in a linear trajectory with plenty of merits and success would seem to be the exemplar, which deserves rewards and progression along the life course (Buzzanell & Goldzwig, 1991; Powell & Mainero, 1992). It seems that brilliant research careers should have no discontinuity patterns or low productivity periods. Furthermore, women often have non-linear and disrupted careers, which are viewed as examples of non-excellence and lack of success.

Most women researchers advance slowly, sometimes taking career breaks and presenting low productivity rates (Ackers, 1989; Adler, 1984; Bagilhole & Goode, 2001; González Ramos et al., 2015; Krefting, 2003). Accordingly, there are very few women in the pool of candidates for relevant appointments, and gatekeepers usually consider them less confident and consistent candidates because of their non-linear careers (Van den Brink & Benschop, 2011; Van den Brink, Benschop & Jansen, 2010). But, as the history of science has revealed, non-linear trajectories might also showcase excellence since outstanding ideas often spring from non-conformist and non-traditional attitudes. Neither male nor female careers match the ideal model, because personal and professional factors are intertwined (González Ramos et al., 2015).

Literature has compared male and female productivity, such as publication ratios, patent registration and funding research rates, in order to discover gender disparities. Women were reported as having low publication rates in journals (Cole & Zuckerman, 1984; Long & Fox, 1995; Ward & Grant, 1995), although recent studies reveal that research productivity depends on structural forces as a result of women's position in academia (Bordons & Mauleón, 2006; Fox, 2005; Xie & Shauman, 2003). The paucity of women in scientific areas might correlate with their low presence and collaboration with private companies, which comes from poor female knowledge-transfer rates. According to the European Patent Office, women registering patents stands at 8% (European Commission, 2009), although there have been small growth rates (Mauleón & Bordons, 2009; Thursby & Thursby, 2005; Whittington & Smith-Doerr, 2005, 2008). These outcomes seem to be the consequence of the work environment, where cooperative research teams increase women's patenting activity, while rigid and hierarchical ones decrease the probability of female inventions (Whittington & Smith-Doerr, 2008). Women receive smaller number of grants than men in research funding. Some studies declare that this is because there are few submissions by female applicants, while other studies claim nepotism in the evaluation process (Blake & La Valle, 2000; European Commission, 2009; Grant & Low, 1997; Steinpreis, Anders & Ritzke, 1999; Wennerås & Wold, 1997).

Gender bias questions the supposedly objective and neutral criteria for career evaluation and development, since social factors affect female confidence about their careers, as well as the decisions of gatekeepers (August & Waltman, 2004; Benschop & Brouns, 2003; Moss-Racusin et al., 2012; Van den Brink et al., 2010). Women would therefore have few opportunities as a consequence of being granted only a small number of resources for research. To what degree can they develop hot topics with very limited resources?

The in/visibility paradox described by Faulkner (2007, 2009) addresses women's positions in highly male-dominated areas where they are a minority. The author explains that several strategies are necessary for women to adapt and be able to fit into the majority social group. Male norms mould the expectations of female actors, because colleagues and gatekeepers act in accordance with stereotypical expectations about women in 'male careers', where they suffer from a 'glass ceiling' effect (Van den Brink & Stobbe, 2009). Some studies suggest that women have more modest goals, as they are more likely to abandon their careers than their male counterparts or go slower (Fels, 2004). Women's altruistic behaviour is socially accepted as natural, while male altruism receives great recognition (Heilman & Chen, 2005); in parallel, women are more likely to receive social penalties than men for successful results in male environments (Heilman & Wallen, 2004). Bosses may act on the basis of gender when they make decisions regarding women's progression. Some studies show that false judgements guide bosses' decisions regarding international mobility, which is crucial for professional advancement. In summary, multiple dimensions affect women's progression in science, which are closely related to equality, fairness and integration in scientific cultures (Bailyn, 2003).

A lively debate in the literature concerns how women's traits make them great knowledge agents in research, but scarce evidence supports this discussion. Feminist authors claim that incorporating and heeding women's particular vision assures that there is more valid knowledge on research and innovation. Conversely, the omission of a female perspective detracts from science's completeness and reliability (Gilligan, 1982; Haraway, 1988; Harding, 1991, 1998; Longino, 1990; Schiebinger, 2001, 2008).

