

# Views from Above the Glass Ceiling: Does the Academic Environment Influence Women Professors' Careers and Experiences?

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**Abstract** Using data from 188 female full professors from all 14 Dutch universities this study examines whether skewed sex ratios in the environment and the absence of a women-friendly environment are related to their career path experiences and to their perception of the general ease of women's obtaining a professorship. Results from multi-level analyses show a positive relationship between the perception of women-friendly environment and both the experience of their own career path, and the perceived ease with which other women could become a full professor. Moreover results show that the higher the percentage of women professors in the academic field the stronger the relationship between perception of women friendliness and the experienced ease with which they became a full professor.

**Keywords** Gender · Academia · Women professors · Women-friendliness · Skewed sex ratios

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## Introduction

Although in most Western countries women now outnumber men at the undergraduate level, the number of female full professors in universities is still low. Recent statistics show that in 30 European countries on average 15% of full professors are women (European Commission 2006). This percentage varies between 2.3 in Malta and 29.1 in Romania. In the USA “among full professors at all institutions nationwide in 2005–2006 women held 24% of the positions” (West and Curtis 2006: 10–11). In all countries the same pattern can be observed: the higher the job level, the lower the percentage of women. This situation is not unique for universities; similar patterns are found in business companies (Helfat et al. 2006; Powell 1997).

In the present study we do not focus on the question of why the percentage of women professors is so low; instead, we try to explain the experiences of female full professors, that is, of those academic women who succeeded in breaking through the glass ceiling (Burke and McKeen 1992; Morrison et al. 1987). In addition to the own experiences of female full professors, whom we will henceforth refer to merely as ‘women professors’, we study their perception of how easy it is in general for women to become a full professor.

This study was done in the Netherlands, where the percentage of female full professors is below the average for Europe; by the end of the year 2005 only 9.9% of all full professors were women (VSNU 2006). An important characteristic of the Netherlands in terms of sex roles is the percentage of women who work part-time. The female employment rate in the Netherlands has risen sharply since the 1980s, and can now be considered high in comparison to other Western countries: 68% of women in the Netherlands

have some kind of paid work. However, 75% of those working women work for less than 35 h per week, almost twice the average in the EU-15. Moreover, the average working week shows virtually no sign of increasing (Portegijs and Keuzenkamp 2008).

Various causes have been proposed for the glass ceiling effect: overt sex discrimination (Bagilhole 1993; Steinpreis et al. 1999), the traditional division of household tasks and child care responsibilities (Pittman et al. 1999; Wilkie et al. 1998), incompatibility of family and professional roles (Probert 2005), sex differences in lifestyle preferences (Hakim 2006), self selection (Van Anders 2004), lower self esteem of women (Kling et al. 1999), less support from family, supervisor and colleagues (Van Daalen et al. 2005), sex stereotyping (Heilman 2001; Hopkins et al. 2002; Willemsen and van Vianen 2008), sexism (Krefting 2003), neglecting sex differences (Pinker 2008) and bias in recruitment and selection procedures (Steinpreis et al. 1999; Husu 2001; Van den Brink et al. 2006). Although many of the barriers mentioned above have probably been met by women professors, the fact that they actually broke through the glass ceiling may mean that they have found ways to handle them or neglect them. Moreover, some of the general sex differences may not apply to our sample, for instance, we can safely assume that these women are ambitious and career oriented (Noe et al. 1991).

To explain women professors' career path experiences and their perception of the general ease of women's obtaining a professorship we pay attention to a factor that seems to underlie many of the earlier explanations: the impact of their environment (Dreher 2003; Jansen et al. 2001). As Kanter (1977) already posited, if women are a minority the differences between men and women are exaggerated. This impacts negatively on women, resulting in heightened exposure to scrutiny, performance pressure, bias in the assessment of their performance and being viewed as women rather than as professionals. As a consequence women have more difficulty in rising to a higher position, both through there being fewer opportunities and through the undermining of their motivation.

In addition to the impact of sex ratios, men and women may appreciate various aspects of organizational culture differently (Van Vianen and Fischer 2002). In general men have a preference for power oriented cultures while women in general prefer people oriented cultures (Williams et al. 1989). Only recently, however, have the consequences of these differences been investigated (Maier 1999; Van Vianen and Fischer 2002). On the whole, masculine cultures are characterized by hidden assumptions, tacit norms and organizational practices that promote forms of communication, views of the self and definitions of success and of good management which are stereotypically masculine (Maier 1999). Exclusion mechanisms such as gender stereotypes and

prejudiced attitudes influence judgments and evaluations of women unfavorably (for instance Eagly and Johnson 1990). Not only masculine cultures and selection by others, but also self-selection, in terms of preferences for a specific environment, influences women's careers (Van Anders 2004).

The goal of this study is to find out how the actual environment in terms of percentages of women professors, and the perception of the environment in terms of women friendliness, affects the career experiences of women professors, and their perceptions of other women who seek to become professor or who have already reached senior positions. Of the actual environment we examine both the effects of percentages of women professors in a university and the percentage of women professors in an academic field (such as, for instance, Arts, or Life Sciences).

