

# Gender Disparities in Career Paths in Math

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## Women still underrepresented in professorships

Two different explanations for underrepresentation: *Leaky Pipeline* (Berryman 1983) and *Glass Ceiling* (Cotter et al. 2001)

- However, no gender bias in hiring professors

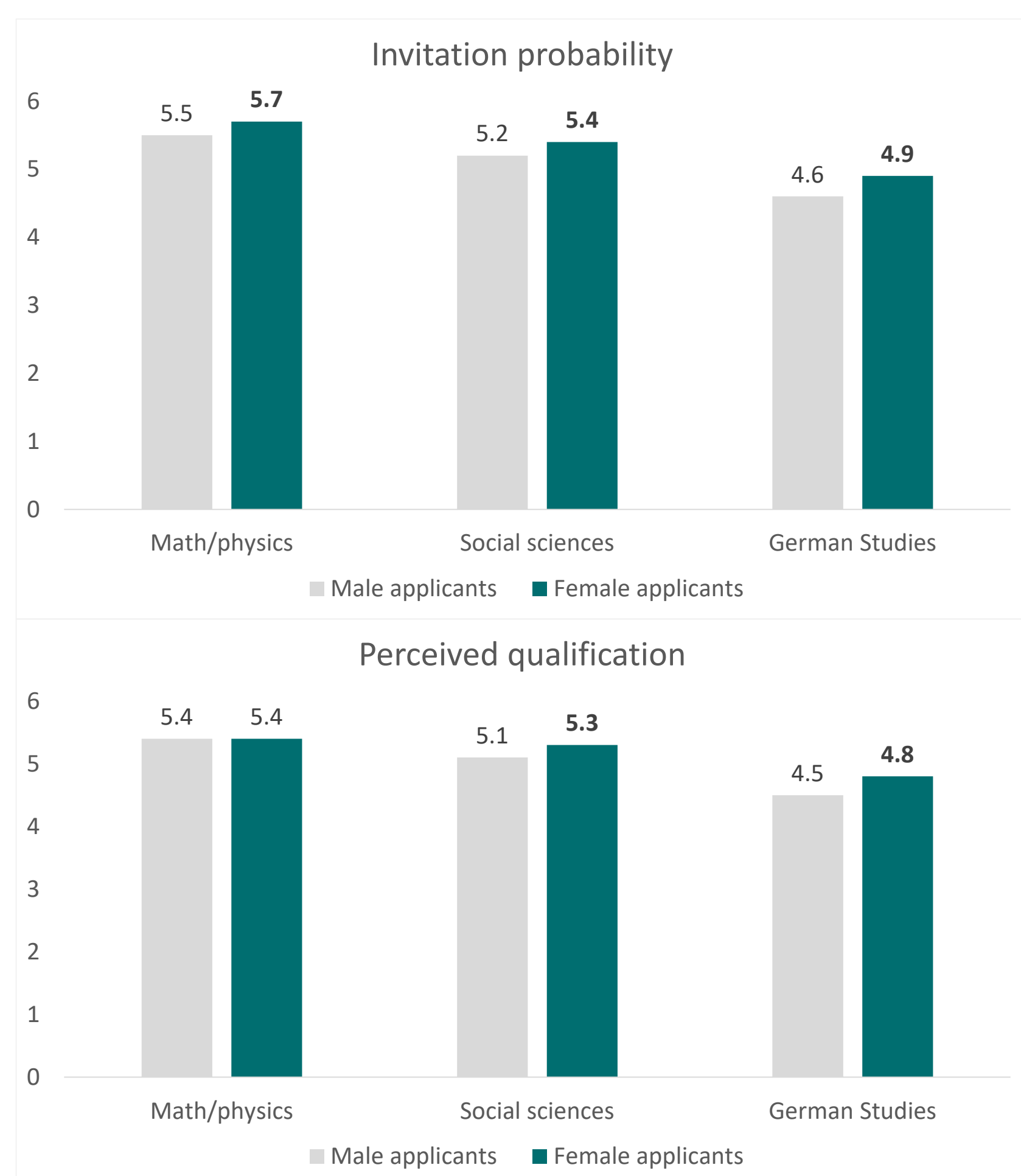


Figure 1: Probability for male and female applicants with identical application profiles  
Source: WZB vignette study with professors at German universities (2020)<sup>1</sup>