Some new paradigms, research methodologies and even fields of knowledge have emerged from women's inclusion in academia, which prove the importance of women's standpoints (Etzkowitz & Ranga, 2011; Haraway, 1991; Longino, 1990).

Without a gender perspective, research questions lack a truly comprehensive analysis, as Schiebinger and Schraudner (2011) state, 'gender analysis must become an integral part of identifying priorities and designing research' (p. 158). However, new ideas are very likely rejected since they deviate from the hegemonic paradigm controlled by invisible colleges. Gatekeepers may dismiss female outcomes because of how different their stances are. How can women break free from the ironclad rules of the scientific community so that they can create new and innovative ideas? A related topic concerns the type of task-oriented functions performed in academia. Some claim that women are generally associated with teaching rather than researching (Ackers, 1989; White, 2004), which would explain women's vulnerable position in scientific institutions. Moreover, gatekeepers could perceive them as excellent teachers but poor researchers, which would place them at a disadvantage.

Little research has addressed the precise activities in which male and female researchers are involved that could help, in turn, to address the factors that influence and impact the differences in their trajectories. Some patterns may alter men's and women's opportunities, and shape strategies for men and women in academia. We want to explore the cultural, structural and action dimensions (Evetts, 2000) that may engender the differences in male and female research performance. These data would cast light on the question of why women are clustered at the bottom of the academic ladder and advance unevenly in comparison to men. Are women acting in accordance with low levels of confidence in their career strategies? Are men and women really different actors performing research in academia, or is research completely regulated by invisible colleges? Are gatekeepers dismissive of women researchers? This work addresses new lines of study with regard to the participation of women in academia, considering the factors involved in research activity.

Research design and population description

The design of this study encompasses the responses of quite a large community of researchers, representing some 23,500 researchers in Andalusia in 2010. Andalusia is the largest region in Spain by population (18.3%) and it has 18.6% of higher education students. In parallel with European data, the number of women starts to dwindle after university studies, where women slightly outnumber men in every discipline (54.7% undergraduates and 58.2% master's degrees, and even technology areas are gender balanced), to doctorate studies, where 47.4% of theses were submitted by women, to associate professors, where only 40% are women (though they exceed men in humanities and health). Moreover, Andalusia is a Southern European region with high unemployment rates and, therefore, the ratio of female associate professors (40%) represents a lower percentage than the European mean 44% (European Commission, 2012).

Advanced research policy systematically collects information about research teams in Andalusia. The SICA database (*Sistema de Información Científica de Andalucía* or Scientific Information System of Andalusia) was launched in 2001 by the regional government for planning strategic policy in research and innovation. This database contains information about Andalusian researchers. We use it for the purpose of this study as a census for our survey. All researchers were contacted by email and invited to respond to the anonymous online questionnaire.

As the survey was supported by the Andalusian government, the final response rate was 22.5%. Women accounted for 38.6% of responses, which suggests a balanced gender sampling compared to the total SICA population, where women represent 40%. Some 18.5% of respondents were research group leaders, a high percentage as they represent just 10% of researchers in SICA. However, for the purpose of this study, this over-representation of leaders in the sample was convenient, since leaders generally have more complete information on research team activities.

Unlike European data that reports an increasing number of women researchers (European Commission, 2012), the information from SICA reveals an imbalance of men and women in research. Segregation by disciplines demonstrates a high concentration of women in humanities (47.1%) and social sciences (42.9%); a lower percentage in health (39.5%); and a minority in science (30.6%) and engineering (20%). Additionally, women remain a minority at the top of the career ladder, so that the majority of women are junior researchers. The average woman is younger than the average man, despite having they received their degrees in 1999, an average of five years later than the men. Only one-third of the leaders are women, confirming the difficulties of holding senior positions. Women are leaders in research groups in health (13.4% of female respondents in this discipline), humanities (11.3%), engineering (10.7%), science (9.3%) and social sciences (7.4%); while the distribution of male leaders is health (26.2%), science (22.7%), social sciences (19.8%), engineering (18.4%) and humanities (17.7%). Considering this variety, the analytical strategy of this work adopts a general description of the online survey, focusing on leaders' responses in every discipline.

