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Uncovering Barriers for Women in Russian Grant Funding: Exploring Rejected and Supported Grant Applications

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This paper analyzes data from about 400,000 supported and rejected grant applications submitted to the Russian Foundation for Basic Research (RFBR) from 1994 to 2016 across eight research fields, including STEM and Social Sciences & Humanities (SSH). This study examined gender disparities in the grant application process by analyzing the number of applications submitted, the percentage of applications supported, and the representation of women across different research fields and grant types. The results indicate gender disparities in funding, although there is a slow positive trend. Women are underrepresented in STEM fields and experience lower acceptance rates for both STEM and SSH grants. Additionally, women are more likely to participate in grant competitions for early-career researchers.

1. Introduction

Gender disparities in research funding have been widely studied, with evidence showing that women in academia receive less funding than men (Oliveira et al., 2019; Yip et al., 2020). While progress has been made in increasing the percentage of female researchers successfully receiving grants, a persistent gender gap still exists (Safdar et al., 2021). However, there is a lack of research on women's representation in grant application processes in Russia.

This study aims to address this gap by analyzing grant applications submitted to one of the largest scientific foundations in Russia over a 20-year period. The study covers eight research areas, including STEM and SSH, and examines different types of grants in terms of principal investigator (PI) academic experience and the purposes for which grants are applied.

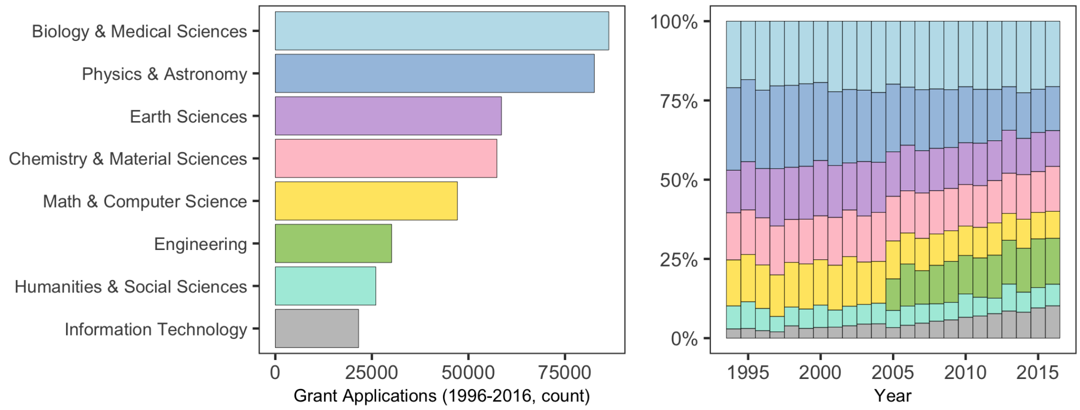
Results show that, although there has been an increase in female applications over the years (gender parity in the number of applications was achieved in two fields), men still have a higher proportion of winning applications in most fields. Women were more likely to apply for and win the less prestigious and lower funding competitions for early-career researchers focused on organizing events and publishing purposes. Despite some progress in achieving gender parity in certain fields, persistent gender inequalities remain in the research funding process.

2. Data

I have collected data on over 400,000 grant applications submitted to the Russian Foundation for Basic Research (RFBR) from 1994 to 2016. The RFBR provides financial support for a range of fields and grant types. The grants are distributed across eight main research fields. I determined the gender of grant applicants by analyzing the gender-specific endings of their last names. This analysis was performed for 326,661 applicants, with 75.5% of the applicants being male and 24.5% being female (see Supplementary Table S1).

The grants are distributed across eight main research fields. Biology *& Medical Sciences* and *Physics & Astronomy* are the two most popular fields, accounting for 21% and 20% of all grant applications submitted between 1995 and 2016. Most of the grant applications received by the RFBR are in STEM fields, with SSH accounting for only 6.4% of the applications (see Fig. 1).

Figure 1: Grants applications by research fields (1994-2016).