This study provides an addition to the literature, as it examines the experience and the perception of a seldom-studied group, women in universities above the glass ceiling.

### Sex Ratios

Kanter (1977) suggested that being a woman in an organization where men are the dominant, that is far more numerous, group, leads to lower probabilities of getting promoted, as women may get stuck in "women's slots" or dead-end jobs, and are overlooked for the really important high status jobs (p. 232–233). Related to, and often inspired by, this theory, a number of studies relates the percentage of women in lower positions to the percentage of women in higher positions. For instance, in a cross sectional study Goodman et al. (2003) found a positive relation between the percentage of women in lower management positions, and the percentage of women in top positions within organizations. Moreover, a number of longitudinal studies also show this effect. Jansen et al. (2001) found that the percentages of women at middle and higher levels in organizations in the Netherlands were the only predictors of an increase of the percentage of women in highest management levels after 2 years. A study by Dreher (2003) of 72 large US companies found essentially the same effect over an even longer period. Sex ratios for all managers in 1982 and/or 1992 were predictive of the sex ratios of senior managers in 1999: The more women there were in all kinds of management position at the first measurement, the more women were among senior management 7 and 17 years later.

The results of studies on the effects of sex ratios in academia are mixed. For instance, Sonnert et al. (2007) found an effect of the percentage of women among the faculty in science and engineering on the percentages of women among undergraduate majors in disciplines (biology, physical sciences and engineering) and departments (major science/engineering). An older study among Israeli

faculty (Toren and Kraus 1987) found an opposite effect: in the sciences, where the percentage of women among faculty was low (an average of 8%), women fared better, i.e., more often held senior positions like full professor (27%) than in the humanities, where only 7% of the women was full professor although they comprised 18% of faculty. The authors attribute this fact to differences between the fields, suggesting that in the natural sciences it is easier to apply objective output criteria than in the social sciences so that gender bias is less probable. Need et al. (2001) found that, in accordance with Kanter's (1977) theory, in Dutch schools with more women professors, female graduate students were more willing to invest in an academic career.

Most of the above studies show that in organizations where more women are present, it is more common for women to be promoted or hired for senior positions than in organizations where sex ratios are more skewed and women are a smaller minority. Or in other terms: Women in male-dominated environments are less likely to receive a promotion than their male colleagues (Maume 1999). In the present study, however, experiences and perceptions of women professors are studied in relation to the skewed sex ratio of women professors in a university and in an academic field, and not in relation to percentages of women in the entire university. However, Kanter (1977) described similar effects for women who can be considered tokens in the organization as a whole and for women who are tokens at the higher reaches of the organization, in her study the management level.

Kanter focuses mainly on the negative effects of being a token, that is, a person who is part of a small minority of up to 15% in their job or job level. They are treated as representatives of their category rather than as individuals, and at the same time are stereotyped. They are highly visible, which creates performance pressures. These negative effects make it more difficult for minority members to make a career. When the minority group is somewhat larger, these negative effects diminish, as the minority members can more easily form coalitions and influence the culture of the group (Kanter 1977, p. 208–210). Being a member of a minority can also have other effects that have been studied from other theoretical viewpoints. For instance, from the perspective of Social Identity Theory it is to be expected that being a member of a minority enhances one's identification with the group, and makes people perceive their own group as more homogeneous than the dominant group. This perception of in-group homogeneity indeed also occurs for women in academia (Brown and Smith 1989; Hewstone et al. 2006). It is therefore to be expected that women professors will think that other women professors, will have had similar experiences, and have met with the same barriers, as they have had on their career path.

As mentioned in the introduction to this study we examine the effects of the percentage of women professors in a university and the percentage of women professors in an academic field (such as, for instance, Arts, or Life Sciences). Although a difference in the effects of the percentages of women professors in the university and in the academic field could be postulated, we refrain from doing this as there is hardly any evidence available regarding the direction of this difference. On the one hand, the more immediate daily environment, in our case the university, can be expected to be most influential. For instance, Sonnert et al. (2007) found that departments had a stronger influence than institutions on the percentage of women among majors. On the other hand, time may also be of importance, as more frequent exposure to a certain situation, like being in a minority in a certain occupation, can enhance the belief that this is the normal situation, and women professors will in general have a much longer experience in their academic field than in their present university.

Additionally, in line with the theory of Kanter (1977), which would imply similarity of experience because of similar token presence in organizations, we hypothesize that the effects of sex ratios will be analogous in the cases of universities and academic fields. The more women professors in the environment (both in terms of university and of academic field), the easier it will have been for women professors to become a full professor, and because of their own experiences they will have the perception that it is also easier for women in general to become a full professor.

Our first hypotheses then are as follows.