- Women are less likely to apply for professorships

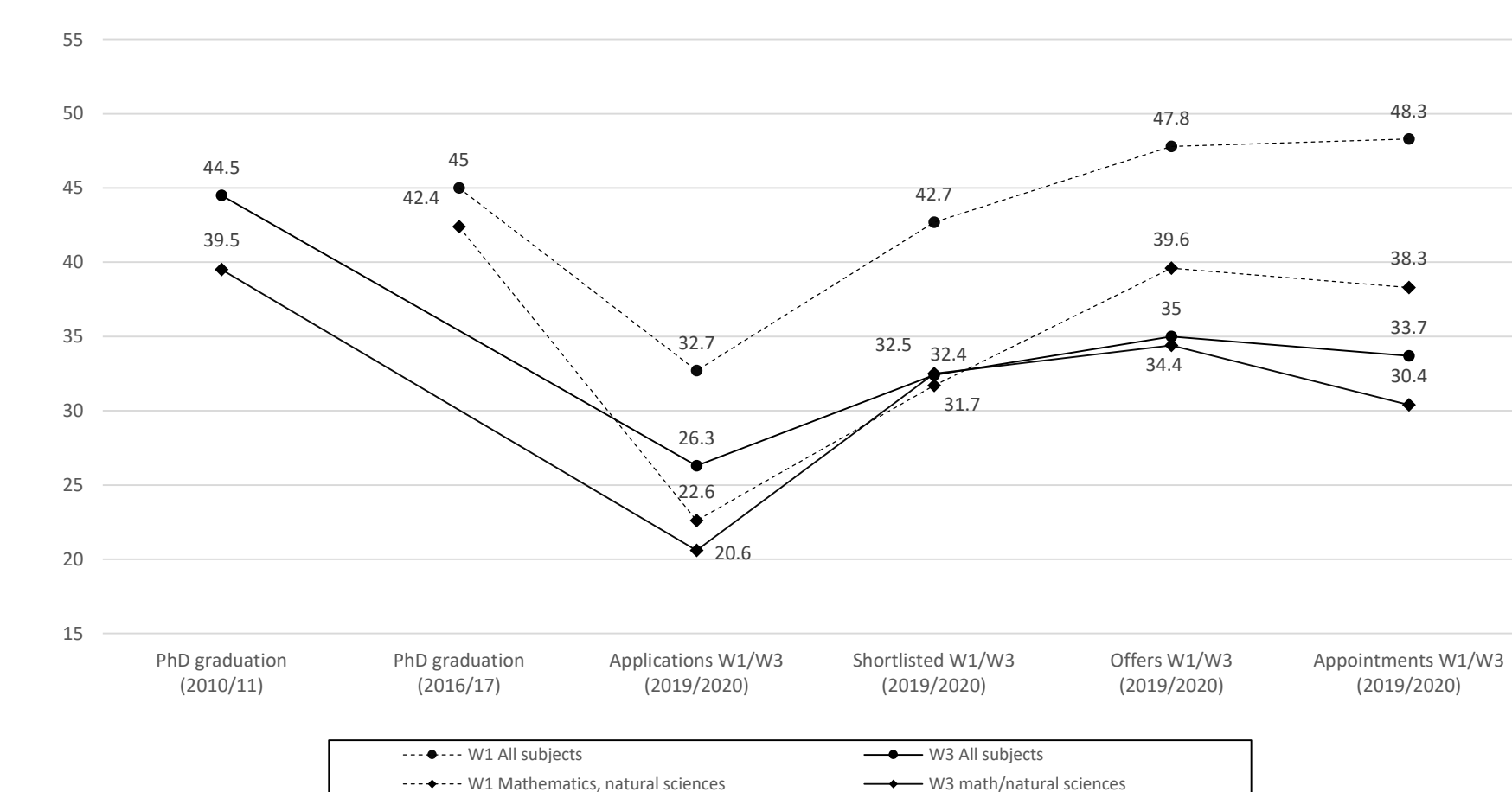


Figure 2: Percentage of women in the recruitment phases for assistant and full professor positions in Germany  
Source: Official statistics (GWK 2010, 2011, 2016, 2017, 2019, 2020)