The main topics of the survey explored the characteristics of researchers and research teams, eliciting descriptions of researchers' main activities in academia, scientific productivity, funding and types of research topics. The questions asked for descriptive answers and a graduated scale (where 1 was the lowest and 5 the highest degree of acceptance) was used when asking for opinions. It used an open-source platform (Ubuntu-Linux server), software for managing data storage (LimeSurvey) and a statistical analysis package (R 'GNU S'). Statistical analysis entailed the use of descriptive statistics and inferential analysis (using significance tests).

Are women singular researchers or followers of the universal pattern in academic work?

At first glance, the characterization of the research groups is similar when we observe the number of members and creation dates. Therefore, it would appear that male and female academics are influenced by the same culture and that universal norms are by all researchers. The research groups led by men and women across knowledge fields show similar composition and history. Every research group consists of 12.5 male and female researchers and 4.4 researchers are under 35 years old. Regarding duration, male groups were created in 1998 and female groups in 1999, with a standard deviation (hereinafter SD) of 6.8 and 6.9, respectively. The only difference is that women's research groups are highly gender composed (6.16 members are women, which places female research groups above the average rate in the sample, representing 5.1 with 4.38 SD), whereas male groups are below the mean (4.45 female members and 3.72 SD). Thus, women appear to be attracted to research groups led by a woman.

Female academics display lower productivity rates, according to standard merit criteria represented by publication and patent registration. Men outnumber women for publication rates in first-quartile journals (Q1), where first-quartile means the top 25% of

the impact factor distribution according to Journal Citation Report, but there is no gender gap in publication rates in second-quartile journals (Q2), which indicates a medium-high position (between top 50% and top 25%). Women publish 4.7 Q1 papers (SD 11.96) while men publish 5.4 papers (SD 7.04), with 3.3 papers in Q2 for both men and women (8.6 SD for women and 4.52 SD for men). Men publish more conference proceedings than women (8.6 papers, 12.69 SD for men, while women publish 7.5 papers, 15.25 SD). Although the female's contribution appears poorer than men's overall, other information shows women's maximum range of publication in Q1 and Q2 journals is higher (230 and 130, respectively, compared to 72 and 69 for men); similarly, with books (a maximum of 140 for women, compared to 71 for men). Large differences reflect the heterogeneity of patterns displayed by women researchers, as they have both the highest and lowest publication rates. This shows that female academic profiles reflect greater diversity with regard to goals and results.

Transfer activity is a key element of difference between men and women scientists. The percentage of women registering patents is lower (38%) than men (45%). Other related activities also show little involvement in private sector projects. While 9% of men are involved in spin-off creation, only 4% of women are. Men's collaboration in start-up companies reaches 6% while only 3% of women participate. Male participation in entrepreneurial activities represents 20% whilst female participation is 12%. This tendency of low female participation in transfer activities in the private sector correlates with the low percentage of women in engineering. It suggests major difficulties with accessing male-dominated environments or women's lack of interest in accomplishing these activities. Despite their sociability, women show a low participation in scientific networking, which impedes women from creating new opportunities for academic work. This is linked to women's low participation in the private sector, as well as low participation on committee boards in journal, panel selection and relevant scientific bodies. Data show statistical differences ($p = .002$*) in networking participation by sex, since 1.02% of women participate on international committee boards while 1.35% of men participate. Scarce participation involves the invisibility of women in research, which keeps them outside the area of influential networking and recognition by their peers.

Another factor related to advancement in research careers is the success rate in obtaining research funding. According to survey results, research groups led by women receive fewer resources than research groups led by men. Table 1 summarizes the total financial resources allocated to groups with male and female leaders in the last three years. The distribution shows statistical differences by the leaders' sex ($p = .0005$*), revealing a high percentage of male groups accumulating large amounts of money from public and private agencies, while a high proportion of female groups receives a smaller range of financial resources from successful grant applications. Nearly 6% of female

Table 1. Total amount of funding (€).