- H1: *The higher the percentage of women professors in a university (a), and in an academic field (b), the more women professors will report their career to professorship to have been easy.*
- H2: *The higher the percentage of women professors in a university (a), and in an academic field (b), the more they will perceive it to be easy for women in general to become a full professor.*

#### Perception of a Women-friendly Environment

Individuals who are task and power-oriented and consider themselves ambitious generally prefer competitive environments, while those who are more people-oriented generally prefer a supportive and less competitive environment. Van Vianen and Fischer (2002) found that managers rated the traditional masculine values of competition, effort and work pressure as more important than did employees who did not occupy a management position. Although, as expected, they found differences in masculine culture preferences for lower level employees, there were no differences in

preferences for employees at managerial levels. At this level women and men both prefer masculine cultures.

Moreover, in organizations with a perceived supportive work-family culture, where employees feel that managers support a work-family balance and that they are not expected to take work home at night and at weekends, both men and women were more attached to the organization and had lower levels of intention to leave (Thompson et al. 1999). If the shared values in an organization included aspects of organizational culture that were typically associated with women, like a positive orientation towards ‘humane’ factors (being nurturing, sensitive, kind, and generous), the percentage of women in management was relatively high. This percentage depended mostly on organizational practices that related to gender equity, like encouraging both women and men to participate in professional development activities, placing women in non-traditional roles, and giving equal opportunities for promotion to men and women (Bajdo and Dickson 2001). Especially in mixed groups, women do not like to be openly competitive, whereas men seem to like competition (Niederle and Vesterlund 2007). These gender differences in the propensity to choose competitive environments could explain the gender gap in higher management positions in competitive organizations like universities.

Together, these studies show that women fare better and have better careers in work environments that are, or are perceived to be, women-friendly. In this study we assume that these effects will hold even if the environment of women professors is male dominated in terms of sex ratios. Therefore we expect that the more women professors perceive their work environment to be women-friendly, the more they will report their own career as having progressed relatively easily, and the more they will have the perception that generally speaking women within academe have sufficient opportunities to become a full professor.

In line with these studies we formulate the following hypotheses for our study of women professors.

- H3: *The more women professors perceive their work environment to be women-friendly, the more they will report their career progression to professorship to have been easy.*
- H4: *The more women professors perceive their work environment to be women-friendly, the more they will perceive it to be easy for women in general to become a professor.*

In addition to the hypothesized main effects of skewed sex ratios and women-friendliness of the environment, we will explore the interaction effects of sex ratios and perceived women-friendliness of the academic environment. It seems logical to expect an additive effect, i.e., those women professors who work in a university with

many other women professors and who perceive their environment as women-friendly will have had fewer difficulties in attaining the professorial rank than their colleagues in other types of university and academic fields. However, as we have found no empirical studies providing a basis for such a hypothesis we will study this issue only exploratively.

Because women professors differ in other aspects which can affect the results of our multi level analyses, we controlled for some characteristics of the women professors, i.e. age, working full time or not, having a partner, having children, their tenure at professorial level, and whether they were retired or not.

## Method

### Overview

Data were collected from two sources. The larger part of the data stems from a survey among the members of the Dutch Network of Women Professors [Landelijk Netwerk Vrouwelijke Hoogleraren; LNVH]. All newly appointed female full professors are approached to join the network and nearly all of them (80–90%) do so. Because of this broad membership we assume that the members of the network will be, on average, reasonably representative of women professors in the Netherlands. The goal of this network is to promote the proportionate representation of women within the university community. It does so by building and maintaining networks to strengthen the ties among women professors, by addressing policy-making organisations in the field of science, and other activities. All members of the network are women who are full professors. Full professors have a special status in Dutch universities, all of which are at a level comparable to US doctorate-awarding universities. Full professors are the only faculty members who can advise the university on the awarding of doctorates and they have a different and higher status compared to assistant or associate professors. In the Netherlands only full professors can use the title “Professor” as an official title, and be addressed as “professor”.

Another part of the data stems from statistics on the numbers and percentages of female and male professors in Dutch universities and in academic fields, which are reported each year by the Association of Universities in the Netherlands, VSNU, on their website [www.vsnul.nl](http://www.vsnul.nl). Every year the VSNU presents a detailed overview of the numbers of female and male faculty and staff in Dutch universities. The data used in our analysis are as at 31 December 2005, the most recent available data at the date of our survey (April 2006).

## Participants in the Survey

A total of 188 women professors (47% response) participated in this survey. Participation was solicited by way of a letter and a questionnaire sent by the investigators to all members of the Dutch Network of Women Professors. The mean age of the respondents was 56.3 (SD=7.25); 76% were married or cohabiting, and 59% of the respondents had children. On average the respondents had been a full professor for 7.7 (SD=5.96) years, and 59% worked full-time. Of the 188 respondents 17 (9%) had retired from the university.

The percentages of women working as full professors in the Dutch universities vary both by university and by academic field. The larger fully multidisciplinary universities such as those in Leiden, Amsterdam, Nijmegen and Utrecht have a relatively high percentage of women professors, while the smaller universities, which developed from either engineering/technical institutions or out of economics schools, such as Delft, Eindhoven, Twente, Rotterdam and Tilburg, have relatively small numbers. In our survey a relatively high number of respondents were from the academic fields of Behavior & Society and Language & Culture, and only small numbers from the fields of Technology and Economics. However, the distribution of respondents across the different Dutch universities is generally representative for the distribution of women professors over the universities and over these academic fields (Universities:  $\chi^2(13)=7.67, p>.10$ ; Academic Field  $\chi^2(6)=2.37, p>.05$ ). Hence we conclude that our sample is representative for the population of women professors both as regards the university and the academic fields they are working in.

