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The different worlds of academia: a horizontal analysis of gender equality in Swedish higher education

Charlotte Silander · Ulrika Haake · Leif Lindberg

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Abstract Women are underrepresented in advanced positions in higher education in Europe. This study takes a horizontal perspective and focuses on the relationship between gender and discipline in order to combine research on gender in higher education with theories of disciplinary differences in academic cultures. The study points out substantial differences between disciplines in gender composition, specifically, the probability of a person leaving academia after earning a doctor's degree and various attitudes towards gender equality work. Our approach, which is based on quantitative longitudinal as well as qualitative research methods, has yielded a more complex and contradictory picture of gender equality in higher education than have vertical cross-sectional studies.

Keywords Gender equality · Horizontal analysis · Academia · Higher education · Discipline

Introduction: A uniform system?

This paper describes and analyses the lack of gender equality in higher education (HE). In Sweden, as in other Western and European countries, women are consistently underrepresented in the higher levels of the academic hierarchy (European Commission 2009; Höskoleverket 2008, 2011a; Monroe and Chiu 2010). In most European countries, more women attend undergraduate HE than men, and more women graduate from HE than men. Still, the unequal gender structure of higher positions (senior lecturers and professors) persists in that men hold more top positions in HE than women, especially at the professor level.

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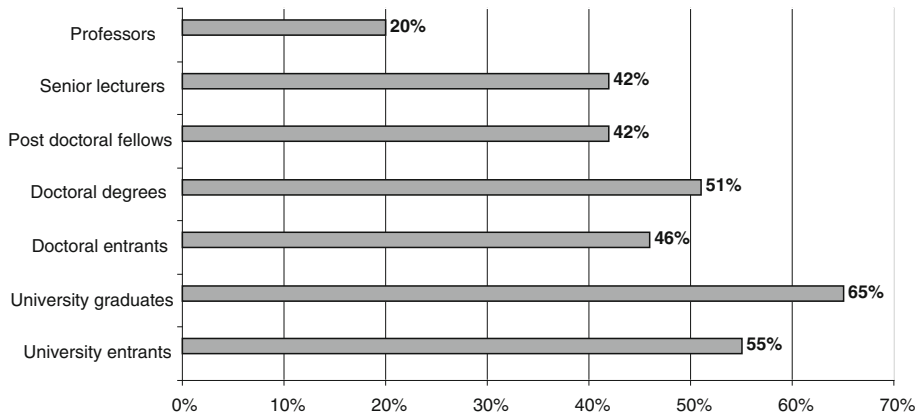


Fig. 1 Vertical gender balance in Swedish higher education 2010. Proportion of women (Statistic Sweden 2011a, b, c)

There are four main categories of academic staff in Swedish universities: professors, senior lecturers (lektor), post-doctoral fellows, like research assistants (forskarassistent), and junior lecturers (adjunkt), even though this law is now updated, and only regulate the positions of professors and senior lecturers (Högskolelagen 1994: 1434). The vertical gender balance shown in Fig. 1 illustrates that women in Swedish HE form a narrowing gendered pyramid. Women are well represented in undergraduate and postgraduate levels, but are less so in the two permanent top positions: senior lectureships and professorships.

However, this description hides differences between academic fields that must be considered in order to analyse and understand the causes of the lack of gender equality in HE (Lindberg et al. 2011).

Swedish HE is generally considered a unitary system (Askling 2001; Kim 2002). Formally, and according to the Higher Education Ordinance, it is a unitary system. The Swedish state university system contains some 40 institutions, including 15 universities, 10 university colleges with the right to award doctor's degrees in certain areas, 12 university colleges without such rights, and some smaller institutions (Högskoleverket 2011b). In addition, there are 12 private institutions, all relatively small. Among these institutions, there are a handful of large professional schools (engineering, medicine, and agriculture) and some are small professional schools (e.g., art, music, and drama). Irrespective of size, specialisation, etc., all state institutions adhere to the same law, the 1994 Higher Education Act and Higher Education Ordinance.

Accordingly, the lack of gender equality is treated as if it is more or less equal all over the system. In university politics, attention is therefore seldom given to the different preconditions and cultures of the academic disciplines of gender equality (Kyndel et al. 2003; Lindberg et al. 2005). This lack of attention is accentuated in two literature reviews that show that studies of HE gender equality tend to focus on the vertical aspect of gender balance (Kyndel et al. 2003; Silander 2010). Verticality, in this case, refers to the fact that women can be found at the lower levels of the academic hierarchy (junior lecturers) while men are found in the higher levels (senior lecturers and professors).

