



# Is there a gender gap in the submission of research proposals?

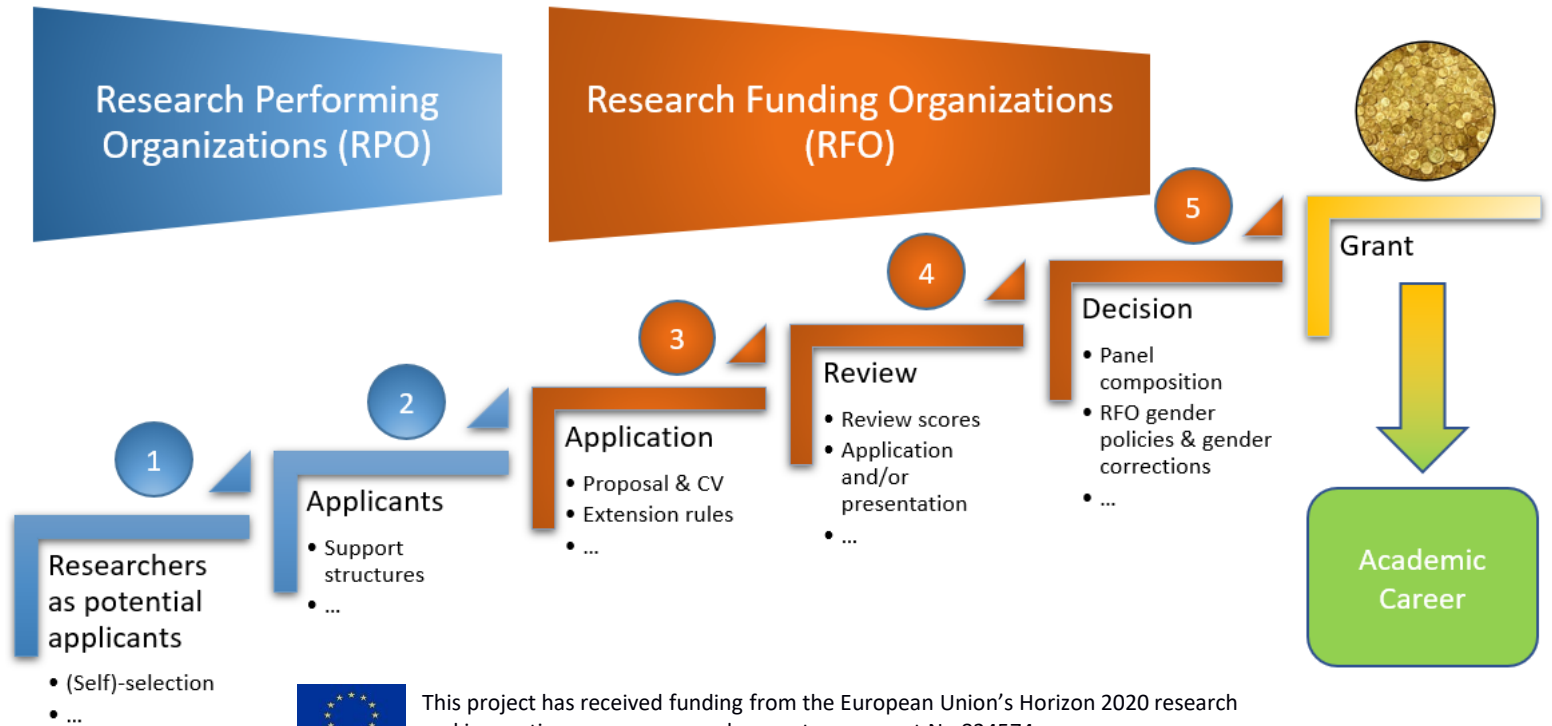
2nd GRANteD Stakeholder Conference

Torger Möller  
October 19th 2023, Vienna

# DZHW

Deutsches Zentrum für  
Hochschul- und Wissenschaftsforschung ■

# The grant application process



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824574

The main question of this presentation:

Is there a gender gap in the submission of  
research proposals?