## What happens before: Data from the Cluster

### Greater uncertainty about career ambition and career knowledge:

- Career ambition: Greater uncertainty about career goal „professorship“ among female young researchers

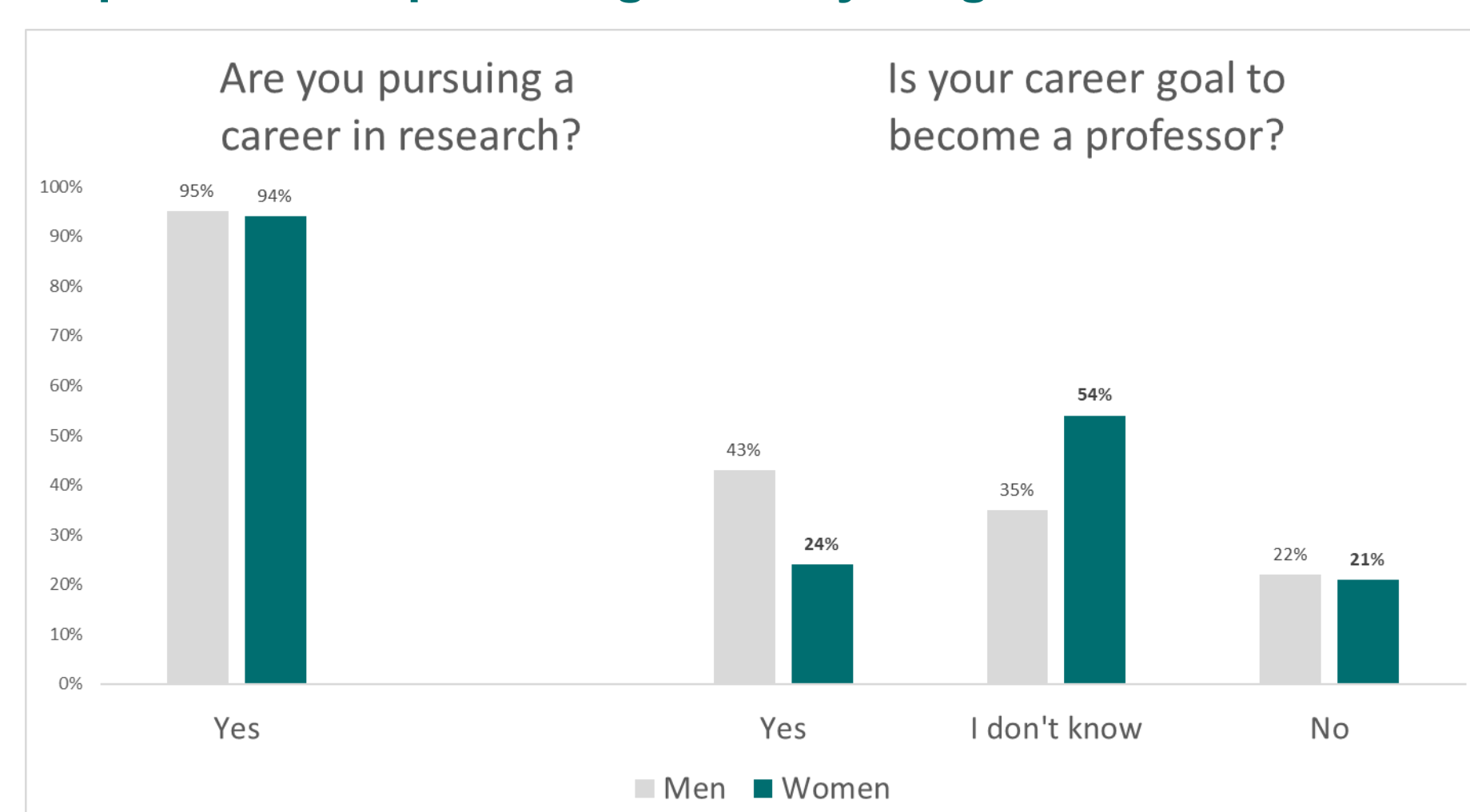


Figure 3: Research career (N = 233) and career goal „professorship“ (N = 268)  
Source: Survey with M+ early-career researchers (MAs, PhD students) and Postdocs

