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# Same job, different status: gender differences in societal status perception of male and female scientists

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Scientists are generally perceived as high-status individuals. This paper examines how society perceives the status of scientists in relation to their gender and context. It relies on a survey experiment conducted with 773 participants from different Italian regions who were asked to assess the status of fictional scientists of different genders. The findings reveal a gendered disparity in status attribution: male scientists are consistently perceived as high-status by both male and female participants, whereas female scientists are attributed lower status, primarily due to the evaluations made by female participants. Notably, female participants from regions with higher levels of egalitarianism attribute higher status to female scientists compared to those from less egalitarian areas, thus narrowing the status gap between male and female scientists. Our work contributes to the discourse on gender in science by demonstrating that status emerges as a distinct dimension of inequality, can be measured independently, follows a gendered pattern, and is contingent upon social contexts.

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## Introduction

In recent decades, a discussion regarding gender inequalities in academia has emerged, inspiring scholars to investigate the topic and policymakers to act.

The literature emerging from this debate—and, more generally, from the debate on gender inequality – has primarily focused on gender disparities in terms of access to resources and power. A recent meta-analysis by Ceci et al. (2023) reveals that women in science achieve outcomes comparable to those of men in areas such as securing tenures, winning grant funding, receiving positive recommendation letters, and having their papers accepted by high-ranking journals. However, they continue to face disadvantages in advancement within the academic hierarchy, salary levels, and teaching evaluations. In the European Union, female scientists comprise 47.1% of postdoctoral researchers, 46.6% of assistant professors, and 40.3% of associate professors, yet only 26.18% of full professors (European Commission, 2021). Likewise, consistent evidence suggests that male and female students perceive male professors as being more knowledgeable and possessing stronger leadership skills in the classroom, despite learning equally from both men and women (Boring, 2017). Moreover, female academic scientists are often assigned administrative and institutional housekeeping tasks that limit the time they can dedicate to research, negatively affecting their scientific productivity (Bird et al., 2004). All of these aspects may contribute to the perception that women have a lower status than men (Larivière et al., 2013; Moss-Racusin et al., 2012; Shen, 2013).

This paper adds to the discourse on gender differences in status attribution within academia, a topic that has been largely neglected within scholarly investigations. This is a significant gap in the literature, as a *status difference becomes a separate factor that generates material inequalities between people, above and beyond their personal control of resources* (Ridgeway, 2014, p. 4). Consequently, the attribution of lower status to female scientists can exacerbate their difficulties in accessing resources and limit their influence.

This work intends to fill this gap by examining differences in society's perceptions of the status of male and female scientists. It also explores the differences in how status is attributed by female versus male evaluators and considers the impact of regional levels of egalitarianism. In brief, the paper answers the following research questions: *How does society perceive the status of male versus female scientists differently? How does the evaluators' gender, together with the extent of societal egalitarianism, impact the gender disparity in status recognition?*

Status ranks individuals in a social hierarchy based on shared beliefs regarding the worth of their groups (Berger et al., 1977; Jackson, 2010; Ridgeway, 2014). It derives from societal recognition rather than personal inclination (Goode, 1978; Ridgeway et al., 1998) and results from deferential behaviors and shared cultural beliefs in terms of honor, esteem, and regard for a group and its members (Griskevicius et al., 2010; Mullen et al., 1992; Munroe, 2004; Ridgeway, 1982; Weber, 1922/2015; Whyte, 1943). Status thus exists within the social realm, encompassing the relationship between an individual and their group or, as intended in this study, a group and society more broadly (Ridgeway and Markus 2022).

As a societal outcome, status is viewed as a socio-cultural schema with a dynamic interplay between norms and beliefs at its core (Ridgeway and Markus, 2022). These beliefs shape our perceptions of who deserves status: they are explicit and culturally transmitted ideas of those competencies, traits, and characteristics which are valued, and those which are not. Following Ridgeway (2011), this paper considers status as operating independently from, but often in interaction with, power and resource-based inequalities.

Among a myriad of social categories in human societies, gender is a primary framework for social relations. It operates as a system of social practices rather than merely a set of individual traits and produces inequalities that are deeply embedded and persistent in most societies (Ridgeway, 2001).

When considering gender inequality, we refer to a state of affairs in which the average member of one gender is disadvantaged compared with the average member of the other (Ridgeway, 2011). Gender perpetuates unequal status attributions, positioning men as the higher-status group linked with competence and agency, while women, who are associated with warmth and community, are attributed lower status (Conway et al., 1996; Cuddy et al., 2008; Fiske and Cuddy, 2006; Glick et al., 2004; Fiske et al., 2002).

Following this line of reasoning, we expected that female scientists would be perceived as having lower status than their male counterparts, and this effect would be gender-specific—that is, influenced by the gender of the evaluator and dependent on the context. To investigate such expectations, we conducted a survey experiment with a sample of 773 participants from various Italian regions. Participants were randomly assigned to evaluate fictional male or female scientists operating in one of four research areas (physical science and engineering, life sciences, social sciences and economics, and humanities). The findings from statistical analyses and econometric models reveal a gendered disparity in the attribution of status. Male scientists are consistently perceived as having high status by both male and female participants. In contrast, female scientists are attributed a lower status, primarily due to the evaluations made by female participants. Notably, female participants from regions with higher levels of egalitarianism attribute higher status to female scientists than those from less egalitarian areas, thus narrowing the status gap between male and female scientists.

This paper contributes to the growing body of research on gender in science by exploring a dimension of inequality related to broader societal factors (as recently called for in the meta-analysis of Ceci et al., 2023), particularly status. It provides insights into academic status disparities stemming from gender stereotyping and societal norms. In doing so, we shed light on the paradox whereby gender inequality receives more attention in societies perceived as more egalitarian, while the discourse on gender issues is notably quieter in less egalitarian contexts.