# State of research

- Literature review of the GRANteD project
  - Cruz-Castro and Sanz-Menéndez 2019
- State of research: women submit less grant applications than men
  - “the percentage of women submitting proposals was less than expected” (Rissler et al. 2020, 814).
  - “Significant gender differences exist in grant application behaviour” (Ranga, Gupta, and Etzkowitz 2012, 18).
- Reasons discussed in the literature
  - Self-selection (women apply less than men) due to risk aversion and preferences against competition procedures.

# Some concerns & methodological challenges 1

- The Conclusion “women submit less grant applications than men” is methodologically challenging.
- Research funding agencies know a lot about their applicants, but little about the pool of potential applicants (= academics as the basic population).
  - “most funding organisations do not monitor the pool of potential applicants by gender. Much more attention should be paid to this point” (Commission 2009, 71).
- Example: in a funding program
  - Gender A submit 60% of the grant applications.
  - Gender B submit 40% of the grant applications.
  - Do the percentages (40%) correspond to the underlying population? Does Gender B apply less than expected?

## Some concerns & methodological challenges 2

- One approach to examine the relationship between applicants and the underlying population (all academics as potential applicants) is to link different data sources:
  - data of applicants of a specific program of a research funding agencies with
  - data from official statistical offices.

# Some concerns & methodological challenges 3

- The approach of linking data from different sources is prone to error:
  - Research funding programs cannot easily be assigned to individual disciplines or a group of disciplines. Research fields could be part of a discipline or transcend the traditional disciplinary boundaries. Research is often interdisciplinary.
  - Data from statistical offices are not based on research practices but on employment relationships in departments, for instance:
    - Not only medical academics work in medical departments, but also biologists, biochemists, epidemiologists, psychologists, sociologists, and others.
    - Comparing the gender ratio of applicants in a cardiology research program with the gender ratio in medical departments bears various sources of distortions.

# Some concerns & methodological challenges 4

- Applications are the unit of investigation
  - But does a grant application have a gender? – No!
- Applicants have a gender – two approaches
  - individual application => gender of the (only) applicant is taken
  - collaborative applications => gender of the principal investigator (PI) is taken



# Some concerns & methodological challenges 5

- The procedure of applying gender to an application can also distort the results:
  - We do not know who all contributed to the grant application.
  - As men are overrepresented in higher positions (prof.) in the academic system, it is more likely that a collaborative application will be classified as male. The application activity of men could thus easily be overestimated.
    - In addition, university procedures favor professors being PIs.
- There is a risk that the contribution of female academics to grant applications tends to become invisible.
  - Instead of the mechanism of women's self-selection, it could also be that women are rendered invisible by group comparisons, by gender classification of applications, or by university procedures.

# What would be a better approach?

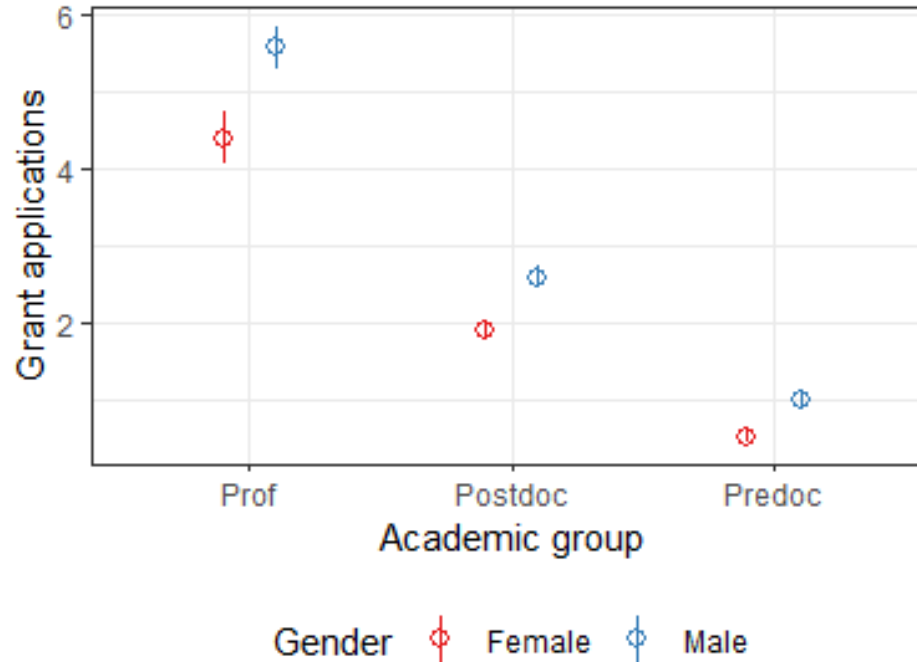
- Data collection not from research funders, but direct from academics as potential applicants
  - Representative survey
  - This approach requires contacting a huge number of academics
  - More time-consuming and resource-intensive approach than acquiring application process data from research funding agencies
- As far as we know from our literature review, there is only one older study from England that takes this approach
  - Findings: “women (...) were less likely to apply for grants” (Blake and la Valle 2000, 3).