- Career knowledge: Female researchers are slightly more uncertain about their career knowledge

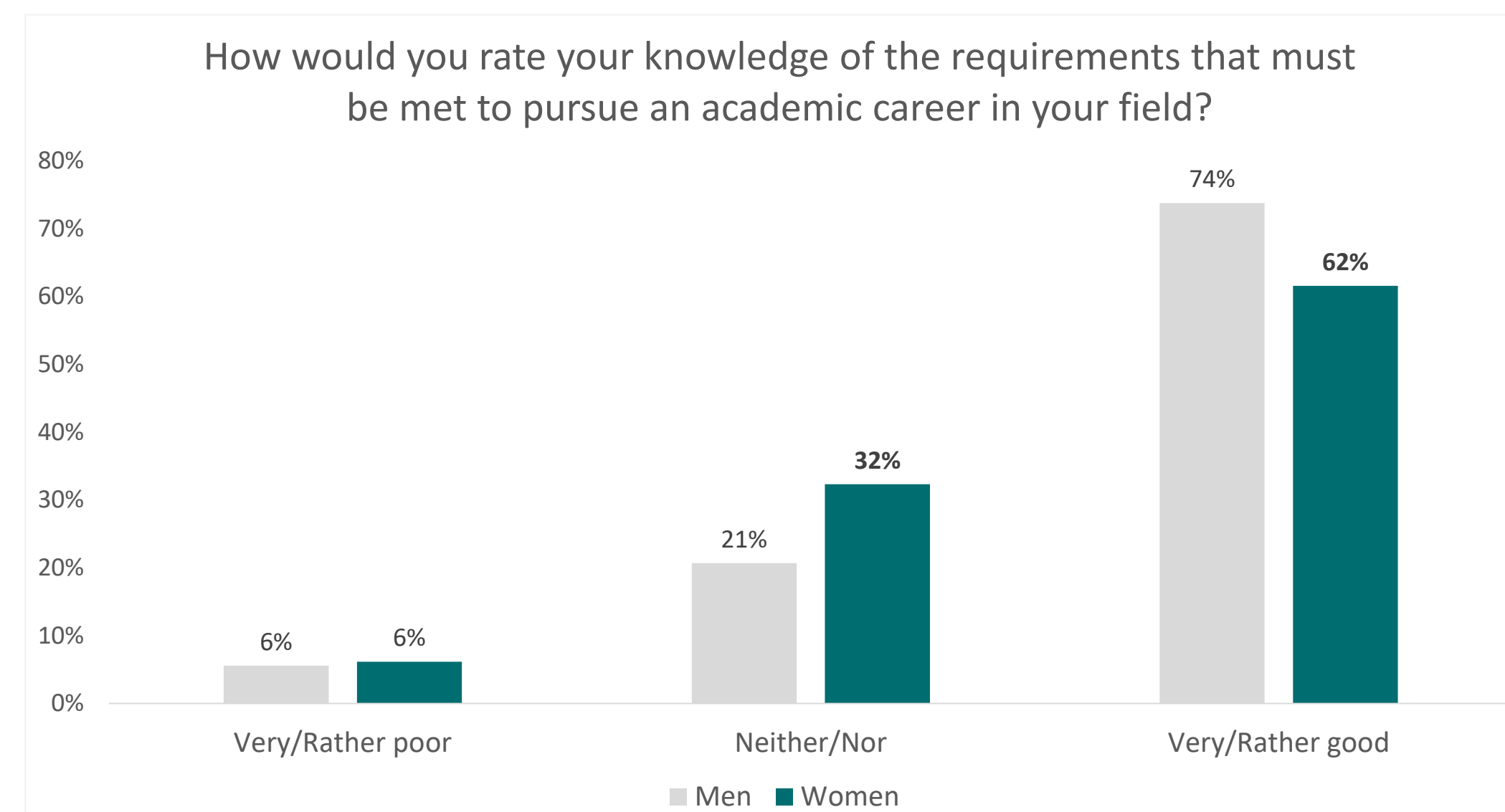


Figure 4: Assessment of own career knowledge (N = 244)  
Source: Survey M+ early-career researchers (MAs, PhD students) and Postdocs