The unitary system approach and the focus on the vertical aspect of gender equality contributes to a situation in which the reasons for underrepresentation in different disciplines are not addressed and does not consider that solutions to underrepresentation need to

vary between disciplines (Lindberg et al. 2011). Consequently, the search has been for one explanation that can elucidate the lack of gender equality in the entire higher education system. Much political work and many studies search for a delimited point in the academic trajectory where the gender underrepresentation is created, for example, the crossover between undergraduate education and doctoral education (Högskoleverket 2006, 2008), the period of doctoral education (Berryman 1983; Kantola 2008), the period directly after the PhD (Academy of Finland 1998; Husu 2005; Kahn 1993), or some point further into the academic career (e.g., childbirth) (Cole 1979; Cole and Zuckerman 1984; Fridner 2004; Martinez et al. 2007; Zuckerman et al. 1991). However, it seems difficult to tie gender inequality in academia to a specific point in time where it was introduced or peaked. Rather, it seems to be an issue involving several processes interacting at different periods of time (Xie and Shauman 2003; Zuckerman et al. 1991). The period of time and the type of processes that cause gender differences might differ by discipline.

The point of departure of this paper is from a gender equality policy perspective (also see Berggren 2011; Timmers et al. 2010). The purpose is not only to argue but also to show that a horizontal gender analysis is needed to complement the commonly used vertical analysis in order to yield a more realistic foundation for future measures and changes to reach gender equality within HE.

The need for a horizontal analysis of gender balance

In contrast to the view of the Swedish system of HE as a unitary system, previous HE research has identified considerable differences between academic disciplines (Biglan 1973; Becher and Trowler 2001; Brint et al. 2008; Deem and Brehony 2000; Neumann 2001; Smeby 2000). Additionally, there are research results suggesting gendered differences in disciplinary values (Becher and Trowler 2001; Umbach 2007). Gender differences between disciplines have been explained using the human capital theory (Becker 1985; Hakim 1996) or the socialisation theory (Marini and Mary 1984; Sandqvist 1995). According to the human capital theory, gender differences in educational choices are explained by the notion that women's choices are influenced by their expectations to coordinate their future work with family obligations or that women seek professions with lower penalties for labor force interruptions (Polachek and Siebert 1993). Conversely, the socialisation theory focuses on factors believed to influence both men and women's preferences and the differential socialisation of boys and girls, arguing that individuals are socialised into specific gender roles (Jenkins 1996). This means that women are traditionally expected to conduct activities such as teaching and caring.

Also, previous studies in Sweden indicate *gender* differences between academic disciplines. Ståhle (1997) studied the extent to which the proportion of men and women with a bachelor's degree is mirrored in those with a doctoral degrees a few years later. He found that in the Nordic countries women in medicine, odontology, and law encounter more difficulties in their academic careers (Ståhle 1997). Chrapkowska (2006) showed that it takes longer for women to reach the professor level compared to men in natural science compared to other sciences (Chrapkowska 2006). Finally, a study from 2006, repeated in 2011, showed that it was less likely for women in humanities and natural sciences to become professors than in other disciplines (Högskoleverket 2006, 2011a).

From this overview, some empirical points can be made concerning the position of women in advanced HE positions in Sweden. First, there are differences in gender composition between disciplines, and, second, although formally considered a unitary system,

Table 1 Horizontal gender balance in Swedish higher education 2011

Academic field	% Women professors	% Women of lecturers	Total % women
Odontology	24	64	58
Veterinary medicine	30	74	71
Humanities and theology	33	50	49
Social science	25	47	47
Medicine	24	51	49
Agricultural science and forestry	23	37	39
Law	30	46	44
Pharmacy and pharmacology	15	65	44
Natural science	18	27	32
Mathematics	11	24	25
Engineering and technology	11	24	22
Total	23	44	43

Per cent female senior lecturers. Statistic Sweden 2011a, b, c, d

the differences between disciplines need to be addressed. Table 1 shows the share of women among senior lecturers in different academic disciplines. There are a higher proportion of female lecturers in the humanities, in veterinary medicine, and in odontology, but men are predominant in areas such as engineering and mathematics.