# Our approach

- Using the DZHW-Science Survey
  - Representative online-survey of academic staff at German universities
  - regularly conducted: 2010, 2016, 2019, (2023)
  - Multi-topic survey with the possibility to include own thematic modules
- GRANteD started in 2019 and we cooperate with the DZHW-Science Survey 2019
  - Some questions regarding the grant application were included in the questionnaire (no own module possibly in 2019)
  - Data: 8,822 fully completed questionnaires

# Findings – first story of two

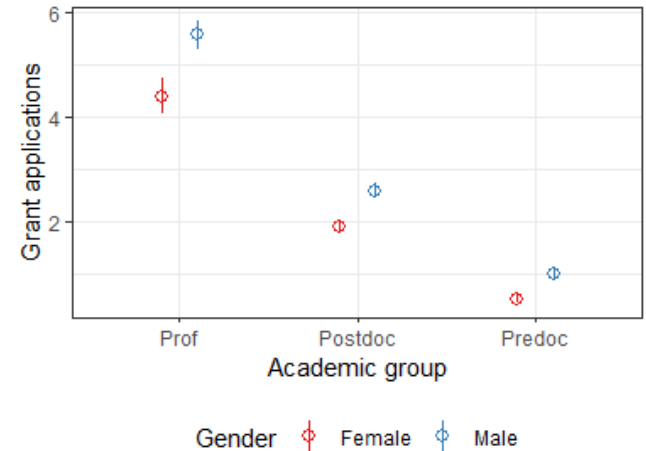
# Number of grant applications by academic group and gender (95% confidence interval)



Data: DZHW science survey 2019 - number of grant applications (> 25,000 €) in the last 5 years regardless of whether they were accepted, rejected or not yet decided.

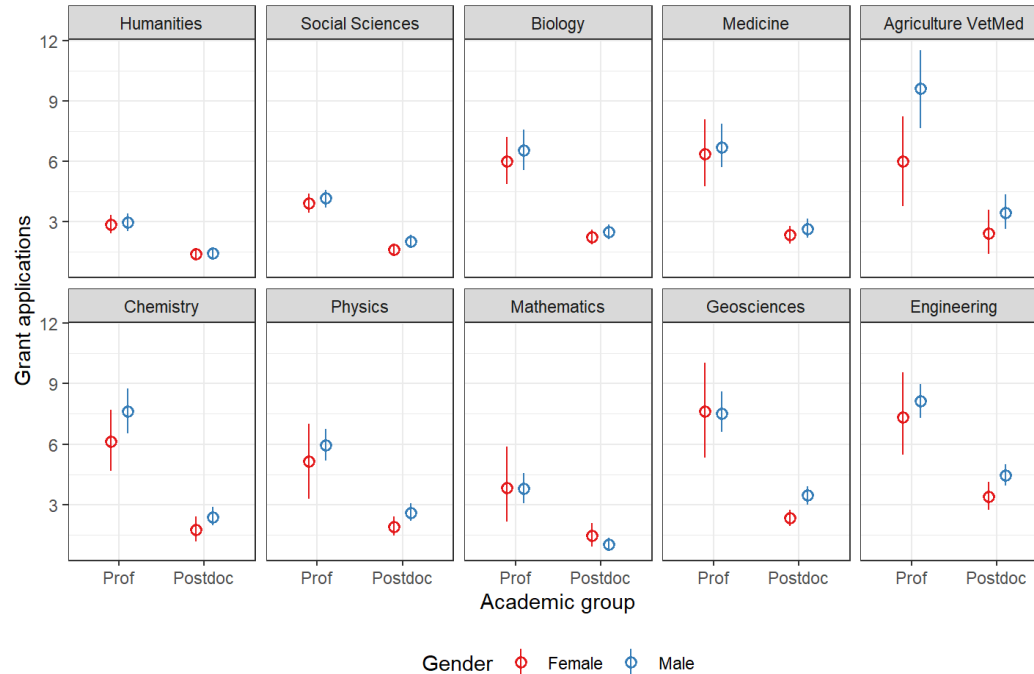
# What the Figure 1 tells us?