## Procedure

In the letter and questionnaire the respondents received by mail, a brief description of the study was presented: this indicated that the objective was to examine the preferences, experiences and opinions of the LNVH membership on a number of issues. Part of the questionnaire contained questions about what the respondents expected from the network itself, and about their opinion on a number of policy measures Dutch universities have taken to improve the representation of women; these questions are not included in the present analysis.

The respondents were given a choice as to how to complete and return the questionnaire. They could either do so in hard copy, returning it by means of a prepaid envelope, or use a URL and login supplied in order to complete it online. The on-line questionnaire was exactly the same as the paper and pencil questionnaire. Full anonymity of the respondents was guaranteed.

## Materials

Participants completed the online questionnaire or the hard copy questionnaire designed for this study. At the end of the questionnaire, participants were invited to add any comments they wished. The items used to construct dependent and independent variables of this study can be found in Appendix 1.

## Variables Derived from Survey Data

### *Demographics*

Information was collected on age, relationship status, parenthood status, educational status, department, school, and university. Relationship questions included whether the respondent had a partner, and was married or cohabiting. In the analysis these latter questions were recoded into partner or not (0=no partner; 1=living together or married). Parenthood questions included numbers of children, and if any children the age of the youngest and the eldest child. In the analyses only the first question was included (0=no children, 1=child or children). We also asked how many years the respondent had been a full professor (tenure as professor) in order to control for possible effects of changes in the percentage of female full professors in the academic field or university in the period since the respondent had become a full professor.

### *Experienced Ease of Obtaining a Professorship (Experienced Ease)*

Respondents were asked to indicate their own experience of becoming a professor through the question “Was it hard for you to become a full professor?”. Answers could be given on a five-point scale (1=“extremely difficult” to 5=“extremely easy”).

### *Perceived General Ease of Women's Obtaining a Professorship (Perceived General Ease)*

Respondents were asked to rate their agreement with the following statement: “In the Netherlands it is hard for women to become a full professor”. Answers could be given on a five-point scale (1=“totally disagree”; 5=“totally agree”). In addition, respondents were asked to react to the following statement “In the Netherlands it is hard for women to become a dean or a member of the Executive Board of a university”. The answers on these two items were highly correlated ( $r=.79; p<.01$ ). In the following analyses only the answer to the first statement is taken into account. In line with the hypotheses and the other

variables, the answers were reverse-coded so that a higher score indicated it was considered easier.

### *Women-friendly Environment*

A three-item-scale was used to assess the women-friendliness of the respondents' academic environment. The statements included in the scale were: "My university is women-friendly", "My school is women-friendly", and "My department is women-friendly". Answers could be given on a five-point scale (1="totally disagree"; 5="totally agree"). The internal consistency of this scale was good ( $\alpha=.82$ ). Scale scores were calculated as the average item scores.

Through a factor analysis we examined whether the three items of the women-friendly scale and the two dependent variables are sufficiently independent. Three factors were found (total explained variance is 85.1%). The factor loadings are presented in Appendix 2. The three factors cluster the three items of the women-friendliness scale and show independent factors for the two independent variables.

### Variables Drawn from National Statistics

#### *University Environment*

Based on the statistics provided by the Association of Universities in the Netherlands (VSNU 2006), for every respondent the actual percentage of women professors in their university ('% University') was added to the data set.

#### *Academic Field Environment*

Likewise, we allocated every respondent to one of the nine academic fields that the VSNU distinguishes; based upon the school and department they reported they were working in. The nine fields are: Agriculture, Science, Engineering, Life Sciences, Economics, Law, Behavior & Society, Language & Culture, and other disciplines. This academic field was then added to each respondent's record, as was the percentage of women professors working in that field in the Netherlands as a whole.

We analyzed whether the perception of women-friendliness differs for the nine academic fields and the 14 universities. In an analysis of variance with the perception of women-friendliness and the nine academic fields and 14 universities as independent variables, neither the academic fields ( $F(8,159)=1.01$ , n.s.) nor the universities ( $F(11,159)=1.46$ , n.s.) were significantly related to the participants' perception of women-friendliness.

### Analysis

Because some of intercorrelations between the independent variables are high we tested for multicollinearity. For none of the variables used in the analyses did we find a tolerance value less than .1 or a VIF value higher than 10. This means that there are no problems related to multicollinearity.