Here we wish to introduce the concept ‘gender balance.’ This is an index showing the relative proportions of women and men in a certain population (Lindberg et al. 2011; Silander 2010). In Sweden, a political definition of gender equality was formulated in the early 1970s, stating that equality is at hand when no sex makes up more than 40 % of a certain group (Lindberg et al. 2011). In accordance with this, we consider gender representation falling within the 40/60 range to be gender balanced, gender representation falling outside the 40/60 range to be gender imbalanced, and gender representation that significantly deviates from the 40/60 range to be more imbalanced than gender representation that deviates less. Horizontal gender balance indicates the correlation between sex and the academic field in which a person works, and vertical gender balance represents the correlation between sex and hierarchical position.

Horizontal gender balance in academia, when compared to the vertical gender balance, is stronger, indicating the importance of disciplinary differences. There is a stronger correlation between sex and the field in which a person works than between sex and hierarchical position. When the variables of gender, position, and field are combined, the picture of unbalanced gender representation in advanced HE positions is even stronger (Silander 2010). The results reinforce the argument that position, field, and gender should not be studied separately but rather in combination, and the results strongly support the importance of studying the horizontal dimension, thus underlining the argument for questioning the unitary approach to investigations on the lack of gender equality in HE.

Investigations on the lack of gender equality in HE thus have generally focused on generic aspects, leaving disciplinary differences under-recognised. In contrast, this study explores whether or not the unitary approach to higher education, in general, is sustainable in the study of gender equality in HE. By studying gender equality in HE from a horizontal perspective, relative to disciplinary differences and referring to the varying distribution of men and women between different fields, we seek to highlight the discipline, as a variable,

which we think needs to be subjected to more systematic study regarding its influence on gender equality.

Outline of the study

The horizontal study of gender equality in HE will be completed by analysing two limited periods of the academic career, doctoral education and the period right after earning a doctorate degree.

Doctoral education is an important period of time to study. The experience during the doctoral period likely influences men and women's view of academia, and we know from previous research that men and women have different experiences of doctoral education (Högskoleverket 2003; Wall 2008). There are substantial differences in gender composition (European Commission 2009; Lindberg et al. 2005) as well as in practices between academic disciplines (Neumann 2001). We investigate how gender differences can be expressed by focusing on the variety of gendered cultures across multiple disciplines. What in the culture of different disciplines can contribute to the understanding of why certain disciplines are gender imbalanced and why changes in this imbalance seem to occur or not? Contradictory values concerning gender equality in the Swedish doctoral education system are analysed by means of interviews and survey among professors and supervisors across different academic disciplines: female-predominated, mixed, and male-predominated.

Further, the period right after earning a doctorate degree can be treated as crucial for an academic career. This is the time when a person makes the decision whether or not to pursue an academic career. In Sweden, 56 % of individuals who earn a doctoral degree leave academia immediately after (Silander 2010). There is a commonly held view that women leave academia more often than men after receiving a doctorate degree (Academy of Finland 1998; Husu 2001b; Preston 2004; Tancred 1998). We investigate—by means of a statistical analysis of population registers—if there is a gender difference in leaving academia after earning a doctorate degree by following all individuals with a doctorate degree in the Swedish labour market in the 1990s for up to ten years after they were rewarded their PhD. An imbalance in exit can be an indication of gender inequality in academia, either as an expression of push forces (discrimination within academia or individual dissatisfaction with academic life) or the existence of pull forces from the outside (good working hours, better salary, etc.). Disciplinary differences in exit could indicate different post-doctoral career opportunities for men and women in different fields (e.g., industry, cultural life).

By investigating these two important periods of the academic career, the doctoral education and the period following shortly after the degree, it is possible to understand disciplinary influences on the academic career from a gender equality perspective.

The study is set in Sweden, a country with a fairly long tradition of gender equality in society in general as well as in academia (Hemlin 1997). A law on equality between women and men in working life was enacted in 1980 (Regeringens proposition, 1978/79: 175). This legislation has successively been reinforced to also cover equality within education. Teaching and learning about equality between women and men was introduced in compulsory and upper secondary schools in 1969 and 1970, respectively (Skolöverstyrelsen 1969). Today, it is imperative for all employers with more than ten employees to map the salaries paid and to draw up a plan for equality between women and men (Government Bill 1991). With this in mind, Swedish society can be assumed to be fairly well off regarding equality between women and men; these expectations should also hold

true in HE since both laws apply to HE institutions as employers. Each (disciplinary) department in HE offering doctoral education also has to formulate plans for reaching and maintaining gender equality—in this study, this is referred to as gender equality work.