- Significant and expected differences between academic groups (prof. > postdocs > predocs).
- Significant gender differences in each academic group (men > women).
- Conclusion story 1
  - Men submit more grant applications than women.
  - Men receive more research funding than women.
  - Gender difference in grant application activity (self-selection?)



# Findings – second story

# Number of grant applications by academic group and gender and research field (95% confidence interval)



Data: DZHW science survey 2019 - number of grant applications (> 25,000 €) in the last 5 years regardless of whether they were accepted, rejected or not yet decided.

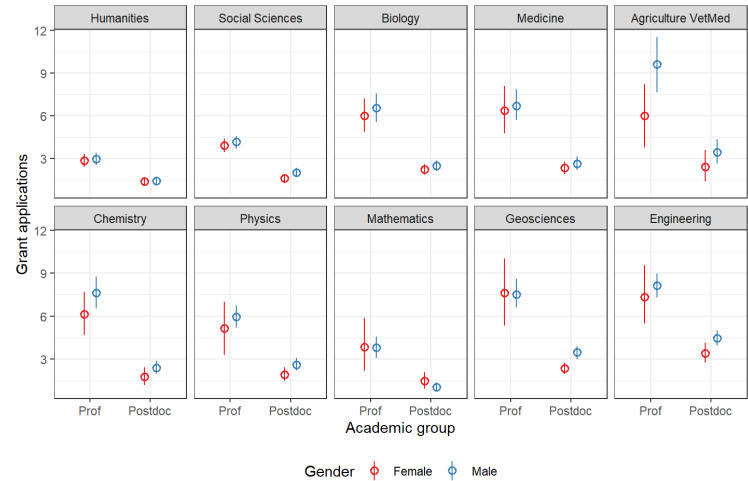


# Significance testing

- Data: over-dispersed count data
  - Count data: 0, 1, 2, 3, ...
  - over-dispersed: variance greater than the mean
  - Significance tests: non-parametric tests (Wilcoxon-Mann-Whitney-Test = Mann-Whitney U Test) or negative binominal regressions
  - For many tests, adjustment of the p-value is required (Bonferroni, Holm, Benjamini & Hochberg).
- Results of significance testing
  - No significance finding
  - One exception with contradictory results: Postdoc in Geosciences
    - significant: Negative binominal regression: adjusted p-value 0.04 (Bonferoni) – 0.021 (B&H))
    - non-significant: Wilcoxon-Mann-Whitney-Test: adjusted p-value 0.29 (Bonferoni) – 0.14 (B&H))

# What the Figure 2 tells us?

- Significant and expected differences between academic groups in each fields (prof. > postdocs).
  - No-significant gender differences after taking academic groups and fields into account.
- ## ■ Conclusion story 2
- No gender difference in grant application activity.