## Data and methodology

**Survey experiment in the Italian context**. We conducted a survey experiment (Druckman et al., 2006; Sniderman and Grob, 2003) in order to probe the status and gender stereotyping of scientists conditional to how egalitarian society is. Most research on gender differences in social status has been conducted on data from the United States (Conway et al., 1996; Correll, 2004; Fiske et al., 2002; Fiske and Cuddy, 2006; Griskevicius et al., 2010; Ridgeway, 2001).

We employ data from the Italian context, which is suitable for our purposes for three reasons: Firstly, gender roles are broadly traditional. Women in Italy often face greater pressure to fulfill traditional gender expectations, such as being the primary caregivers and homemakers (Giuliano, 2017). The National Institute of Statistics (ISTAT, 2023) reported significant ongoing challenges with gender stereotyping, especially regarding economic roles and family responsibilities, even though there have recently been improvements in this respect. Secondly, there are in Italy significant and notable differences across regions in terms of levels of egalitarianism in society. Those in Northern Italy generally display greater egalitarian attitudes toward gender

**Table 1 Description of research areas and the eight combinations considered.**

| Group of scientists | Explanation of the research area for the participant (English) |
|---|---|
| Male academic scientists in Physical Science and Engineering (PSE)<br>Female academic scientists in Physical Science and Engineering (PSE) | Physical Sciences and Engineering refers to the research area dedicated to the study of methods and matter. The main disciplines included within this research area are: mathematics, engineering, physics, chemistry, materials science, and computer science. |
| Male academic scientists in Life Sciences (LS)<br>Female academic scientists in Life Sciences (LS) | Life Sciences refer to the research area dedicated to studying living beings. The main disciplines included in this research area are: biology, human and animal medicine, physiology, neuroscience, environmental studies, and biosystems. |
| Male academic scientists in Social Sciences and Economics (SSE)<br>Female academic scientists in Social Sciences and Economics (SSE) | Social Sciences and Economics refers to the research area dedicated to studying society, economy, or politics. The main disciplines included in this research area are: sociology, psychological sciences, economics, political science, communication, and international relations. |
| Male academic scientists in Humanities (HUM)<br>Female academic scientists in Humanities (HUM) | Humanities refers to the research area dedicated to the study of human culture. The main disciplines included in this research area are: languages, literature, anthropology, history, philosophy, archeology, art, geography, educational sciences. |

The above definitions have been translated from Italian. An external agency translated and proofread the status scale for accuracy. It was subsequently cross-checked for consistency and scientific merit by the authors.

equality, influenced by better socioeconomic conditions and higher levels of education. Such shifts toward a more egalitarian society are notably less pronounced in southern/central regions of Italy, where traditional and conservative attitudes dominate to a greater extent. In the north, women are often more likely to partake in the workforce and have access to better educational and career opportunities than their counterparts residing in southern/central regions. Indeed, southern/central Italy continues to harbor more traditional views on gender roles. Historically, the effects of higher unemployment and slower economic development have helped maintain traditional gender norms (Amici and Stefani, 2013; Costantini and Monni, 2009). Finally, the present study follows up on an existing study on gender stereotyping in Italy published by Carvalho Silva et al. (2024), and thus contributes to an ongoing discussion that recognizes Italy as an appropriate context for such studies. For the same reason, our findings will be directly comparable to this prior study on the same context.

**Survey design**. The study leverages data from a survey experiment. The survey initially greeted the participants and introduced them to the study. A brief overview of the purpose of the study was provided—to understand the beliefs held by Italian society regarding academic scientists. Following this introduction, participants were asked for their informed consent, explaining that all data gathered would remain anonymous.

The second section of the questionnaire addressed the sociodemographic details of the respondents (e.g., gender, age, region, and type of employment). Additionally, we enquired as to whether the participant personally knew any academic scientists and, if so, how many. We then asked participants to rate their exposure to academic scientists in both traditional and social media, using an adapted Likert Scale ranging from 1 ("never") to 5 ("very often") (Mirón-Juárez et al., 2022).

Participants were then automatically divided into eight groups by Qualtrics software, with each group presented with a different scenario. Each scenario consisted of participants being exposed to a scientist of a certain gender and geographic area (e.g., the first group was exposed to a man in life sciences, the second to a woman in life sciences, and so on until all combinations were exhausted). Participants were asked to contemplate how society perceives of specific scientists and thus asked to assess what they believe society considers to be their status. This aligns with measuring status beliefs, defined by those perceptions which most people have of a group (Correll et al., 2017; Ridgeway et al., 1998). Investigating perceptions of what most people think allows comparisons with previous research and minimizes social desirability bias. The instructions given to participants were directly adapted from previous studies (Bye and Herrebrøden, 2018; Canton et al., 2023; Cuddy et al., 2007; Froehlich and Schulte, 2019; Fiske et al., 2002; Mize and Manago, 2018). An overview of the eight groups is provided in Table 1, and the definitions of the four different scientific disciplines were adapted from the taxonomy of the European Research Council (ERC) Panel.