Design and method

The first step of the study was to investigate whether or not differences in gender composition are expressed in how organisational work on gender equality is considered. To study this, we qualitatively analyse attitudes towards gender equality work (i.e., activities aimed at gender equality and gender balance) within different disciplines in relation to doctoral education.

The study focuses on six academic disciplines in Sweden: two male-predominated—one from the social sciences (soc) and one from natural science and medicine (nat/med); two female-predominated—one from social sciences and one from natural science and medicine; and two gender-mixed—both from the humanities (hum). Statistical evidence was used to determine “male-predominated” disciplines (more than 75 % men), “female-predominated” (more than 75 % women) and “gender mixed” (the composition of sexes falling within the 40/60 % range) with regard to each discipline’s research and teaching staff. The data collection included 24 interviews (two per discipline) at each of two large Swedish universities.

Questions concerning activities aiming at gender equality in doctoral education were directed at supervisors and directors of research studies. Furthermore, an electronic survey questionnaire, based primarily on categories of answers identified in the interview study, was sent to all senior staff in Sweden (professors, associate professors, and senior lecturers) within the disciplines studied. A total of 283 answers were returned, yielding a total response rate of 30 %. While this is admittedly a low return rate, it is sufficient in this case since the number of senior staff who lack experience in doctoral education can be quite high; moreover, the staff records can hold both emeriti and those who no longer work in the specific department. 89 % of those answering the survey had experience with doctoral student supervision, 40 % were professors and 30 % were females. 26 % ($N = 73$, 51 women and 22 men) were from female-predominated disciplines, 11 % ($N = 30$, 16 women and 14 men) from mixed, and 64 % ($N = 180$, 19 women and 161 men) from male-predominated disciplines. Different statistical analyses of the material were conducted, and factors from explorative factor analyses as well as differences in the variance between mean values for groups in the material were tested for significance. All of the survey results discussed here as differing over disciplines and/or faculties are significant ($p < 0,001$ or $p < 0.05$).

The next step of the academic career is the post- doctoral period. In order to study gender and disciplinary differences in exit from academia, individuals on the Swedish labour market with a doctor’s degree were tracked for up to 10 years after they had earned their degree. Data were drawn from Statistics Sweden (LISA Statistics Sweden, Longitudinal Integration Database for Health Insurance and Labour Market Studies). The database contains information about all individuals with a doctor’s degree in the Swedish labour market from 1992–2003 (a total of 43,274 individuals). The time period was set to capture the development during the 1990s, when a large expansion of Swedish HE took place. Around 1990, the number of students in undergraduate HE was 200,000, and by 2003, this number had risen to 360,000 since more economic resources had been added to the system through government decisions (Högskoleverket 1997, 2004).

With the intention of studying individuals who leave and who remain in academia, the material was split according to workplace, which was coded using Swedish Standard Industrial Classification (SNI), based on the EU's recommended standard for Statistical Classification of Economic Activities (NACE). This allowed for the classification of production units and companies according to their activity. Individuals holding a position on the Swedish labour market were included in the dataset, and this includes individuals who were on parental leave. Individuals coded as working within universities, higher education institutions, and publicly-funded research institutes were considered to be 'inside academia.' 'Leaving academia' meant that a person was not working in universities, in higher education institutions, or in publicly-funded research. The person could, however, hold a position that included research in the private sector, such as pharmacological research.

In order to study gender differences in post-doctoral careers, we followed the cohort that received their doctorate degrees in 1993 in order to determine where they were working 1, 5, and 10 years later. The result was then compared with the cohort of 1995. The category '1 year after the doctoral degree' showed the direct actions of men and women after obtaining their degrees. After 5 years, an individual could be expected to be more or less established in the labour market and even more so after 10 years. In 1993, 1,036 individuals received a doctoral degree (70 % men and 30 % women), and 958 of these individuals could be identified as holding a position in the Swedish labour market.¹

The material was also split according to academic field using SUN, Swedish Educational Terminology (adapted to the international terminology ISCED 97, International Standard Classification of Education), which is the standard for the classification of educational programs. The SUN codes determine the discipline of the individual's doctoral degree. Since the number of doctoral degrees, according to the classification of Statistics Sweden, can be very small in certain areas, and only the results of the five largest research areas are shown: humanities and religion, social sciences, natural science, technology, and medicine.