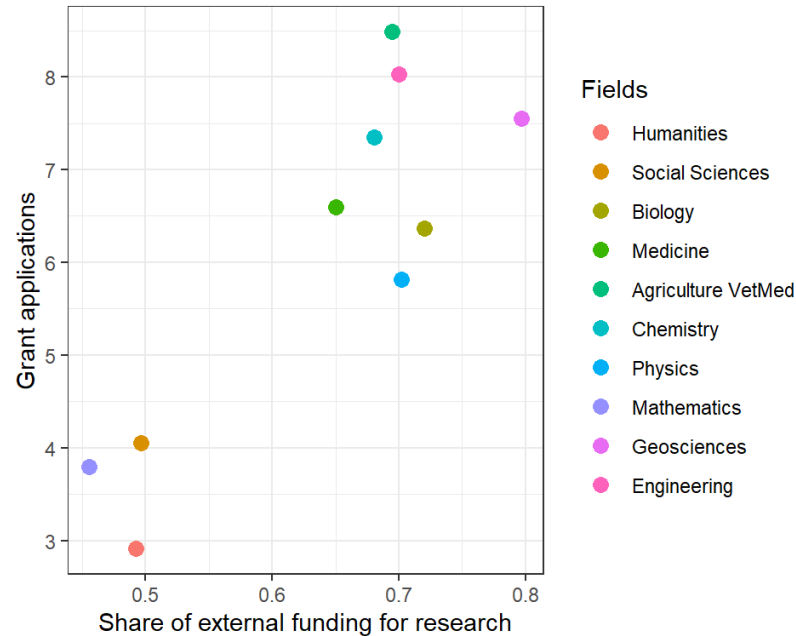
# Paradoxical findings?

- Yes, and it has a name. This type of paradoxical findings is called the Simpson's paradox in statistics
  - The Simpson's paradox is a statistical phenomenon where an association between variables, here number of grant applications and gender, disappear or even reverse when the data set is divided into subgroups, here the fields of research (cf. Sprenger and Weinberger 2021).

# How can this be explained – in terms of content?

- There are gender differences in the German university system:
  - 43% of postdocs were female.
  - 26% of the professors were female.
- In addition, the proportion of women in the individual research fields varies considerably:
  - The proportion of female academics is highest in the humanities and social sciences.
  - The proportion of male academics is highest in engineering, followed by physics, chemistry, mathematics and geosciences.
- Application activity differs between research fields.
  - It is lower in the humanities and social sciences.

# Number of funding applications and share of third-party funding by research area (professors only)



Data: DZHW Science Survey 2019 - To what extent does basic funding cover your research expenditures (personnel and materials).

# Funding applications & resources

- Application activity differs between research fields.
  - The humanities, social sciences, and mathematics have the lowest need for external resources (opportunities?) and thus the lowest funding activity.
- In short
  - Some only need a computer for writing and a library,
  - while others also need a laboratory, measuring instruments, chemical, biological, or physical material and a mainframe computer for calculations.
  - The demand for resources and application activity differs between research field and is related to the research practice of the respective field and not to gender.

# Conclusion of the two different stories

- Men submit more grant applications than women **at the science system level**
- Men receive more research funding than women **at the science system level**
  - The proportion of female academics at universities is lower and unequally distributed between research fields.
  - More grant activity in research fields where men are overrepresented.
  - However, this has nothing to do with gender, but with the resource requirements of the different research fields.
- Is there a gender gap in the submission of research proposals?
  - No, after taking academic group and **research field** into account there is no gender difference in grant application activity.
  - The results indicate that there is no self-selection of women in applying for grants.

# Limitations

- No data on the extent of the contribution to the grant application.
- No data on success rates.
- No data on application support.
- No data on motivation to apply or not apply for a grant proposal.
- No data on PI status.
- No data who will benefit from the grant application.
- No data on who is the main caregiver.
- In addition, the data reflect the status before Corona.



# ~~Limitations~~ New Survey in 2023

- ~~No~~ data on the extent of the contribution to the grant application.
- ~~No~~ data on success rates.
- ~~No~~ data on application support.
- ~~No~~ data on motivation to apply or not apply for a grant proposal.
- ~~No~~ data on PI status.
- ~~No~~ data who will benefit from the grant application.
- ~~No~~ data on who is the main caregiver.
- In addition, the data **will** reflect the status ~~before~~ during Corona.

# Practical implications from the perspective of gender equality (GE)

- Good news
  - There is no gender gap in grant application activity of women and men in the same academic group and research field.
  - No indication of a self-selection of women.
- Bad news
  - Funding is unequally distributed between genders in the science system. This situation will not change in the next decade(s).
    - The cause lies in the research performing organization and the unequal appointment of women and men to positions.
- The funders' options for additional GE action are limited regarding the potential applicants.

# Thank you for your attention!

Möller (2023): “Do female academics submit fewer grant applications than men?”, <https://doi.org/10.55835/644303d4b2b5580ba561581a>