**Data collection and sample**. The survey (full questionnaire available in the Supplementary information file) was distributed between 22nd September, 2023 and 4th July, 2024, to a sample of individuals who were predominantly born and raised in Italy. Participants were recruited via the *Prolific* platform, and the questionnaire was created with Qualtrics. Each participant received £2.00 as compensation for their involvement. The survey was submitted to 800 individuals, and 779 responses were received (97% response rate). Among respondents, only 6 identified as "non-binary" when asked about their own gender. Since this represented a small percentage, they were excluded from the study, resulting in a final sample size of 773 participants, with a balanced representation of men (50.7%) and women (49.3%). The sample is almost evenly divided between two geographic areas, with 52.4% from Central and Southern regions and 47.6% from Northern regions. Respondents were on average 35 years old, with ages ranging from 18 to 69 years. The average ages of female (34.9) and male (35.5) respondents were not significantly diverse ($t = 1.244$, $\Pr(|T| > |t|) = 0.2137$). Table 2 reports how observations are spread across characteristics of the respondents against manipulations (i.e., assessing female or male scientists and assessing scientists in physical sciences and engineering, life sciences, social sciences and economics, or humanities). None of the tabulations demonstrate a significant test statistic, suggesting that random assignment is effective and comparable across all observations.

In order to assess the adequacy of the sample size ($N = 773$), we applied the non-parametric sample size formula proposed by Banerjee (2020), which does not rely on distributional assumptions. The required sample size per group is calculated as:

$$n = \frac{\sigma^2}{\delta^2}\left(\frac{1}{\sqrt{\alpha}} + \frac{1}{\sqrt{\beta}}\right)^2$$

**Table 2 Characteristics of respondents against experiment manipulations (gender and research area of assessed scientist).**

| | Gender of assessed scientist | | | | Research area of assessed scientist | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Female | Male | $\chi^2$ | *p*-value | PSE | LS | SES | HUM | $\chi^2$ | *p*-value |
| Gender of the respondent | | | | | | | | | | |
| Female | 179 | 202 | 2.622 | 0.105 | 91 | 98 | 95 | 97 | 1.057 | 0.788 |
| Male | 207 | 185 | | | 105 | 94 | 99 | 94 | | |
| Do you have children? | | | | | | | | | | |
| Yes | 83 | 79 | 0.138 | 0.710 | 39 | 45 | 39 | 39 | 0.965 | 0.810 |
| No | 303 | 308 | | | 157 | 147 | 155 | 152 | | |
| Are you an Italian citizen? | | | | | | | | | | |
| Yes | 378 | 372 | 2.177 | 0.140 | 189 | 187 | 186 | 188 | 2.525 | 0.471 |
| No | 8 | 15 | | | 7 | 5 | 8 | 3 | | |
| Are you a student? | | | | | | | | | | |
| No | 233 | 239 | 0.181 | 0.913 | 125 | 103 | 123 | 121 | 7.710 | 0.260 |
| Full-time students | 99 | 97 | | | 50 | 54 | 47 | 45 | | |
| Working students | 54 | 51 | | | 21 | 35 | 24 | 25 | | |
| Which is your field of study? | | | | | | | | | | |
| Physical science and engineering | 45 | 49 | 2.236 | 0.692 | 27 | 27 | 22 | 18 | 9.855 | 0.629 |
| Life Science | 28 | 23 | | | 14 | 13 | 14 | 10 | | |
| Social science and economics | 36 | 34 | | | 16 | 21 | 14 | 19 | | |
| Humanities | 33 | 36 | | | 13 | 22 | 18 | 16 | | |
| Others | 11 | 6 | | | 1 | 6 | 3 | 7 | | |
| What is your occupation? | | | | | | | | | | |
| Employee | 152 | 164 | 3.402 | 0.493 | 76 | 83 | 83 | 74 | 7.939 | 0.790 |
| Entrepreneur | 76 | 76 | | | 40 | 33 | 39 | 40 | | |
| Homemakers | 15 | 8 | | | 9 | 5 | 4 | 5 | | |
| Retired | 7 | 4 | | | 3 | 3 | 4 | 11 | | |
| Unemployed | 37 | 38 | | | 18 | 14 | 20 | 23 | | |
| Which field is your work related to? | | | | | | | | | | |
| Physical science and engineering | 73 | 81 | 0.662 | 0.956 | 40 | 33 | 38 | 43 | 4.479 | 0.973 |
| Life science | 20 | 20 | | | 8 | 10 | 11 | 11 | | |
| Social science and economics | 66 | 64 | | | 33 | 33 | 29 | 35 | | |
| Humanities | 66 | 61 | | | 34 | 29 | 32 | 32 | | |
| Others | 56 | 58 | | | 28 | 32 | 31 | 23 | | |
| Do you know one or more academics? | | | | | | | | | | |
| Yes | 98 | 80 | 2.426 | 0.119 | 43 | 43 | 44 | 48 | 0.664 | 0.882 |
| No | 288 | 307 | | | 153 | 149 | 150 | 143 | | |
| Do you work in university | | | | | | | | | | |
| Yes | 351 | 348 | 0.228 | 0.633 | 170 | 178 | 176 | 175 | 4.576 | 0.206 |
| No | 35 | 39 | | | 26 | 14 | 18 | 16 | | |
| Geographic region of respondent | | | | | | | | | | |
| South/Central Italy | 204 | 201 | 0.064 | 0.800 | 96 | 100 | 109 | 100 | 2.042 | 0.564 |
| Northern Italy | 182 | 186 | | | 100 | 92 | 85 | 91 | | |

where $\delta = |\mu 1 - \mu 0|$ represents the observed absolute difference in group means, $\sigma^2$ represents the outcome (i.e., status; a variable introduced in the subsequent paragraph) variance for the control group (those assigned with a male scientist) and $\alpha$, $\beta$ are, respectively, Type I and Type II error rates. In our study, with $\delta = 0.3685$, $\sigma^2 = 1.9619$, and $\alpha = 0.05$, we estimated the effective power based on our actual sample size (386 participants with a female scientist and 387 with a male) by rearranging the Banerjee formula as follows:

$$\frac{1}{\sqrt{\beta}} = \sqrt{\frac{n \cdot \delta^2}{\sigma^2}} - \frac{1}{\sqrt{\alpha}} \Rightarrow \text{Power} = 1 - \beta$$

This formula yielded an estimated ex-post power of 94.4%, confirming that our study is adequately powered to detect the observed effect under conservative, distribution-free assumptions.