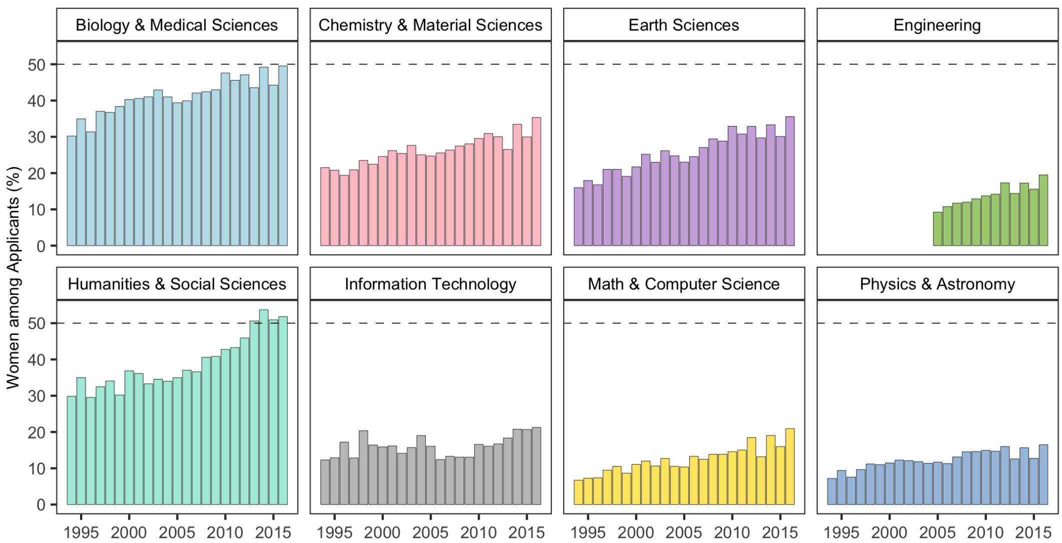


3. Results

3.1. Gender dynamics by research field

The number of applications submitted by women remained consistently lower than that of men, but the proportion of female applications has steadily increased. By 2016, the proportion of female applications had reached 31.8%, compared to 17.2% in 1994. Figure 2 illustrates the increasing female representation in grant applications across all research fields. SSH showed the highest proportion of female applications, with a steady increase from 30% in the 1990s to 50% at the end of the period. *Biology & Medical Sciences* also increased from 30% at the start of the period to gender parity at the end. *Physics & Astronomy* had the lowest proportion of female applications, gradually increasing from 7% in 1994 to 16.5% in 2016.

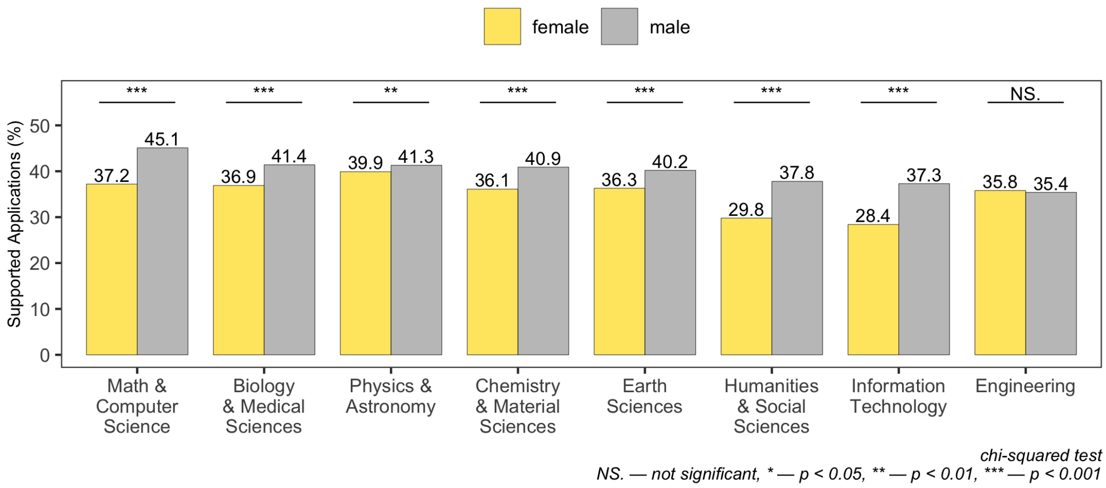
Figure 2: Proportion of women among grant applicants by field.



3.2. Supported applications gap

Figure 3 displays the proportion of approved grant applications for men and women in different research fields. The data indicates that men have a higher share of successful applications in *Math & Computer Science*, with 45.1% of applications submitted by men being approved. However, only 37.2% of applications submitted by women are approved in this field. The data also shows that in most fields, women have a significantly lower share of approved applications than men, with the largest gap observed in *IT* and *Social Sciences & Humanities*. The only field where the gap is not significant is *Engineering*, where both women and men have an equal share of approved applications.