	Women (%)	Men (%)
<25,000	18.4	10.2
25,000–50,000	13.8	11.5
50,001–100,000	14.4	14.1
100,001–250,000	23	24
250,001–500,000	20.7	19.1
500,001–1,000,000	5.7	14.9
>1,000,000	4	6.2

and 15% of male research groups received € 500,000–1,000,000. As women are less attached to companies and transfer activity, female-led groups have a clear disadvantage due to their lack of focus on private institutions and resources. In the last three years, female groups were awarded 3.9 contracts (7.15 SD), while male research groups received 4.4 (7.2 SD). Thus, male-dominated environments in the private sector turn out to have few opportunities for women scientists to receive larger financial resources for carrying out research.

Institutional barriers in male-dominated areas may explain the low funding of female research groups, but are female scientists aware of this weakness? The online survey asked about the satisfaction of male and female leaders with respect to the money they were allocated, showing researchers' moderate satisfaction (researchers rated this question 3.1 mean out of 5, SD 1.18). Women reported lower than average satisfaction, 3.00 (1.17 SD), and men above average satisfaction, 3.16 (1.19 SD), revealing that women are more critical in this area ($p < .0001$).

Despite lower resource allocation to female leaders, 40% of women stated that their research work is carried out in a consolidated research group (but below the average of 44%), and 49% claimed they work in a growing group (above the average, also 44%). On the contrary, men evaluated their research groups as consolidated (47%), higher than average (44%), and as growing (41%). These data may reflect women's lack of confidence, believing their research quality is below average. This point is confirmed by previous results (Faulkner, 2007; Fels, 2004; Van den Brink & Stobbe, 2009).

Figure 1 displays men's and women's evaluation on the quality of their research activity in comparison to the average quality of research in their field of work. Data confirm that men overestimate their research quality, showing greater satisfaction than women (49% claim that their research exceeds the average in their knowledge field, $p = .002$*). On the contrary, the majority of women tend to judge their activity as average in their knowledge area (44% of women affirm that their research is above average in their knowledge field). Surely, fulfilment prophecy must have an impact on the attitudes of gatekeepers and female academics, and thus undermine women's progression in research careers.

In terms of the selection of topics and research orientation, we expected to prove that women conduct a different type of research and are oriented to a broader diversity of research goals, as they are a heterogeneous group. However, the survey data suggest that both men and women are equally interested in every type of research, which

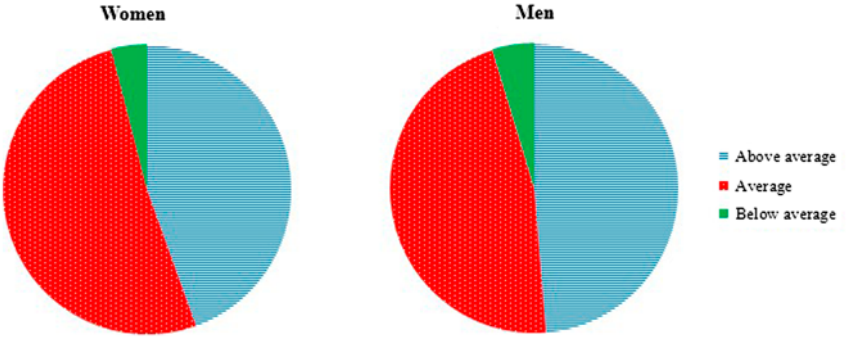

Figure 1. Opinion about quality of research activity.

Table 2. Preferences of research orientation.

	Women (%)	Men (%)
Basic research	84	78
Applied	83	77
Technological development	34	39
Experimental	48	41
Innovative	65	58
Technical reports	42	41

suggests strong leading values in research. As Table 2 reveals, men and women declare similar preferences for basic, applied, experimental and innovative research and technical reports. Women present a high percentage of responses in every category, except on technological development, which seems to interest men (39%) more than women (34%), showing statistical differences ($p = .02$).