**Measuring status**. In measuring status, we adapted the status scale developed by Fiske et al. (2002), which is designed for participants to evaluate how society perceives the social status of a specific social group. Fiske et al. (2002) focused on prestige, economic success, and education. However, since our study focused on highly educated individuals (scientists), we maintained two out of three items, including prestige and economic success as in Cuddy et al. (2007). Instead, we replaced the educational item with a new item that considers societal impact, acknowledging that scientists are evaluated on their capacity to improve society. The scale assessment followed a 5-point Likert scale ranging from "not at all" to "extremely". Table 3 presents the distribution of scores for the total sample, the group in which the randomly assigned fictional scientist was female, and the group in which the randomly assigned fictional scientist was male. As can be seen, there is a slight tendency for respondents to assess the status of female scientists as lower than their male counterparts.

## Results

**Descriptive statistics and empirical strategy**. Before proceeding to a formal analysis, it may be useful to first examine the status measures across genders descriptively. Figure 1 represents the bar plots of the status dimension scores based on whether the assessed scientist is male or female. The plots indicate that respondents assign lower status scores to female scientists. These graphs provide an initial indication that society tends to perceive

**Table 3 Distribution of respondents across status assessment scores.**

| | Female No. | Female % | Male no. | Male % | Total No. | Total % |
|---|---|---|---|---|---|---|
| Prestige | | | | | | |
| 1—Not at all | 7 | 1.8 | 3 | 0.8 | 10 | 1.3 |
| 2 | 54 | 14.0 | 32 | 8.3 | 86 | 11.1 |
| 3 | 132 | 34.2 | 136 | 35.1 | 268 | 34.7 |
| 4 | 147 | 38.1 | 169 | 43.7 | 316 | 40.9 |
| 5—Extremely | 46 | 11.9 | 47 | 12.1 | 93 | 12.0 |
| Total | 386 | 100.0 | 387 | 100.0 | 773 | 100.0 |
| Economic success | | | | | | |
| 1—Not at all | 10 | 2.6 | 10 | 2.6 | 20 | 2.6 |
| 2 | 98 | 25.4 | 72 | 18.6 | 170 | 22.0 |
| 3 | 168 | 43.5 | 151 | 39.0 | 319 | 41.3 |
| 4 | 91 | 23.6 | 127 | 32.8 | 218 | 28.2 |
| 5—Extremely | 19 | 4.9 | 27 | 7.0 | 46 | 6.0 |
| Total | 386 | 100.0 | 387 | 100.0 | 773 | 100.0 |
| Societal impact | | | | | | |
| 1—Not at all | 17 | 4.4 | 10 | 2.6 | 27 | 3.5 |
| 2 | 108 | 28.0 | 81 | 20.9 | 189 | 24.5 |
| 3 | 159 | 41.2 | 154 | 39.8 | 313 | 40.5 |
| 4 | 90 | 23.3 | 115 | 29.7 | 205 | 26.5 |
| 5—Extremely | 12 | 3.1 | 27 | 7.0 | 39 | 5.0 |
| Total | 386 | 100.0 | 387 | 100.0 | 773 | 100.0 |

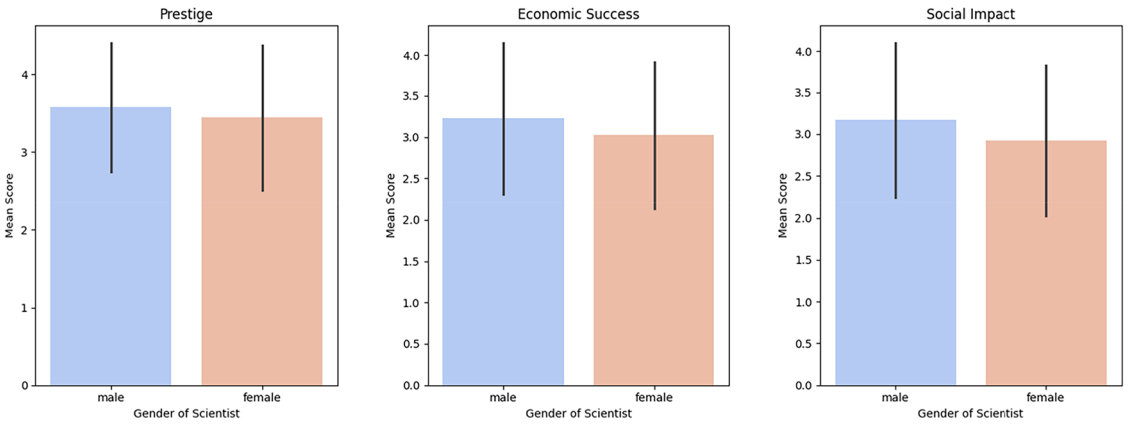


**Fig. 1** Bar plots indicating average scores of male and female scientists across three status dimensions: Prestige, Economic Success, and Social Impact. Error bars represent standard deviations.

female scientists as having lower status than similarly qualified male scientists, across all three dimensions.

The three measures of status were found to represent a unidimensional construct, as indicated by Cronbach's $\alpha = 0.7528$ and McDonald's $\omega = 0.7622$. This conclusion was further supported by Polychoric Principal Component Analysis, which suggested that the three measures could effectively be captured within a single latent component, referred to as "Status" (see Tables 5.1 and 5.2 in the Supplementary Information file for details).

