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# "Screwed from the start": How women perceive opportunities and barriers for building a successful research career

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After finishing the PhD, the researcher enters a stage in their early research career where more independence is expected. Within a relatively short time period, the researcher needs to gather research experience and support in the form of tangible resources as funding, and intangible resources like access to research networks, close collaborations, and mentorship to support their next career stage. How resources are allocated are therefore important determinants for the success of researchers. However, research shows that the resource allocation decisions in academia are biased in favor of men, with many of these gender biases that influence the success of research careers increasing. In this study, we asked women employed as early-career researchers (WECRs) about how they view their opportunities and potential for long-term success within academia, and how this relates to the resources that they have access to. We found that the WECRs were given few resources and support, and that they perceived that finding resources important for their career was up to themselves. The noticeable male dominance in who receives resources and positions within the university and the lack of women as role-models signals to WECRs that they are not wanted in academia. The WECRs suggest several ways to improve the possibilities for a successful research career for women on more equal terms as their male colleagues: these include transparent processes for resource allocations, equal opportunity officers in all hiring processes, and mandatory gender training for all senior research and administrative staff. All the actions suggested are within the control of the university.

## KEYWORDS

academic resource allocation, early career researchers, exclusion, gender, post docs' career, research career, success, women researchers

## Introduction

Despite increasing numbers of women in academia over the past several decades, women doing research in higher education are overwhelmingly found in lower-ranked research positions; men are still overrepresented in senior academic positions, and this pattern is global and spans most scientific fields (Shen, 2013; European Commission, 2019;

UNESCO, 2021). Such gender-biased patterns in senior academic appointments are also found in countries with high gender equality rankings, like Sweden, where data on new academic appointments show that large gender gaps remain (European Commission, 2019; Sweden Higher Education, 2019, 2020, 2021; Jämställdhetsmyndigheten, 2020). In academia, achieving a permanent or tenured senior research position is institutional acknowledgment of a successful research career and is one of the few ways of attaining job security. The fact that there remains a bias in appointing men to these positions raises questions specifically relevant to achieving gender equality in academia: i.e., how does this male appointment bias both reflect and subsequently affect resource allocation within academic institutions, and thus influence the possibility for women working as researchers to be considered successful in their academic careers?

Many studies have found that women and men experience research environments differently, and that there are systematic barriers that impede women’s transitioning from junior to senior academic positions (e.g., Kalaitzi et al., 2017; Huang et al., 2020; Makarem and Wang, 2020). One of the most important determinants for this transition is the allocation of resources (e.g., financing, mentorship, and networks), and how these resources both determine and are determined by an individual’s perceived scientific production and impact. This creates a 2-fold challenge for women wanting to remain within academia; first, that resource access is influenced by homophily: i.e., people in charge of resources (primarily men) tend to interact with and subsequently reward people with a similar gender and ethnicity (Bird, 1996; Sang et al., 2013; Behtoui and Leivestad, 2019), and second, that the merits used to judge scientific productivity for determining where resources should be allocated are subject to biases in favor of men (Figure 1). Such biases include: (1) scientific citations

(Dworkin et al., 2020) in which men more frequently self-cite (Cameron et al., 2016) and male-biased citation patterns increasing (Dworkin et al., 2020); (2) scientific authorship, where women are underrepresented in prestigious authorship positions (with this bias increasing; West et al., 2013; Van den Besselaar and Sandström, 2017) and men more likely to be included as co-authors by male principal investigators (Salerno et al., 2019; Kwiek and Roszka, 2021); and (3) scientific awards and prizes being male biased (Dolphin, 2006), and correlated with the level of dominance of men in the award committees, particularly the gender of the chairperson (Lincoln et al., 2012). Thus, the interrelationship between resources and merits, and how gender bias influences their distribution, will likely increase the gender gap in science in the future (Lindahl, 2020).

This clearly indicates that scientific merit is not the sole basis for advancement in a research system, because women do not have the same opportunities for career development or receive the same rewards for achievement as their male colleagues (Wennerås and Wold, 1997; Nielsen, 2015; Hofstra et al., 2020). Different possibilities for women’s career advancement include fewer appointments to permanent positions, smaller networks, reduced inclusion in applications, and lower levels of funding, resources, and income (Duch et al., 2012; Fassa and Kradolfer, 2013; van der Lee and Ellemers, 2015; Behtoui and Leivestad, 2019; European Commission, 2019; Steinþórsdóttir et al., 2020; Llorens et al., 2021). This is likely to greatly affect women researchers’ ability for a successful long-term research career. Yet despite the barriers that female scientists face in academia, the *annual* scientific production from men and women is nearly identical. The “production gap” between men and women in academia can instead be most clearly seen in *total* scientific production and scientific impact during their career, with gender differences increasing steeply in recent