An additional question explored the motivation of male and female researchers to undertake research projects pursuing different goals. The questionnaire contained five main items asking about different research focuses: creating original knowledge, exploring methodological approaches, making an impact on technological innovation, achieving social innovation and obtaining high scores for academic excellence. Table 3 summarizes the responses of male and female researchers, showing a similar distribution of data, which would demonstrate that research standards are deeply instilled. Common patterns in scientific culture would homogenize men's and women's research activity. The exception is social innovation, which women valued more positively than men (64% women, 59% men, $p < .0001$). On the other hand, men had high response rates related to transfer orientation, which underlines previous evidence about men's preferences for conducting this kind of research activity. Women also displayed high response percentages on improving academic excellence rankings, which might prove women's strong commitment to institutional goals.

It is a widespread idea that women devote more time to teaching than research, which positively affects successful male careers since research merits are more valuable than teaching scores. According to the survey data, a quarter of men and women spend between 50 and 75% of their working time teaching and conducting research, spending the rest of the time on administrative tasks. But the similarity in activity patterns by sex disappears when observing the percentages of time devoted to each task. Women spend more time teaching (27%) compared to the average rate (23%), while men spend more time performing research activity (24%) than average (23%).

Thesis supervision is a highly valuable activity generally involving seniority. Statistical differences ($p < .0001$) are observed on this activity, whereby, in the last three years, men supervised 1.72 (SD 1.96) theses whereas women supervised 1.34 (SD 1.89).

Table 3. Main goal of research orientation.

	Women (%)	Men (%)
Knowledge production	97	96
Methodology approach	79	75
Transfer and innovation	55	58
Social innovation	64	59
Academic excellence rankings	79	77

Therefore, women devote a lower percentage of time to thesis supervision, which would affect their low seniority status and, in parallel, may lead to low peer recognition for advancing in academia.

Discussion

Scientific cultures strongly determine research activity because there is an accepted set of criteria for selection and promotion based on evaluation of limited kinds of activities. Men and women have to follow these standards in research to pursue higher academia tracks. Although male and female researchers may feel that neutrality and objectivity will protect them from unfair judgements, the evolution of male and female careers proves that there are crucial differences between them. It is evident that women progress more slowly and show significant differences in their research outcomes and in academic work performance.

Despite women's strategies being quite similar to men's in research, women researchers reveal singular features (feminization of research groups) and academic working orientation (regarding transfer and innovation projects). These differences usually put them in a disadvantageous position related to resource allocation. As Bailyn (2003) argued, equality and fairness are important, as well as the integration of diversity into research institutions. Women academics deviate quite significantly with respect to supposedly linear career paths, and are often distant from the ideal model career (González Ramos et al., 2015). Moreover, survey findings suggest a great diversification of female profiles and research orientation, while men present more homogeneous patterns regarding performing academic work, more in line with the most valued activities for advancing in science.

This supports the idea that the scientific community should accept the existence of diverse progression pathways in research careers, which would benefit creativity and the opportunities to create new approaches (Gilligan, 1982; Haraway, 1988; Harding, 1991, 1998; Longino, 1990). Some studies point out that deviation from standard quality criteria may help to advance research knowledge. Schönemann (1991) ponders whether the peer review system in journals really leads to the selection of the best papers for publication. Pack, Peacey, and Munafò (2013) underline that some subjectivity in peer reviews can actually curb the herding process, thus benefiting the decision-making process and estimating merit more accurately.

Publication rates reveal women deviate from standard quality criteria and showcase greater diversity than male patterns. Men exceed women in publication rates in Q1 journals, but there is no gender gap with regard to the production of articles in Q2 journals and books. Moreover, although women state that they have fewer conference proceedings and books than men, women have a maximum range of books higher than that of men. These data suggest gender differences in research productivity (Bordons & Mauleón, 2006; Cole & Zuckerman, 1984; Fox, 2005; Fox & Xiao, 2013; Thursby & Thursby, 2005; Xie, 1998) due to women's difficulty in publishing articles in the top journals, or maybe simply that women have different and mid-range goals for their academic careers.

Survey results confirm that women are poorer knowledge-transfer agents (European Commission, 2009). They have low participation percentages for items related to patenting activity, collaboration with enterprises and involvement in innovative activities. Consequently, research groups led by women receive funding from public organizations and very little additional private sector funding; also there are fewer women in

engineering and technology areas that collect more resources from these institutions. Although the reasons still remain unclear, two possible causes emerge: women feel little confidence in forging relationships within the private sector, or companies prevent women from actively working in this sector. Both reasons underline the negative impact of male environments on the progression of women's research activity.