## Possible explanations for uncertainty/fewer applications<sup>2,3</sup>:

- Gender stereotypes among PIs regarding PhD students and postdocs

1. The ascription that females have less (career) motivation than males	
<b>Female PhD students and postdocs</b>	<b>Male PhD students and postdocs</b>
a bit more concerned with security (B34: 151)	take risks (B06:75)
I have to do a lot more convincing (B36: 59)	always want to answer (B30: 188)
2. The ascription that females still have (and want to have) main care responsibility	
<b>Female PhD students and postdocs</b>	<b>Male PhD students and postdocs</b>
because of the responsibility for the family (B34: 151)	
because the private is much more important than the career at that time (B36: 59)	
3. The ascription that females and males differ in their personality traits	
<b>Female PhD students and postdocs</b>	<b>Male PhD students and postdocs</b>
insecure (B25:109)	praise themselves (B33:113)
reluctant (B18:88)	tend to climb Mount Everest no matter what (B02: 69)
silent (B30:188)	stand out (B33:113)

Figure 5: Perspectives of PIs on female and male PhD students and postdocs  
Source: Semi-structured interviews with scientists in leadership positions in M+ research projects

- Gender (masculine) attributions implicitly linked to potential for success in science

However

- No doubts on side of the PIs about the mathematical competencies of female scientists