The data set consists of survey data of 188 women professors nested in 14 Dutch universities, supplemented with statistical data at the university and the academic field level. This means that the data can be conceptualized at three levels: 1. Information provided by the individual participants (experienced ease, perceived general ease, and perceived women-friendliness of the academic environment) 2. Information about the academic field (% academic field), and 3. Information about the university (% university). For the second level the assumption was made that the percentage of women professors in each academic field is the same within the different universities, and that the academic fields are nested within universities. As the data can be conceptualized at three levels: participants (women professors), academic fields, and university, it is appropriate to use a hierarchical 3-level modeling approach that simultaneously models effects at the within- and between subunit-levels (Raudenbush and Bryk 2002). Following a multi-level approach means that the analysis takes into account the hierarchical data structure (women professors within academic fields within universities) by using a hierarchical linear model. This is a statistical model for hierarchically structured data that takes into account within-group variability as well as between-groups variability. It is similar to a regression model but in addition includes random effects to represent the unexplained differences between groups: in this case between academic fields and between universities. Using ordinary least squares regression analysis would lead to unreliable results because participants working in the same university have common influences, so that the assumption of independent observations, required for ordinary regression analysis, would be violated (Bryk and Raudenbush 1992).

In multi-level analysis, the variance in the dependent variable is divided into variance that can be accounted for by the university level, the academic field and the individual level. In our research the variance for experienced ease of obtaining a professorship explained by difference between universities was 8.2%. This was 7.7% for the perceived general ease of women's obtaining a professorship. Fixed effects are entered into the model on the basis of theoretical considerations, as in multiple regression analysis. In this study, the presentation of results focuses on fixed effects. The increase in model fit (represented by the decrease in deviance) follows a chi-square

**Table 1** Means, standard deviations and correlations between the variables.

| Variables                 | Mean  | SD   | 1     | 2     | 3     | 4    | 5      | 6     | 7     | 8    | 9    | 10    |
|---------------------------|-------|------|-------|-------|-------|------|--------|-------|-------|------|------|-------|
| 1. Experienced ease       | 3.08  | .98  |       |       |       |      |        |       |       |      |      |       |
| 2. Perceived general ease | 2.00  | 1.00 | .30** |       |       |      |        |       |       |      |      |       |
| 3. % university           | 12.07 | 5.76 | .02   | .02   |       |      |        |       |       |      |      |       |
| 4. % academic field       | 11.64 | 4.27 | .04   | .08   | .67** |      |        |       |       |      |      |       |
| 5. Women-friendliness     | 3.28  | .93  | .28** | .35** | -.08  | -.03 |        |       |       |      |      |       |
| 6. Age                    | 56.27 | 7.25 | -.18* | -.09  | .04   | .01  | -.16*  |       |       |      |      |       |
| 7. Partner                | .76   | .43  | -.11  | .10   | -.04  | -.03 | .01    | .07   |       |      |      |       |
| 8. Fulltime               | .59   | .49  | .04   | -.15* | -.02  | -.09 | -.23** | -.03  | -.05  |      |      |       |
| 9. Children               | .57   | .49  | .06   | .03   | -.03  | -.02 | -.05   | .04   | -.14  | .05  |      |       |
| 10. Tenure as professor   | 7.73  | 5.96 | .11   | .02   | .09   | -.02 | -.09   | .56** | .14   | -.10 | .08  |       |
| 12. Retired               | .09   | .29  | -.07  | -.01  | .05   | -.04 | -.07   | .45** | .23** | .01  | -.02 | .46** |

Endpoints of the different scales: experienced ease, 1='extremely difficult', 5='extremely easy'; perceived general ease and women-friendly environment, 1='totally disagree', 5='totally agree'

\* $p < .05$ ; \*\* $p < .01$

distribution, with the number of added predictor variables as the number of degrees of freedom. The fixed effects of single predictor variables are comparable to regression coefficients in ordinary regression analysis. These were tested by means of one-sided  $z$  tests to the ratio 'estimate/standard error'.

## Results

### Descriptive Data

Means and standard deviations, along with correlations between study variables, are reported in Table 1. The Table shows that the women professors experienced their own career (the ease of obtaining a professorship) as more easy than they perceive that it is for women in general to obtain a professorship ( $t(169)=12.19$ ;  $p < .01$ ). In line with their own experience the women professors perceive their work environment as quite women-friendly. The percentage of women professors at the different universities and in the different academic fields are more or less the same, and are slightly higher than the 9.9% which were reported for 2005 (VSNU 2006).

The two dependent variables, experienced ease of obtaining a professorship and perceived general ease of women's obtaining a professorship were correlated ( $r = .30$ ,  $p < .01$ ). The two scales concerning actual sex ratios (% university, % academic field) were also correlated:  $r = .67$ ,  $p < .01$ . These two scales were not related to the perception of the women-friendliness of the environment ( $r = -.08$ , and  $-.03$ , both not significant).

Experienced ease and perceived general ease of becoming a full professor were positively related to the women-friendliness of the environment: the more the participants perceived their environment as friendly toward women, the

easier they reported had been their own experience of becoming a full professor ( $r = .28$ ,  $p < .01$ ), and the easier they thought it was in general for women to become a full professor ( $r = .35$ ,  $p < .01$ ). No relationship was found between the actual percentages of women professors in their university or academic field and ease of obtaining a full professorship, both as regards their own experience and for women in general.