However, creating a latent construct for status using this approach would result in losing approximately 30% of the total variation in measuring status. Consequently, the data was expanded so that each respondent was observed three times, corresponding to each of the three status measures, resembling a panel dataset. The subsequent analysis thus regresses against the five-level status measure provided by respondents. The dataset therefore, contains 2319 observations representing 773 respondents, each of whom assessed the same scientist across three different dimensions of status. A categorical variable was included in order to control which status dimension the specific observation refers to.

Given that the dependent variable is ordered and categorical, an ordered logistic regression model was deemed appropriate. The model's suitability was confirmed using the Brant test, which found no evidence of a violation of the proportional odds assumption (with $p$-values $> 0.05$ for all predictors). Due to the panel structure of the data, we opted for a random effect ordered logit specification. Indeed, a log-likelihood ratio test indicated that the random effects model is favored over a standard ordered logit specification (see the foot of Table 4).

For the sake of transparency, analysis was also carried out using a standard ordered logistic regression with standard errors clustered at the respondent level. This approach acknowledges the potential lack of independence among observations, as the same respondent assessed the same randomly assigned scientist across three different status measures. All regressions employed the Huber-White sandwich approach to estimate the standard errors of the coefficients, ensuring robustness against potential heteroscedasticity.

**Variables and main results**. To test how society perceives the status of scientists in relation to their gender and context, two

**Table 4 Econometric models.**

| Variabile | Model 1 Coef. | OR | Model 2 Coef. | OR | Model 3 Coef. | OR | Model 4 Coef. | OR |
|---|---|---|---|---|---|---|---|---|
| Interactions | | | | | | | | |
| Female participant assessing female scientist × North | | | | | 0.838*(0.475) | 2.311 | 0.673**(0.307) | 1.961 |
| Male participant assessing female scientist × North | | | | | 0.103(0.433) | 1.109 | 0.055(0.284) | 1.057 |
| Female participant assessing male scientist × North | | | | | −0.071(0.453) | 0.931 | 0.045(0.298) | 1.046 |
| Gender variables | | | | | | | | |
| Female participant assessing female scientist | −0.678***(0.230) | 0.508 | −0.658***(0.245) | 0.518 | −1.091***(0.351) | 0.336 | −0.795*** (0.226) | 0.451 |
| Male participant assessing female scientist | −0.448**(0.207) | 0.639 | −0.429**(0.217) | 0.651 | −0.482*(0.290) | 0.617 | −0.309* (0.187) | 0.734 |
| Female participant assessing male scientist | 0.061(0.221) | 1.063 | 0.136(0.229) | 1.146 | 0.161(0.314) | 1.175 | 0.044(0.208) | 1.045 |
| Male participant assessing male scientist | Benchmark | | Benchmark | | Benchmark | | Benchmark | |
| Geographic region of respondent | | | | | | | | |
| Northern | 0.015(0.158) | 1.016 | 0.088(0.183) | 1.092 | −0.097(0.309) | 0.907 | −0.108(0.201) | 0.898 |
| Central and southern | Benchmark | | Benchmark | | Benchmark | | Benchmark | |
| Research area of assessed scientist | | | | | | | | |
| Life Science | | | −0.127(0.234) | 0.880 | −0.160(0.232) | 0.852 | −0.090(0.151) | 0.914 |
| Social science and economics | | | −0.494**(0.225) | 0.610 | −0.510**(0.224) | 0.600 | −0.333**(0.148) | 0.717 |
| Humanities | | | −1.581***(0.236) | 0.206 | −1.607***(0.236) | 0.200 | −1.068***(0.158) | 0.344 |
| Physical sciences | | | Benchmark | | Benchmark | | Benchmark | |
| Status dimension | | | | | | | | |
| Economic | | | −1.187***(0.091) | 0.305 | −1.186***(0.091) | 0.305 | −0.818***(0.065) | 0.441 |
| Social impact | | | −1.432***(0.105) | 0.239 | −1.432***(0.105) | 0.239 | −0.981***(0.075) | 0.375 |
| Prestige | | | Benchmark | | Benchmark | | Benchmark | |
| Respondent controls | | | | | | | | |
| Has no children | | | −0.478**(0.207) | 0.620 | −0.503**(0.206) | 0.605 | −0.311**(0.131) | 0.732 |
| Is not italian | | | 0.067(0.462) | 1.069 | 0.174(0.450) | 1.190 | 0.064(0.286) | 1.067 |
| Has not got academic friends | | | 0.036(0.189) | 1.037 | 0.038(0.189) | 1.038 | −0.011(0.120) | 0.989 |
| Work at a University | | | −0.461(0.293) | 0.630 | −0.467(0.293) | 0.627 | −0.298(0.187) | 0.743 |
| Occupation | | | | | | | | |
| Employee | | | 0.028(0.216) | 1.028 | 0.034(0.216) | 1.035 | −0.003(0.140) | 0.997 |
| Entrepreneur | | | 0.055(0.262) | 1.057 | 0.056(0.260) | 1.058 | 0.012(0.171) | 1.012 |
| Homemaker/Retired/ Unemployed | | | 0.032(0.295) | 1.032 | 0.051(0.296) | 1.052 | 0.023(0.191) | 1.023 |
| Full-time student | | | Benchmark | | Benchmark | | Benchmark | |
| Geography controls | | | | | | | | |
| Log (number of academics) | | | −0.046(0.138) | 0.955 | −0.074(0.138) | 0.929 | −0.043(0.087) | 0.958 |
| Female share of academics | | | 0.091*(0.051) | 1.096 | 0.097*(0.050) | 1.102 | 0.064*(0.033) | 1.066 |
| Growth of female academics | | | 0.263(0.512) | 1.300 | 0.221(0.510) | 1.247 | 0.166(0.343) | 1.180 |
| Constants | | | | | | | | |
| Constant 1 | −5.482***(0.266) | | −4.201**(2.051) | | −4.316**(2.030) | | −3.049**(1.327) | |
| Constant 2 | −2.224***(0.183) | | −3.833***(2.044) | | −0.813(2.021) | | −0.559(1.313) | |
| Constant 3 | 0.392**(0.172) | | −0.963***(2.046) | | 2.059(2.023) | | 1.316(1.313) | |
| Constant 4 | 3.413***(0.203) | | 5.467***(2.053) | | 5.350***(2.030) | | 3.509***(1.317) | |
| Variance component | 3.472***(0.378) | | 3.841***(0.417) | | 3.808***(0.418) | | | |
| Global statistics | | | | | | | | |
| Observations | 2319 | | 2319 | | 2319 | | 2319 | |
| Number of respondents | 773 | | 773 | | 773 | | 773 | |
| Log-likelihood | −2860.944 | | −2722.708 | | −2720.450 | | −2957.488 | |
| Log-likelihood comparison | −3085.031 | | −2963.402 | | −2957.488 | | | |
| $\chi^2$ | 14.092 | | 320.428 | | 325.231 | | 305.481 | |
| LR test against standard model | 448.170*** | | 481.390*** | | 474.070*** | | | |
| Pseudo-$R^2$ | | | | | | | 0.046 | |