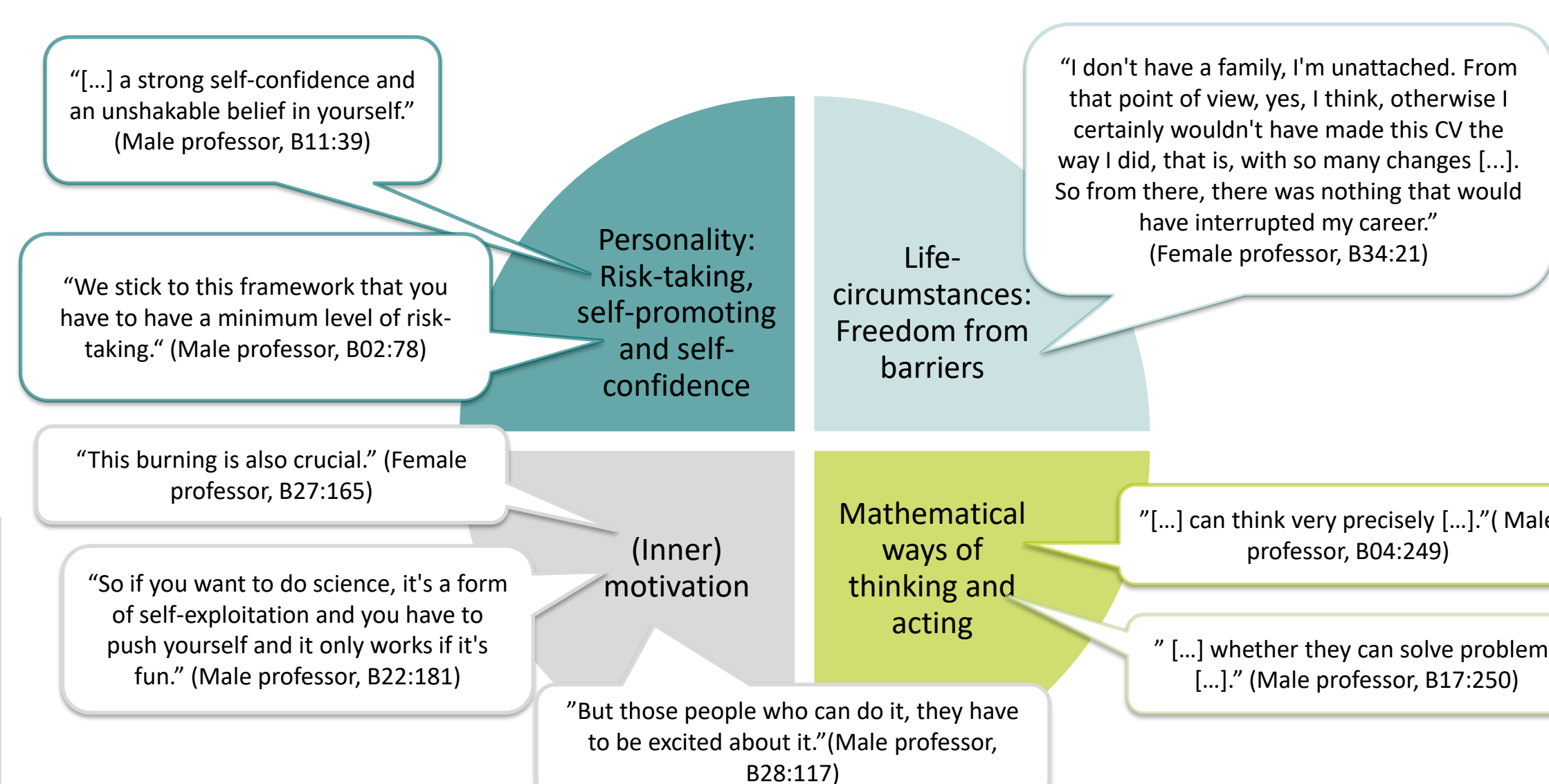


Figure 6: The image of the (potentially) successful scientists  
Source: Semi-structured interviews with scientists in leadership positions in M+ research projects

- Hiring and supervision practices susceptible to gatekeeping based on gender stereotypes

(1) Internal hiring for project positions is common and legitimized by the need for fit:

- Need for fit ≠ objective
- Main reason for rejecting women in the recruitment process → share of women in the pool remains low<sup>3</sup>

Necessity of fit due to external constraints:		
Success	Time	Responsibility for Qualification
"I have to be on the lookout for an employee who has exactly the right profile, the right prior knowledge [...] as far as possible, to successfully work on this project." (B04: 107)	"[...] these short projects where you have to deliver something in a short period of time, it has to be a bit of a fit." (B21: 89)	"You can't in good conscience put someone in a doctoral position who you're not certain will be able to do it." (B06: 210)

Figure 7: Reasons for internal hiring on side of PIs  
Source: Semi-structured interviews with scientists in leadership positions in M+ research projects

(2) Specific perceptions of female scientists when it comes to career advice

- Belief among (male and female) PIs that more persuasion is needed because women are less motivated to pursue an academic career + persuasion is perceived as uncomfortable (only male PIs)