### Testing the Hypotheses

In Table 2 the results of the multilevel analyses are presented. Model 1, in which only the control variables are included as predictors, shows an effect of age on the two dependent variables: the older the respondents, the more difficulty they reported having experienced in becoming a full professor and the more difficult they thought it would be for women in general to become a full professor. The latter effect, however, disappeared when aspects of the environment were entered in the model. We also found an effect of tenure on ease of becoming a full professor: the longer the respondents had been a full professor, the easier they reported their own career path to have been. To examine these two seemingly contradictory effects of age and tenure on experienced ease to become a professor the interaction effect *age X tenure* was calculated. However, the effect of this interaction was not significant (not in the table;  $B = .08$ , n.s.)

The different hypotheses predicted that the sex ratios (H1 and H2) and perceived women-friendliness (H3 and H4) of the academic environments would be related to the two dependent variables: experienced ease and perceived general ease. Therefore in Model 2 these aspects of the environments were added to the models. Because we did not hypothesize interaction effects, testing of these main effects was based on the results of Model 2.

**Table 2** Multi level analyses with experienced ease, and perception of general ease measures as the dependent variables.

| Variables                         | Experienced ease |         |         | Perceived general ease |         |         |
|-----------------------------------|------------------|---------|---------|------------------------|---------|---------|
|                                   | Model 1          | Model 2 | Model 3 | Model 1                | Model 2 | Model 3 |
| <i>Individual level</i>           |                  |         |         |                        |         |         |
| Age                               | -.41**           | -.36**  | -.37**  | -.21*                  | -.16    | -.17    |
| Partner                           | -.05             | -.05    | -.04    | .10                    | .11     | .11     |
| Children                          | .01              | .02     | .01     | .10                    | .10     | .10     |
| Full vs part-time                 | .04              | .11     | .11     | -.13                   | -.04    | -.05    |
| Tenure as professor               | .37*             | .39**   | .35**   | .07                    | .09     | .08     |
| Retired                           | -.01             | .03     | .01     | .07                    | .09     | .08     |
| (H3/H4) Women-friendliness (WF)   |                  | .30*    | .31*    |                        | .32*    | .32*    |
| <i>Academic field</i>             |                  |         |         |                        |         |         |
| (H1b; H2b) % Academic field (%AF) |                  | .07     | .10     |                        | .19     | .15     |
| <i>University level</i>           |                  |         |         |                        |         |         |
| (H1a;H1b) % University (%Uni)     |                  | .04     | .01     |                        | -.05    | -.05    |
| <i>Cross level</i>                |                  |         |         |                        |         |         |
| Interaction %Uni WF               |                  |         | .08     |                        |         | .01     |
| Interaction %AF WF                |                  |         | .12*    |                        |         | -.05    |
| Constant                          | 5.78             | 3.86    | 3.85    | 2.91                   | .89     | .89     |
| Model fit X <sup>2</sup>          | 472.57           | 443.44  | 433.21  | 470.57                 | 454.33  | 452.28  |
| Change in model fit               | 8.90             | 29.13   | 10.23   | 6.18                   | 16.24   | 2.05    |

Endpoints of the different scales: experienced ease, 1='extremely difficult', 5='extremely easy'; perceived general ease and women-friendly environment, 1='totally disagree', 5='totally agree'. The test of increased fit for the model 1 was related to the model with only the base-line intercept

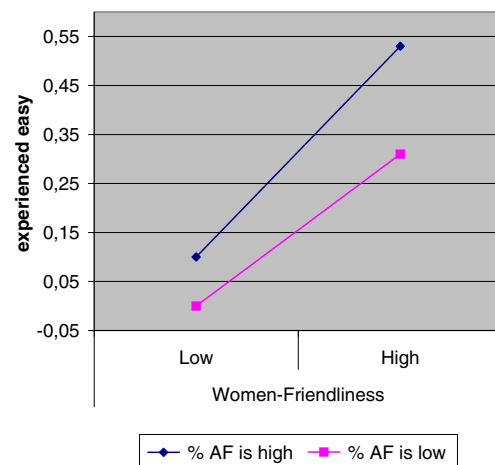
\* $p < .05$ ; \*\* $p < .01$

In the first two hypotheses we expected positive relationships between the percentages of women professors in a university and in an academic field on the one hand, and their own career experiences and the perception of the experience of women in general on the other hand. For the statistics-based sex ratios of the environments (percentage of women professors in the university, and in the academic field) no relationships were found for experienced ease of obtaining a professorship (respectively  $B = .07$  (H1a), and  $B = .04$  (H1b); both not significant) and for perceived general ease for women to become full professors (respectively  $B = .19$  (H2a); and  $B = -.05$  (H2b); both not significant). This means that we can not confirm H1 and H2.

In the third and fourth hypotheses we expected positive relationships between the perception of the women-friendliness of the work environment on the one hand, and their own career experiences and the perception of the experience of women in general on the other hand. In line with these hypotheses, the degree of women-friendliness of the environment did relate positively to how easy it had been for the respondents themselves to attain their professorship ( $B = .30$ ,  $p < .01$ ; H3) and to the perceived ease with which women in general could become a full professor ( $B = .32$ ,  $p < .01$ ; H4). This means that our third and fourth hypotheses are confirmed: the reported women-friendliness of the academic environment was positively

related to the experienced ease (H3) and the perceived general ease of women becoming a professor (H4).