Models 1–3 are random effects ordered logistic models; Model 4 is a regular ordered logistic model with cluster corrected standard errors.
Coefficients listed left. Corresponsing odds ratios listed right. Standard errors in parentheses below coefficients.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

explanatory variables were employed. First, gender-related variables were created by considering respondent gender alongside the gender of the scientists whose status they had assessed. These variables are categorical, measuring whether the observation is a female (participant) assessing female scientists, a female (participant) assessing male scientists, a male (participant) assessing female scientists, or male (participant) assessing male scientists. For the sake of brevity, when presenting the analyses, we refer to *Gender Variables* as *Female Assessing Female*, *Female Assessing Male*, *Male Assessing Female*, and *Male Assessing Male*.

Secondly, a dummy variable (*North*) distinguished respondents located in the more traditional southern and central regions of Italy (coded as 0) from those in the more egalitarian northern regions (coded as 1).

The investigation began by examining only the main effects (Model 1, Table 4). Control variables were then introduced (Model 2, Table 4). Controls included a categorical variable capturing the research area of the assessed scientist and a categorical variable indicating which of the three assessed status types the observation refers to. Additionally, respondent-level characteristics were controlled, including the age of respondents, whether the respondent has children, whether the respondent is Italian, whether the respondent has academics as friends, whether the respondent works at a university, and the occupational status of the respondent. Furthermore, we obtained regional-level data on academics in Italy covering 20 different regions from the official website of the Italian Ministry of University and Research. These data encompassed the total number of academics in the area, the percentage of female academics, and the increase of female academics between 2012 and 2022, acting as controls for the possible exposure of respondents to female scientists. In the third and final random effects model (Model 3 in Table 4), the interaction effect between the gender variable and a dummy variable that indicates whether the respondent is from southern/central areas of Italy or northern areas was introduced. This was carried out in order to test whether the observed gender stereotyping is context-dependent.

Model 1 in Table 4 presents evidence indicating that female scientists receive significantly lower status scores, irrespective of whether they are assessed by male or female evaluators, compared to male scientists assessed by male respondents. To determine whether the coefficient associated with female and male evaluators assessing female scientists (−0.678 and −0.448, respectively) differs from the coefficient associated with female evaluators assessing male scientists (0.061), a Wald $\chi^2$ test was conducted. The results confirmed significant differences in both cases ($\chi^2 = 9.39$, $\text{Prob} > \chi^2 = 0.002$; $\chi^2 = 5.45$, $\text{Prob} > \chi^2 = 0.020$). Interestingly, no significant average difference was identified between male and female respondents in their assessments of female (or male) scientists. Thus, female scientists are consistently perceived as having lower status than their male counterparts, regardless of the gender of the evaluator.

Introducing the controls in Model 2 results in minimal changes to estimates and conclusions thus remain. With regards to controls, respondents generally assign higher status scores to researchers in the physical sciences than those in the social sciences and humanities. Additionally, they often assign greater importance to prestige than to economic and social impact status. Additionally, the analysis shows that respondents from regions with a higher proportion of female academics tend to provide higher status assessments than those from regions with a lower share of female academics.

**Heterogeneity analysis**. Model 3 examines whether the differences in status assessments across genders differ between respondents from egalitarian northern regions compared to more traditional southern/central regions. This analysis is conducted by relating the regional North with *Gender Variables* to the gender assessment categories. Our findings regarding gender persist. The interaction term between the variables *Female assessing Female* and *North* is significant at the level of 10%, with an estimated value of 0.838.

The Wald $\chi^2$ test identified whether there is any difference between *Male assessing Male* and *Female assessing Female* in egalitarian northern regions. This test investigates whether the coefficient of *Female assessing Female* (−1.090) plus the coefficient for the interaction between *Female assessing Female* and the regional dummy for the more progressive *North* (0.838) is significantly different from zero. The Wald $\chi^2$ was estimated at 0.580 with an associated $\text{Prob} > \chi^2$ equal to 0.445. The lower assessment of female scientists received by female assessors, as compared to male scientists assessed by male assessors, is only present in the more traditional south and central Italy and not in the more egalitarian northern regions of Italy.

Table 4 also reports the associated odds ratios of each estimate. For the *Female assessing Female* variable in Model 3, the associated odds ratio is 0.336. This suggests that in southern/central Italy, the odds of being in a higher status category are 2.976 times higher (1/0.336) for *Male assessing Male* than for *Female assessing Female*, keeping all other variables constant. The corresponding odds in egalitarian northern Italy are essentially zero.