The literature establishes that gatekeepers may underestimate women's research activity (August & Waltman, 2004; Benschop & Brouns, 2003; Moss-Racusin et al., 2012; Van den Brink et al., 2010; Ward & Grant, 1995). They receive less money for research (Blake & La Valle, 2000; European Commission, 2009; Steinpreis et al., 1999). The results of this study confirm this and, beyond that, suggest a detailed explanation based on lack of confidence and the great effort that women leaders make to accomplish research goals in their field of knowledge. Although they get fewer resources and have low expectations for their research performance, they may do their best to obtain the best results possible.

Another important result of this paper concerns the difference in women's voices regarding research contents. Although there is an unequal distribution of women in scientific fields, as seen by the minority representation of women in technological research fields, women are as equally interested as men in performing all types of research with the exception of development projects. On the contrary, women are more interested in social innovation than developing technical solutions, as the feminist literature has pointed out (Faulkner, 2009; Longino, 1990; Schiebinger, 2001, 2008). Topics related to the improvement of human conditions are more positively valued by women researchers who lead their research in order to promote a social impact. Apart from that, women seem to be slightly more oriented to teaching tasks than research tasks.

Low expectations from women and gatekeepers act as a fulfilment prophecy to reinforce the gender gap in academia. Findings show women are rarely thesis supervisors, which is a sign of lack of recognition of seniority in academia. The percentage of women on international committee boards remains lower than male members, thus impeding women from garnering social credit in the academic community. These external and internal impediments keep women in low positions without much visibility at academic organizations, reflected in their frequently absence from top positions and recognition. Some authors recommend strengthening professional networks in order to turn more women into gatekeepers (European Commission, 2009), although this policy has had little impact on academia. Real impact will surely necessitate a different model, where the diversity of career trajectories and a female approach rather than male hegemony will have to be taken into account.

Conclusions

The current study explores different aspects of the research activity performed by women in the Andalusia, which lets us explore why women progress slowly in academic careers. In doing so, we have examined whether women adopt convergent patterns in their research work, as a result of the two genders having a different standing in the academic community and a different social attribution of roles or, conversely, if they do assimilate the predominant values and scientific culture.

The results contribute to the existing literature and expand upon the general understanding of women's inclusion in academia. Our focus in this study aims to address the research environment in which men and women are involved, looking for new insights about how the nature of academic work may influence career trajectories, because other

studies have already focused extensively on how work–life balance interferes with female careers, impeding their advancement. These findings suggest that a new direction is needed to assess research careers if we want to retain female talent, and truly appreciate and take advantage of the diverse strengths and circumstances of both male and female academics.

Women are more interested than men in developing social innovation than technological solutions, which suggests different gender orientations in research goals. They are greatly committed to their professional careers, as demonstrated by the percentage focusing on developing teaching, research, administrative and management tasks. They produce fewer articles in Q1 journals and are less involved in knowledge transfer. Their fundraising capability is less relevant than their male colleagues because their funding resources are mainly from the public sector. Women leaders judge their research work more critically than their male counterparts, placing their outcomes below the average in their research field, maybe because of low self-confidence, which probably leads them to plan mid-range objectives in their projects. They usually receive less money because they apply for smaller quantities. In line with this, the implementation of coaching programmes could be significant in generating successful results for women and research institutions.

The results of this study underline that career development is designed and planned according to standard criteria and is blind to gender. Women have to fit into these criteria because, otherwise, gatekeepers reject their applications, as they often do anyway, according to their lower numerical outcomes in comparison to male colleagues. Most women follow merit standards because this is the only path forward in academia, but they do show some differences that very likely affect their advancement and peer review opinions. While female researchers may have fewer papers in prestigious journals, their work is accepted in a wide range of textbooks and publications. This suggests that ideas and preconceptions about women's careers must be challenged, and women academics should not be disregarded simply because they do not completely fit with standard patterns.

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