To test the interaction effects between the actual environment in terms of skewed sex ratios and the perception of the women-friendliness of the academic environment, we calculated interaction effects for each dependent variable. In order to eliminate non-essential correlation between the



**Fig. 1** Experienced ease of obtaining a professorship as a function of the percentage of women professors in the academic field (%AF) and women-friendliness of the academic setting.



interaction terms and their component variables, all predictor variables were centered (Aiken and West 1991). In Model 3 the interaction effects were added to the model. The analyses showed a significant interaction effect between the percentage of women in the *academic field* × *women-friendliness* on experienced ease ( $B = .12, p < .05$ ). In Fig. 1 this interaction effect is depicted. The relationship between the perception of women-friendliness of the academic environment and the experienced ease of obtaining a full professorship was stronger when the percentage of women in the academic field was higher.

Exploratively, the two-way-interaction of % *Academic field* × % *University*, and a three way interaction of % *Academic field* × % *University* × *Perception of women-friendliness* were calculated. None of these interaction effects were significant (not in the Table; experienced ease:  $B = .04$ ;  $B = .13, n.s.$ ; and perceived general ease:  $B = .14$ ;  $B = -.03, n.s.$ ).

## Discussion and Conclusion

The aim of this study was to examine the relationship between the environment in terms of skewed sex ratios, the perceived women-friendliness of the academic environment, and experiences of women professors. In studying this relationship we examined whether sex ratios and the perception of a women-friendly environment could explain the experiences women professors themselves have had in becoming full professors and their perception of the general ease for women to become a full professor. To answer this question survey data from 188 Dutch women professors were combined with statistics on the percentages of women professors at the 14 Dutch universities and in seven academic fields.

### Testing the Hypotheses

Given the results of this study two main conclusions can be drawn. First, the skewedness of sex ratios in the environment, be it the university or the academic field, is not related to the experienced ease and the perceived general ease for women of obtaining a full professorship. Secondly, the perception of a women-friendly environment is, as expected, positively related to both the experienced ease and the perceived general ease for women of obtaining a full professorship. A further result is that the higher the percentage of women in the academic field, the stronger the relationship between the perception of women-friendliness and the experienced ease of obtaining a full professorship.

Contrary to our hypotheses we found no main effects of sex ratios, and just one interaction effect of sex ratios and women-friendliness: Only the sex ratio in academic

field × women-friendliness on experienced ease to become a full professor was significant. One reason for the absence of the main effect and of more interaction effects may be the lack of variation in sex ratios. That is, the sex ratios in the universities and academic fields of our respondents do vary, but without exception women form a small minority in the professorate: the percentage of women professors in any university varies between 1.8 and 14.1, in any academic field between 3.0 and 16.8. In terms of Kanter's theory, almost all respondents in our study are part of a minority of less than 15% and thus tokens (Kanter 1977). They all have probably met with more or less the same difficulties on their career path, and recognize that it is only realistic to expect that other women have the same problems in the same situation. Hewstone et al. (2006), who also tested Kanter's theory in academic settings, came to the conclusion that very few differences in experiences and perceptual processes existed between skewed (an average of 8% women) and tilted (27% women) groups. Apparently being in the minority is the crucial aspect, not whether it is a small or larger minority. In our case, as all our respondents turned out to be in just one condition of Kanter's theory, i.e., in the token position, not finding an effect of percentage of women does not really disconfirm Kanter's theory, but neither does it confirm the general idea behind her theory that the sheer number of women in an organization impacts on the perceptions and career perspectives of all women in that organisation. In future research it may be more fruitful to "look beyond the numbers" (Yoder 1994) and pay attention to other aspects of the environment than percentages of women alone.

One such aspect of the environment is how women-friendly it is, and this aspect did relate to the career experiences of women professors, as we had expected. Although we did not find a main effect of percentages on the perception of ease of making progress in their own career, the interaction effect of women-friendliness with percentage of women professors in the academic field demonstrates that it is important to have a few more women professors around for the women-friendly policies to have a stronger effect on women's careers. The hoped-for effect of a women-friendly culture, that it attracts women, may thus lead to an acceleration of this effect itself.

### Controls

Older participants in our sample have experienced situations in which women professors were even more of an exception than they currently are, and report a more difficult path to becoming a professor than younger respondents: the effect of age on experienced ease of obtaining a professorship is a strong negative effect. Moreover, older respondents have experienced how long

it took Dutch universities to get a few more women professors: from 3% in 1990 to scarcely 10% now. On the other hand, tenure was positively related to the experienced ease of becoming a professor: the longer one has been in the job, the easier it seems to have been to achieve this. This may seem inconsistent with the effect of age. Inspection of cross tabulations of age and tenure showed that, as is logical, the younger professors had less years of tenure as a professor, but in the higher age ranges both long and short tenure seemed equally present. Post hoc analyses (removing the respondents who were retired) showed that the correlation between tenure and age, which we found to be .56 ( $p < .001$ ) for the whole group, was due to a correlation between tenure and age in the relatively younger group (under 50 years;  $N = 79$ ); here the correlation was .43 ( $p < .001$ ). However, in the group of women professors over 50 years ( $N = 87$ ) some were just appointed while others had been a professor for a long time, and here the correlation was only .18 ( $p = .10$ ). Therefore, it is not so inconsistent that age and tenure do not have the same effect on the perceived experience of women professors.