The standard ordered logistic regression with clustering of error terms at the respondent level (Model 4 in Table 4) reports consistent results with those of the random effect specification only with stronger significances of the estimates associated with the interaction terms.

**Marginal effects**. To probe deeper into the results, marginal effects (linear predictions) and contrasted marginal effects (differences between groups) were calculated using the results of Model 3 in Table 4. The left panel of Fig. 2 displays the marginal effects for the four gender combinations across the two geographical areas, while the right panel contrasts the predicted margins of the north and southern/central Italy. Female respondents assessing female scientists report lower status assessments than any other group. While only significant at the level of 0.059, the female assessment of females are those observations with the greatest deviance between the traditional southern/central Italy and the egalitarian north of Italy as clearly indicated by the contrasted margins on the right-hand side of Fig. 2.

To further explore the differences in status assessments across groups, all eight groups were compared against each other (see Table 5.3 in the Supplementary Information file for results). In southern/central Italy, female respondents rated the status of male scientists higher than they rated the status of female scientists. However, in northern Italy, there was no statistical difference in the status assessments of female respondents for male and female scientists, with both male and female respondents providing similar ratings for male and female scientists. Male respondents did not score females differently in the traditional southern/central Italy to the egalitarian north of Italy. This observation can be attributed to the fact that male respondents in traditional southern/central Italy assessed the status of female scientists as significantly higher than their female counterparts. This suggests that in more egalitarian societies, there is greater alignment in status assessments between genders than in more traditional societies. Notably, given that our study is limited to a developed country setting, this observation should be interpreted with caution and not generalized to comparable contexts.

**Robustness across status indicators and research area**. To investigate variations across status indicators, the analysis was conducted separately for each of the three measures using a standard ordered logistic regression. Although the significance levels for the interaction effects were lower when considering economic impact and absent when evaluating social impact, the overall findings remained consistent across the various status dimensions (see Table 5.4 in the Supplementary Information file).

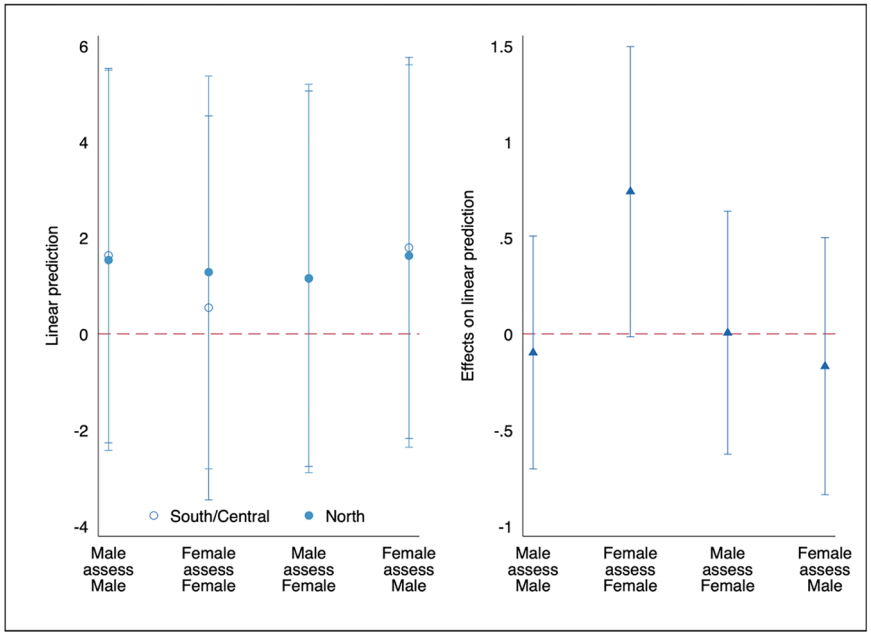


**Fig. 2** Plot of marginal effects of the four assessment groups across the two regions (left panel) and plot of the regional difference of marginal effect of the four assessment groups (right panel).

Moreover, separate analyses were conducted for each research area. The results were largely consistent with the main analysis for the social sciences, although weaker in significance. However, the humanities did not provide any evidence that aligned with the primary analysis, and the physical sciences and engineering results did not provide significant estimates, even though they were consistent with the sign of the coefficient (see Table 5.5 in the Supplementary Information file). It should be noted that the reliability of this analysis is uncertain given the substantial reduction in sample size.

## Discussion

This work examines how women and men evaluate the status of male and female scientists differently, highlighting the variation in these assessments based on the gender of the evaluators and the levels of egalitarianism (high vs. low) in the regions where evaluators reside. In so doing it addresses calls for research on gender differences in terms of status (Ridgeway, 2011, 2014; Ridgeway and Markus, 2022) and on the societal factors sparking gender issues in science (Ceci et al., 2023). More generally, it contributes to a wider discourse concerning the links between science and society (e.g., Beauchamp and Rios, 2020; Cologna et al., 2025; Fiske and Dupree, 2014; Sturgis et al., 2021; Sturgis and Allum, 2004). The findings from the survey experiment involving 773 participants from various Italian regions offer a comprehensive and nuanced picture of how the gender of scientists influences their perceived status in society, providing valuable insights for both scholars and practitioners. We find that female scientists are consistently attributed a lower status than their male counterparts. This effect is primarily driven by the evaluations made by women in less egalitarian regions, who tend to assign very low scores to the status of female scientists. In contrast, no significant differences exist in the evaluation of male scientists across gender or region.

This research enhances current knowledge in two key areas. Firstly, it adds to ongoing discussions regarding gender inequalities in academia by highlighting a frequently neglected yet essential aspect of inequality: status. While prior studies have mainly focused on disparities tied to unequal access to resources and power, this work defines and assesses status as a separate – and empirically significant—dimension of inequality. In doing so, we enrich the understanding of how gendered hierarchies are reproduced and legitimized within academic contexts (Ceci et al., 2014, 2023; Tartari and Salter, 2015).