Disciplinary differences in gender equality work in doctoral education

Previous research on disciplinary differences in doctoral education has pointed out considerable differences concerning research cultures (Deem and Brehony 2000), degree of recruitment and completion (Smeby 2000), and teaching (Neumann 2001; Neumann and Becher 2002). Additionally, research on gender significance in doctoral education has revealed differences in how doctoral education is perceived (Wall 2008) and completed (Seagram et al. 1998). In this study, we investigated whether or not differences in gender composition are expressed in how organisational work on gender equality is considered. What attitudes towards gender equality work (i.e., activities aimed at gender equality and gender balance) within different disciplines in relation to doctoral education, were found?

Answers to questions about admission and selection processes of new doctoral students yielded a clear pattern in relation to faculties, and not gender: In the humanities and social sciences, the admission procedure was mainly based on a collegial rationale (soc 84 %, hum 69 %, compared with nat/med 29 %). This rationale means that the application and selection procedures are coordinated in special admission committees where colleagues are

¹ The remaining 78 persons cannot be found on the Swedish labour market. This means that they are either deceased or work abroad. The majority of these individuals are likely to be on post-doc positions abroad.

involved and where the existence of shared criteria for the rating of doctoral candidates is obvious. Within natural sciences and medicine, an individual rationale was more common, or was combined with a collegial one (nat/med 71 %, hum 31 % and soc 16 %). The individual rationale is instead based on each supervisor or director of research studies having responsibility for the whole application and selection process. Each individual supervisor can decide the criteria used in the selection of doctoral students and also to decide on the applications. Staff in nat/med disciplines also viewed the entire admission procedure as being less open and more biased than staff did in other disciplines. In this area, therefore, differences are found in relation to faculty affiliation variations (Haake 2011).

However, several areas in this study revealed gendered discipline cultures in relation to gender equality work in doctoral education. The interviews and the survey asked for explanations as to why disciplines were or were not predominated by one sex. Reasons for gender-imbalance given by supervisors in male-predominated disciplines were based on explanations internal to the discipline; the power to change resides to a great extent within the discipline itself. The methods used for change were identified as utilising same-sex role models ($X = 3,7$ for male-predominated and $X = 2,4$ for female-predominated disciplines²) as well as networks and mentors ($X = 3,5$ for male-predominated and $X = 2,3$ for female-predominated disciplines). Thus, interventions were made to support the under-represented sex in homogeneous groups (Conrad and Phillips 1995; King 1998; Viefers et al. 2006).

Well, it is partly true that if you already have a male-predominated discipline; it continues to be male dominated. Because as a woman you might find it hard to enter a male-predominated world, so you chose a milieu...where you feel more at home as a person. If you look at for instance PhD student's admissions, I think that, even though this will be eagerly denied from many directions, men are keener on choosing men as doctoral students. (m, male, nat/med)³

But I don't know why a rather permanent gender-imbalance exists and differs between disciplines. It partly has to do with the lack of role models and good examples [for the under-represented sex]. (m, male, soc)

But, what do we actually do? One thing of course is that those women who are here should feel comfortable, and that they are not discriminated against; rather, they should get extra support. The female doctoral students that are in the system can be used as ambassadors or role models for undergraduate students; they should meet with them. But that is a rather passive activity in some senses. (m, male, nat/med)

The interpretation of these quotes is that gender equality problems, in male-predominated disciplines, are considered to exist mainly because of the handpicking of doctoral students are made out of homo-social preferences, of the presence of too few female role-models in the departments, and of the appearance of discrimination of women. The interviewees, thus, focus primarily on their own shortcomings in relation to gender imbalance and gender inequality.

² All mean values (X) in this study are related to answers on a scale from 1 to 6, where 1 is disagree and 6 is fully agree.

³ In parenthesis, the sex of interviewee (m or w), if the discipline is male-predominated, mixed or female-predominated (male, female or mix), and if the discipline is in the area of humanities (hum), social sciences (soc) or natural science and medicine (nat/med) appear.