Figure 3: Proportion of supported applications by gender.



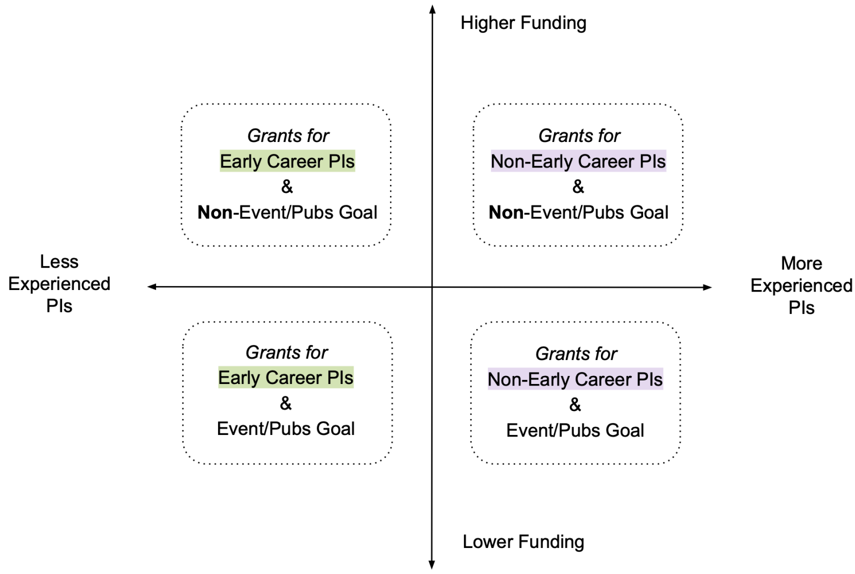
When we analyze the gender gap in accepted applications by year, we observe a pattern of a higher level of support for women in *Engineering* (see Fig. 4) and similarly in some years for *Physics & Astronomy*. However, in all other fields, the trend is a higher level of support for men, which is consistently observed annually.

Figure 4: Gender disparity in the proportion of supported applications by field.

3.3. Types of grants: Who can be a PI, and what is a goal

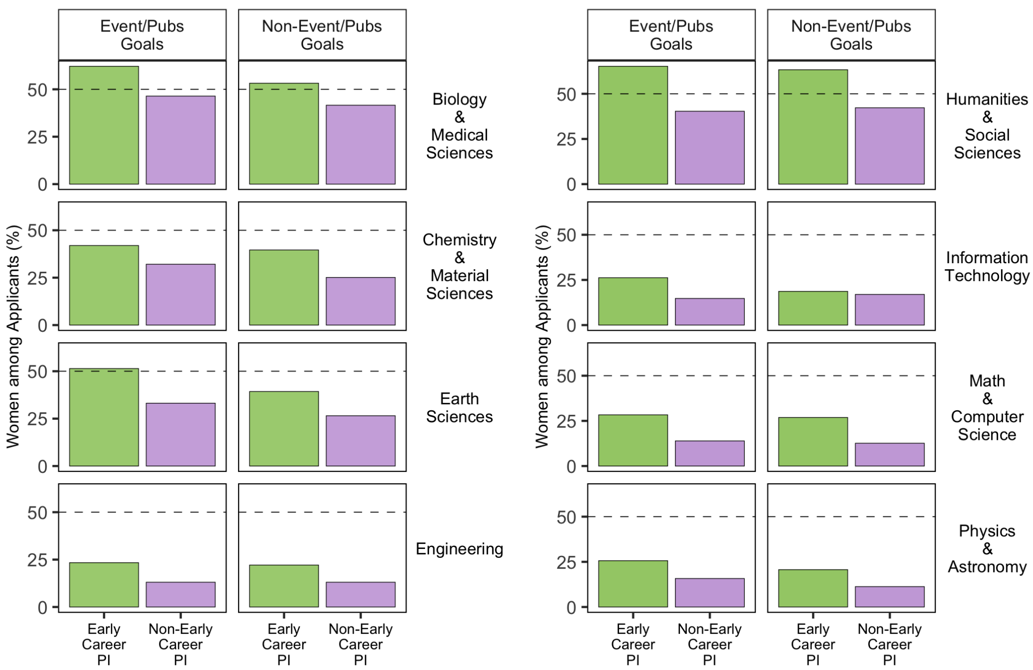
The RFBR provides grants not only in various research fields but also in different types of grants with varying goals and academic experience of a PI. The size of the financial support and expected results will also differ for different types of grants. For instance, grants may be awarded for organizing educational conferences or publishing books. These types of grants differ by funding size from the grants for laboratory research projects. We analyze grants separately for competitions targeted at early-career researchers and those not specifically targeted at them. Furthermore, we will distinguish between competitions that fund events/publishing and those that do not have such a focus. This classification will enable us to identify competitions of different "status," with varying funding levels and academic experience of PIs and results (see Figure 5).