Second, this work demonstrates that status attributions are shaped by individual traits—particularly the gender of the respondent—and contextual elements such as the degree of egalitarianism in their local area. This supports the theory that status operates as a sociocultural schema (Ridgeway ānd Markus, 2022), with its attribution reliant on existing societal norms and beliefs. Indeed, we find that in regions where gender equality is well-established and ingrained in social norms, participants assign similar scores to female and male scientists, regardless of their genders. In these contexts, public recognition that female and male scientists deserve equal status could support the discourse on current inequalities and approaches to addressing them. Conversely, in areas where social norms reinforce the belief that "science is not a field for women", women are often more critical of the status of female scientists, while men generally maintain more lenient views in their assessments. These results suggest that in regions where gender equality is at stake, women internalize the gender stereotypes rooted in local social norms such that gendered disparities in the scientific sector are more likely to be normalized. Women in less egalitarian regions, having likely encountered challenges in asserting themselves in a challenging social environment, anticipate that society will continue to uphold traditional power structures that subordinate women, even within the scientific community, despite the critical societal role of science itself. In these regions, many women believe there is a status gap between male and female scientists, which disadvantages women in science. Therefore, female scientists face challenges in securing support, even from their social group, which appears to reinforce stereotypical perceptions of women. This deep-seated stereotype may hinder the potential for collective action or institutional change.

As with any scholarly work, this paper has certain limitations that suggest directions for further research. Firstly, the focus is

exclusively on scientists, raising questions about its generalizability to other professions. Future studies are encouraged to examine gender differences across various professional social categories, particularly those associated with high social status. Secondly, although our findings shed light on how status perceptions differ across regional contexts, the unique cultural and institutional characteristics of Italy, along with the general socioeconomic conditions in Western Europe, may not accurately reflect situations in non-Western or developing nations. Further research is needed in order to determine whether analogous patterns exist in other countries. We therefore advocate cross-country studies that facilitate comparisons of status evaluations of female scientists within contexts shaped by distinct social norms. Recognizing status as a sociocultural construct, we consider these studies vital for deepening our understanding of how status influences the dynamics of the science-society relationship and the degree to which it is gendered. Thirdly, differences in how status is perceived across regions may lead to concerns in terms of endogeneity: does egalitarianism contribute to a higher perceived status for women, or does the high status attributed to female scientists prompt egalitarianism? Although our experimental design helps mitigate endogeneity concerns and current theory supports the first interpretation, it remains a limitation that must be acknowledged. Fourthly, our manipulations do not account for variations in age, race, or regional background of fictional scientists. Respondents may have applied certain assumptions to these characterizations which could lead to uncontrolled variation in how they judge status. Conducting experiments where manipulations address these factors may help clarify how gender interacts with other social group memberships in affecting status attribution. Is there an intersectionality in status attributions? Do women from minority ethnic groups experience twofold penalization? Although maintaining brevity and clarity is vital for experimental manipulations, future studies should investigate how these additional identity markers interact with gender and context in influencing the perceptions of status.

Our results offer valuable insights for practitioners interested in promoting inclusion in science, including policymakers and stakeholders in higher education. Efforts to promote gender equality in science should be context-specific, taking into account that the variations in social norms, culture, and beliefs impact status attributions. In regions where gender equality remains unachieved, it is crucial to highlight positive images of female scientists in significant social roles. This motivating message should primarily focus on women, particularly girls of a high school age, in order to illustrate the possibility of achieving equality. Additionally, it is essential to understand the relationship between status, resource acquisition, and power in these areas. Thus, it becomes vital to implement policies that improve women's access to scientific funding and empowerment programs. Put another way, in less egalitarian regions, where women often view the status of female scientists with skepticism, policies must not only emphasize structural inclusion (such as hiring quotas, visibility campaigns, and role models) but also confront entrenched social norms and gendered expectations through targeted educational initiatives (Lee, 2002; Ovid et al., 2023).

Likewise, in more egalitarian regions, it is essential not to underestimate the risk of *complacency*; that is, the assumption that gender equality has already been achieved (Carstairs and Janovicek, 2016). This could mask more subtle inequalities, including gender dynamics in recognition, credit attribution, and leadership opportunities. It is therefore essential to implement monitoring tools and accountability mechanisms in seemingly progressive regions in order to prevent the continuation of invisible or informal barriers.

## Data availability

The dataset generated and analyzed during the current study is available from the corresponding author upon request.

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## Author contributions

Conceptualization OM; Methodology OM and TR; Validation OM and TR; Data collection OM and CRL; Data curation OM and CRL; Data analysis OM and TR; Writing—original draft preparation OM and TR; Writing—review and editing OM and TR; Supervision TR; Project administration OM and TR.

## Competing interests

The authors declare no competing interests.

## Ethical approval

This study was conducted in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. The Ethics Committee of the Politecnico di Milano reviewed and approved this research. Approval was granted on December 21st, 2022 (Approval n. 51/2022), following the request submitted on December 5th, 2022, and the Committee hearing held on December 14th, 2022.

## Informed consent

Informed consent was obtained from all individual participants included in the study. Participants were informed about the research objectives, the voluntary nature of participation, the pseudonymous treatment of data, and their right to withdraw at any time. Consent was collected prior to participation using a mandatory opt-in form embedded in the online survey system (Qualtrics). Data collection occurred between September 22nd, 2023, and July 4th, 2024.

## Additional information

**Supplementary information** The online version contains supplementary material available at https://doi.org/10.1057/s41599-025-06376-5.

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