#### Limitations

Although this study showed some clear relationships between perceived environment on the one hand and experiences on the other, it has a number of limitations. First, the cross sectional design of the study precludes a conclusion about the direction of some effects: whether the perception of the environment has an effect on the experiences of women professors, or whether the experiences have an effect on the perception of the environment of the women professors. The only conclusion we can draw is that the perception of women-friendliness of the environment and the past experiences of women professors are related. This limitation does, however, not apply to the sex ratios of the environment, though here we meet another limitation: we used the percentages of women professors within universities and within the academic field for the year the data were collected, whereas such statistics from before the time female faculty became professor would have been preferable. To compensate slightly for this limitation the number of years that a respondent has been a full professor was included in the analyses.

Another limitation concerns the high number of women professors working part-time: 41% of the respondents in our sample worked part-time. This makes the generalization of the results to countries where women and men professors predominantly work full-time difficult. Although working part-time is very prevalent among Dutch women, research shows that Dutch women (and men) full professors are less prone to working part-time than the general population and that they do not

differ from each other in this respect (VSNU 2006). The average labor contract of Dutch professors is for .85 fte (full-time equivalent) for women and for .87 fte for men. In the general population 75% of Dutch women and 15% of Dutch men work part-time (Portegijs and Keuzenkamp 2008).

As a final limitation we mention that we only used data of women professors, and therefore we do not know what the effect of the academic environment is on men professors, or whether there are any sex differences in this respect. However, as men professors are virtually never in a minority position like women professors, there is no reason to expect the same influences as women experience. Moreover, there is more to a minority like women in academic settings than just a numeric minority; women's minority status is intricately compounded with other gender differences in status and gender appropriateness of the academic work (Yoder 1994). In general the disadvantages of the token position are therefore not symmetrical, i.e., men's higher status in society may bring some advantages to a token position for them and make them, for instance, more easily promoted. In her study on two groups of workers in token positions, female police officers and male nurses, Ott (1989) summarized these differences in fairy tale terms: Men in feminine contexts are crown princes, women in masculine contexts Cinderellas.

In some respects, women professors may also be more similar to male professors than on the average women are similar to men. Women professors are more likely to be unmarried and childless than the general population. In our sample, 41% of the respondents were childless; while in the general Dutch population only 18% or less of the women of similar age groups are childless (Portegijs et al. 2006, p. 28). Therefore, these women are more similar to men than other women, in that they do not have primary responsibilities for household and children (Lyness and Thompson 2000), and therefore the gender differences may not be too large. Van Anders (2004) reports results that are in line with these expectations: women, more than men, perceive possible parenthood as a barrier to becoming professors and therefore self-select away from the professorate. Related to this limitation we do not know anything about the perceptions of women who are not (yet) promoted to full professor. The question for future research can be if it is possible to explain from their perceptions of their own career experience so far whether they will be promoted in the near future or not.

From an applied point of view the most important contribution of this study is probably that we demonstrated that, in universities as in other organizations, the sheer number of women in higher echelons may in itself have hardly any effects, but it does make a women-friendly environment more effective.

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## Appendix

Appendix 1. Items used for the construction of dependent and independent variables (in English and Dutch)

Experienced ease of obtaining a professorship (experienced ease)

1. Was is hard for you to become a full professor? (Was het moeilijk om een hoogleraar te worden?) (1= 'extremely difficult'; 5= 'extremely easy')

Perceived general ease of women's obtaining a professorship (perceived general ease); (1= 'totally disagree'; 5= 'totally agree'); only the first item was used.

1. In the Netherlands it is hard for women to become a full professor. (In Nederland is het moeilijk voor vrouwen om hoogleraar te worden)
2. In the Netherlands it is hard for women to become a dean or a member of the Executive Board of a university. (In Nederland is het moeilijk voor vrouwen om een decaan of lid van het College van Bestuur te worden)

*Women-friendly environment* (1= 'totally disagree'; 5= 'totally agree')

1. My university is women-friendly. (Mijn universiteit is vrouwvriendelijk)
2. My school is women-friendly. (Mijn instituut is vrouwvriendelijk)
3. My department is women-friendly. (Mijn afdeling is vrouwvriendelijk)

## Appendix 2. Results of a factor analysis

|  | Factor 1 | Factor 2 | Factor 3 |
|--|----------|----------|----------|
| My university is women-friendly          | .87      |          |          |
| My school is women-friendly              | .72      | (.38)    |          |
| My department is women-friendly          | .84      |          |          |
| Experienced ease of becoming a professor |          | .69      |          |
| Perceived general ease                   |          | (.31)    | .52      |

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