Figure 5: Types of grants by PI academic experience and grant goal.



During the period under review, grants specifically aimed at early-career researchers were not available every year. However, when these grants were offered, we observed a higher proportion of women applying for them than other grants across all research fields (Figure 6). Additionally, when we classify grants based on their purpose and separate event/publication grants as a distinct category, we found that more women applied for these grants (which typically have lower funding levels) than those without such objectives.

Figure 6: Proportion of women among grant applicants by grant type (2005-2016).



Therefore, we conclude that the classification of grant types by status, as presented in Figure 5, is meaningful – we see fewer women applying for higher-status contests. Women are more likely to apply for grants for early-career researchers and those with event/publication goals. However, do they have a higher success rate in winning these grants? Preliminary analysis suggests a gender gap in supported applications favoring women for these types of grants. However, the trend is not consistently observed yearly (see Supplementary Figure S1).

4. Conclusions and Further Research Directions

We reviewed applications for RFBR grants and found that only 24.5% of applications were submitted by female PIs. However, the proportion of female applications has gradually increased from 17.2% to 31.8% from 1994 to 2016. By the end of the period, gender parity in the number of applications was achieved in SSH and *Biology & Medical Sciences*. In all other scientific fields, the proportion of female applications was significantly lower, but the gradual movement toward parity continued (see Figure 2). Men had a larger share of winning applications in most fields, except *Engineering*, with the greatest disparity in *IT* and *SSH* (see Figure 3).

Thus, we can distinguish three types of research fields:

- *Physics & Astronomy* and *Engineering*: these fields show relatively balanced chances of approving female applications. Although the proportion of female applications in these fields is still low, there has been a consistent increase in the share of female applications over time.
- *Social Sciences & Humanities* and *Biology & Medical Sciences*: the share of female applications is comparable to that of male applications. However, a higher proportion of applications are approved for men than for women.
- In *all other fields*, the share of female applications remains low (though increasing over time), and men are more likely to win applications than women.

Women were more likely to apply for grants targeting early-career researchers, organization of events, and publishing (see Figure 6), for which there is a gender gap in supported applications in their favor. These grants typically offer lower funding and attract PIs with less academic experience. Although women were more likely to receive such grants, it is premature to conclude that there is sustained gender bias in their favor at this stage of the study.

The research will be expanded to include a more detailed study of grant types. Currently, it is divided into relatively large groups – grants for early-career researchers, for events, for publishing books. However, in the future, we will rank the types of grants more carefully by their “status,” considering the maximum payout on grants and minimum academic experience of PIs, such as degree and position. In addition, we are currently conducting a textual analysis of the titles in applications to divide the eight research fields into subfields, as there is reason to believe that the subfields may have different gender structures.

Open science practices

The source code used in this study is publicly available on GitHub (https://github.com/hellche/grant_applications) and can be accessed by anyone interested in reproducing this work. The data used in this study was collected by web scraping from open sources. The final dataset is posted on OSF (https://osf.io/3xv9a/). A detailed description of the data collection process is provided in the supplementary materials (https://hellche.github.io/grant_applications/).
As someone who uses open-source software such as R and Python, along with their packages/libraries developed by other people for general use, I strongly support the {softbib} initiative (Arel-Bundock, 2023). The {softbib} scans a project folder, identifies the software used, and

automatically generates software bibliographies. This initiative highlights the importance of acknowledging the contributions of software developers to scientific research (Arel-Bundock & McCrain, 2023). With your permission, I would like to add a section of software bibliography, collected using the {softbib} package, to the reference section.

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Competing interests

The author declares no competing interests.

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