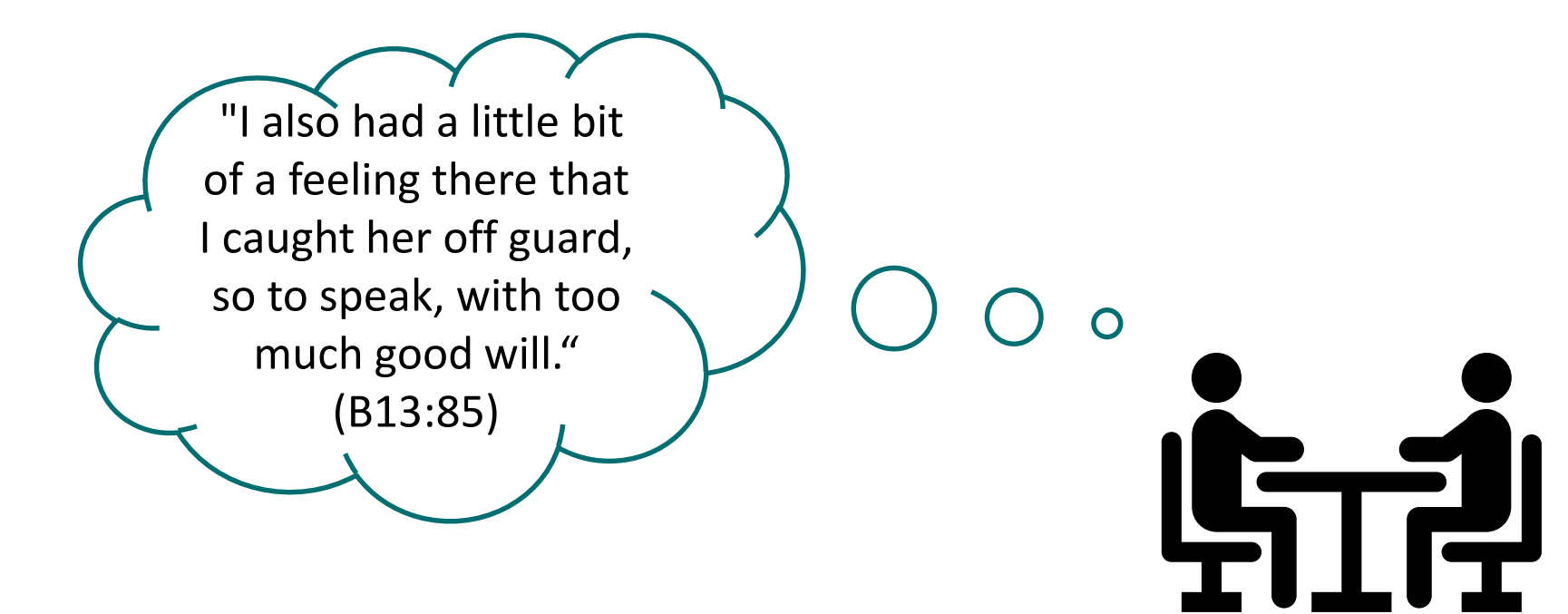


Figure 8: Stylized representation of a supervisory meeting between male PI and female supervised  
Source: Semi-structured interviews with scientists in leadership positions in M+ research projects

## Conclusion & next steps

Gender disparities in career path that may result in fewer applications from women:

- Greater uncertainty about career goal and career knowledge
- Uncertainty due to being confronted with gender-science stereotypes
- Proportion of women cannot increase if gendered gatekeeping takes place

Interrelations between individual uncertainty, external ascriptions and organizational framework need to be considered.

Next step

- Analysis of the perspectives of female PhD students and postdocs on reasons for uncertainty/not applying

## References

Berryman, Sue E. 1983. *Who Will Do Science? Trends, and Their Causes in Minority and Female Representation among Holders of Advanced Degrees in Science and Mathematics. A Special Report*. New York: Hg. v. The Rockefeller Foundation.

Cotter, David A.; Hermesen, Joan M.; Ovadia, Seth; Vanneman, Reeve (2001). *The Glass Ceiling Effect*. In: *Social Forces* 80 (2), 655-681.

GWK. 2022. *Chancengleichheit in Wissenschaft und Forschung*. Materialien der GWK, Vol. 85. Bonn: Gemeinsame Wissenschaftskonferenz.

For more information see:

<sup>1</sup>Solga, Heike; Rusconi, Alessandra; Netz, Nicolai. *Professors' gender biases in assessing applicants for professorships*. 2023. *European Sociological Review*.

Solga, Heike; Rusconi, Alessandra; Hofmeister, Sophie. *Gender biases in assistant professor recruitment: Does discipline matter?* (submitted 2023)

<sup>2</sup>Mischau; Anina, Ransiek, Anna. *Gendered gatekeeping in the recruitment and support of (prospective) PhDs and Postdocs in a mathematical cluster of excellence*. *International Journal of Gender, Science and Technology* (submitted 2023).

<sup>3</sup>Hofmeister, Sophie; Lindenau, Johannes; Mischau, Anina; Ransiek, Anna & Solga, Heike. 2021. *Erste Befunde aus dem Projekt 'MATH+ as a Research Object'. Karriereziele, -wissen und -handeln, Nachwuchsförderung und Rekrutierung*. WZB Discussion Paper SP I 2021-501 SP I 2021-501. Berlin: WZB. <https://bibliothek.wzb.eu/pdf/2021/i21-501.pdf>