Explanations for gender imbalance within female-predominated disciplines tended instead to focus on factors outside of the discipline in how historical and cultural factors of society have influenced the gender-labelling and status of work domains and occupations. An explorative factor analysis shows that the female-predominated disciplines attach significantly more importance to the factors 'undergraduate education is predominated by one sex and results in occupations that are gender-labelled' and 'the discipline is gender-conscious and of low status.' The interviewees acknowledged that the status and credibility of their disciplines was low, which may explain why it is difficult to recruit more men in these areas (August and Waltman 2004; Umbach 2007; Viefers et al. 2006).

Individuals in female-predominated disciplines also favour the explanation that gender equality work brings changes to the discipline's status and salaries and therefore possibly to changing the discriminating patterns of 'many women = low status' ($X = 4,7$). On the contrary, individuals in male-predominated disciplines do not agree that this issue is an important one for gender equality work ($X = 2,3$). For female-predominated disciplines, concrete gender equality work also differs towards more general activities that are not based on special treatment of the under-represented sex. Instead, gender-conscious doctoral courses for both men and women were encouraged ($X = 1,9$ for male-predominated and $X = 4,4$ for female-predominated disciplines), even though only a few men would be available to participate in such activities (according to the low number of men in these disciplines).

Well, it has to do with traditions, the tradition that this occupation [has] always been aimed at women. So it has to do with traditions. (w, female, nat/med)

From analyses made and from what you guess yourself, the explanation is that this discipline's everyday subject has been a female area of responsibility, at all times and in all cultures. (w, female, soc)

Somewhere, I read...that if we only got more men in our discipline, we would also be better paid. It would raise our salaries... and that would strengthen our discipline. But, we are dealing with a traditional female occupation so.... (w, female, soc)

Generally, I think that if its legitimacy and status could be improved, we could attract more men to the discipline. (w, female, soc)

Here, within the female pre-dominated disciplines, the interpretation is that interviewees perceive old traditions as the largest problem for achieving gender equality, not discipline-internal aspects. The disciplines are connected to traditionally female working areas, areas that in our society have low status and do not attract men. In the analysis different views of how to tackle this matter are shown. One understanding is that more men in the discipline will result in higher status and legitimacy. Another is that if the discipline gains higher status it will attract more men.

In sum, both male- and female-predominated disciplines, attitudes and actions point to an essentialist view of gender (Bourdieu 2001; Moi 2002). In some studies, the effectiveness of gender-specific support strategies, favoured by informants from male-predominated disciplines over those from the female-predominated ones, is questioned (Blackmore 2006; Haake 2009; Madden 2005). These studies suggest that gender-specific interventions may turn out to be counterproductive since they may contribute to increased dualism between sexes as well as the preservation of traditional gender roles. Also, in some cases, it appeared to be acceptable in female-predominated disciplines to hold the view that gender imbalance was unproblematic and that female dominance was acceptable.

Conversely, this view did not seem to be practicable in the male-predominated disciplines. No answers were given in which supervisors from male-predominated professions said anything in favour of the male dominance of their discipline. At the same time, examples of male supervisors handpicking male doctoral students were pointed out as bad examples. From a female-predominated discipline, the following example shows the opposite:

There are a lot of successful women when it comes to research and doctoral education, but one should not exclude any group. You should see beyond male and female and look at the competence instead.... But well, men should not be excluded, but I do not think that there is any reason to try to get more men because there is no evidence that men would be more successful than women. (w, female, nat/med)

So far, we have shown that substantial differences regarding the way gender equality work is viewed depended on whether the discipline is male- or female-predominated. The disciplinary differences, in relation to the predomination of male or female staff outlined by this horizontal analysis, should further be analysed if activities for concrete gender equality work, in different doctoral education, attempts to be less gendered than is shown here.

Disciplinary differences at the post-doctoral level⁴

Do men and women leave academia to the same extent in medicine and in the natural sciences as in the social sciences and humanities? In other words, do we see the same pattern of gender differences in all academic fields? In order to investigate this, we used a longitudinal method to study men and women's actions after earning a doctorate degree. If the choice is to stay or leave academia is the same, this would indicate that the gender difference is more or less the same over disciplines. However, if academic exit varies over fields, it is also indicative of different pre-conditions for post-doctoral careers for men and women.

Leaving academia—exit—can be related to opportunities on the labour market (Blackaby et al. 2005). However, when gender is taken into consideration, more attention is paid to the family situation (Preston 2004). Exit can be viewed as an expression of choice or as an expression of exclusion. If exit is a choice, women may be more prone to leave their academic careers because they are disappointed with academia or because they are offered better jobs outside of academia. If exit is about exclusion, women may leave academia because the environment is not welcoming to them or because they are not admitted on a permanent basis. The option of an alternative job market as well as loyalty to the institution is expected to affect the choice to exit (Blackaby et al. 2005; Hirschman 1970). Exit as exclusion can be related to theories of discrimination or to the conceptions of women having limited career possibilities due to higher family workload (Bagilhole 1993; Committee on Maximizing the Potential of Women in Academic Science and Engineering (U.S.) 2006; Preston 2004; Stolte-Heiskanen 1991).

Women might have different experiences of academia than men (Aisenberg and Harrington 1988; Husu 2001a; Sonnert and Holton 1995) or exit might be related to salaries (Blackaby et al. 2005) or possibilities to receive a job outside academia (Siemenska 2000). Previous research indicates that men and women have different reasons for staying in or leaving academia (Fridner 2004; Preston 2004). Swedish higher education

⁴ Parts of this investigation are presented in Silander (2010).

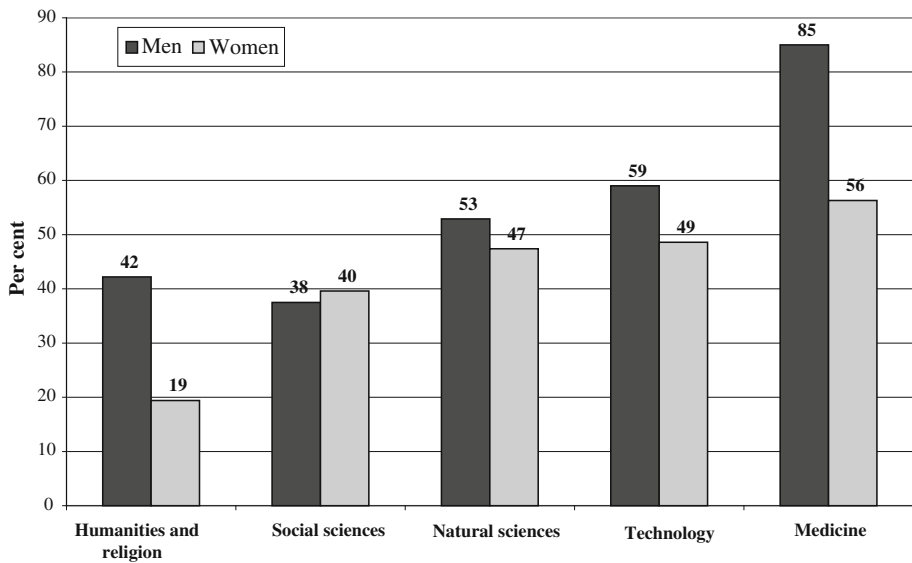


Fig. 2 Per cent of women and men outside academia 5 years after earning their doctoral degree by research area (cohort 1993)

and labour market are horizontally gender divided making career option different for men and women (Berggren 2011). Here, our main purpose is to see if there are differences between disciplines in the actions of men and women during the period after earning a doctorate degree.

The results, illustrated in Fig. 2, show individuals with a doctor's degree working outside academia 5 years after earning their degrees, categorised according to academic fields (Silander 2010).

On a general level, previous research has showed that proportionally more women than men leave academia after obtaining a doctorate degree (Academy of Finland 1998; Husu 2001a; Rees 2001). Figure 2 shows that this is not the case in Sweden. This forces a re-examination of the theories regarding gender and academic exit because exit cannot explain the lower share of women in higher positions; instead, we hypothesise a mechanism of slower advancement for women than for men. Second, the graph shows that there are substantial differences in exit from academia between different groups of academic disciplines. More individuals leave academia in medicine, technology, and natural sciences than in humanities and religion and social sciences. For doctors of the former, a job market with good and relevant alternatives exists outside academia. This is not likely to be the case of humanities. According to the National Agency of Higher Education in Sweden, persons with a doctoral degree in Medicine, Social Sciences and Technology, are more likely to be established on the labour market than persons with a degree in Humanities or Natural sciences (Högskoleverket 2007, 2010). This fact does not, however, explain the gender differences. Third, Fig. 2 reveals that the gender composition of the exit rates varies according to research area; the gender differences are most evident in medicine, humanities and religion, where substantially more men than women leave academia after receiving a doctorate. In other disciplines, gender differences are less pronounced. Only in social sciences do more women than men leave academia, but the difference is not pronounced.

Table 2 Correspondence between gender composition 2009 and exit rates 2003

Research field	Gender composition	Gendered exit rate
Humanities and religion	Mixed	Higher exit for men than for women
Social sciences	Mixed	Mixed
Natural sciences	Male-predominated	Mixed
Technology	Male-predominated	Mixed
Medicine	Mixed	Higher exit for men than for women

Moreover, the relationship is reversed after 10 years when more men than women in the social sciences have left academia (not shown in figure).

There are substantial gender differences between academic fields concerning exit from academia, which indicates diverse conditions for men and women in academic careers. Special attention should be paid to the areas of medicine and humanities and religion, both of which have a rather mixed gender composition, but as shown in Fig. 2, the gender differences in exit are substantial. This also indicates a complex connection (without performing a statistical test) between gender composition and exit rates. Men leave academia in mixed areas such as humanities and medicine; meanwhile, the gendered exit rate is mixed in the male predominated areas.

The correspondence is illustrated in Table 2. Gender composition was measured as the share of women among lecturers in 2009 (Table 1), gender exit rates compared the share of men and women in academia 5 years after earning a doctor's degree (Fig. 2).

The differences between disciplines indicate that the presence of an alternative labour market can play an important role in explaining exit from academia and point to the relevance of viewing exit as the result of pull forces rather than push forces. These results are also in line with studies of academic exit in the field of economics (Blackaby et al. 2005; Booth et al. 2003).

Conclusions

The investigation into the horizontal dimension of gender equality in HE, has pointed at substantial gender differences between disciplines concerning the composition of gender, especially regarding the probability of leaving academia during the post doctoral career and in the attitude towards gender equality work. Previous research has demonstrated gender differences associated with disciplines, gender equality work, and disciplinary cultures. However, these research approaches are generally applied one by one. Here, we try to bring these approaches together.

There are differences in how gender equality work is viewed: male-predominated disciplines point to internal explanations of the imbalanced gender situation, while female-predominated disciplines focus on factors external to academia. In reporting on measures that were taken, or measures that should be taken to improve gender balance within their discipline, the interviewees in the male-predominated disciplines discuss mentoring female doctoral students, in providing role models, and other actions aimed at bringing change about for women and the female group. They say little or nothing about actions to change the disciplinary culture. It could also be noted that not many of the interviewees from female-predominated disciplines, speak of a need for cultural changes, even though their female domination is very strong.

There are substantial disciplinary and gender differences in men and women's actions during post doctoral careers. Contrary to previous studies (e.g., Academy of Finland 1998), and to our expectations, the analysis showed that men, not women, leave academia after obtaining a doctor's degree. On a theoretical level, this is a call for a revision of theories regarding exit as the result of push forces such as discrimination of women. On practical and political levels, it should be noted that reaching a statistical gender balance—we call it having a mixed gender composition falling within the 40/60 criterion—does affect women in academia; women are more prone to stay in situations with a mixed gender composition. The deviation in Table 2 is found in the social sciences, but after 10 years, male exit exceeds female exit as well.

The strong influence of discipline on academic identity suggests that disciplines need to be subjected to more systematic study regarding their influence on gender equality. Staff in male-predominated versus female-predominated disciplines do face different situations during and after their doctoral education, indicating that, in order to understand and change the imbalanced gender situation in HE, we should not assume that the situation is uniform within HE. Diversity is probably a more convenient metaphor to describe HE (Becher and Trowler 2001; Haake 2011; Lindberg et al. 2011). Biglan (1973, p. 210) asserts that 'any attempt at universal standards for academia will impose a uniformity of activity and output which is inconsistent with the particular subject matter requirements of specific areas.'

The findings of the horizontal differences in gender equality reveal that a one-dimensional explanation to gender inequality is too inflexible (also see Berggren 2011). Instead, the results lead the way for new theoretical explanations of the underrepresentation of women in academia. Our contribution, therefore, has practical as well as theoretical implications: political and administrative measures taken against imbalanced gender situations in HE should not be based on a mainstream conception of the cause of imbalanced circumstances, but rather on a careful and contextual analysis of the specific field. It seems important that measures taken are based on research. Theoretically, there is a need for a composite framework that can handle the different aspects of the varied worlds within academia.

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