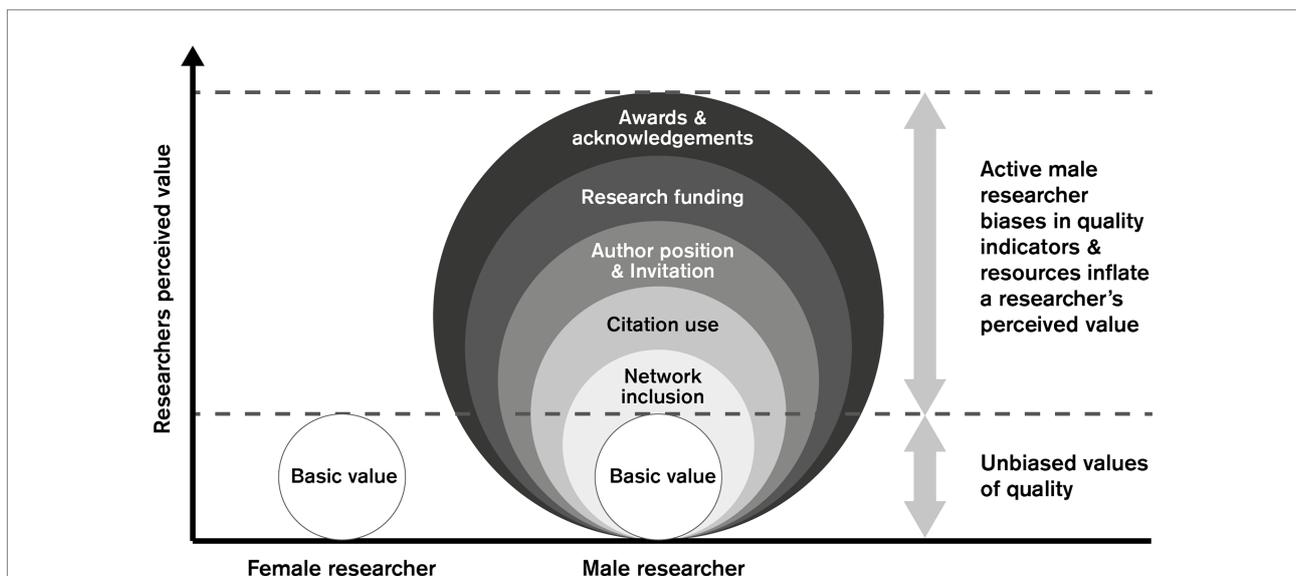


FIGURE 1 Schematic figure describing known and current factors that inflate male researchers’ perceived value (e.g., Dolphin, 2006; West et al., 2013; Cameron et al., 2016; Van den Besselaar and Sandström, 2017; Salerno et al., 2019; Dworkin et al., 2020).

decades (Huang et al., 2020). A difference in research output arises because the most important factor determining total scientific production is the length of one's career, and men have longer average careers because they are more likely to be awarded permanent or tenured positions with the resulting job security (Huang et al., 2020; Llorens et al., 2021). This suggests that it is at the career transition from short-term contract employment to long-term tenured employment that men appear to gain a significant advantage over women, with men allocated most permanent positions (European Commission, 2019; Sweden Higher Education, 2019, 2020, 2021; Landelijk Netwerk Vrouwelijke Hoogleraren, 2021). Thus, it is at this early stage in the research career that we should examine how gender-biased resource allocation influences job security in academia.

The aim of this study is to get a deeper understanding of how women employed as early-career researchers (WECRs) experience the allocation of resources in an academic organization. Through focus group interviews, we examined how resource allocation affected these women's perceptions of research capacity and future opportunities by focusing on: (1) how do women in the role of early-career researcher perceive the organization's resource allocation in the context of their workload and career possibilities; (2) what resources are offered to junior academics, particularly women, by senior affiliated academics within the organization; and (3) what practices do women in early-career academic positions suggest need to change to improve their opportunities for a successful research career. These questions were analyzed and discussed within the general framework of how the presence or lack of resources (both tangible and intangible) affect WECRs. A qualitative focus group study makes it possible to explore the complexity of how WECRs understand their own situation in academia. As McDowell (1997) argues, it is important to investigate how gender-power relations are produced and maintained in different geographical settings in order to be able to challenge them. Our study contributes with more knowledge of WECRs' perceptions and experiences of how different kinds of resources are allocated in academia; such knowledge provides not only a greater awareness of gendered patterns and practices, but also a starting point for important discussions in higher education. The findings in this article could also lead to a better understanding of how support for women pursuing academic research careers could be designed.

## Resources for a successful career

### Tangible and intangible resources

Systematic disparities between employees regarding power and control over resources are notable aspects of inequality in organizations (Acker, 2006). However, there are few studies that have examined how well-known long-term gender biases in academic appointments may be influenced by gender differences in the amount of resources that early-career researchers are offered during this period in the academic career (but see Holliday et al.,

2014). A recent study found presence of behaviors toward women and other minorities in academia that focused on blocking their opportunities and resources; they included making someone invisible (e.g., denying authorship), refusing promotion (e.g., canceling a position), blocking access to spaces, documents, objects, or information, labeling people as incompetent to colleagues and selection committees, and physically or financially destroying research projects (Naezer et al., 2019). The growing literature on the problems faced by early-career academics indicates that they constitute one of the most vulnerable groups among research and teaching staff in academia, as they compete for senior positions and often must rely on external research funding (Case and Richley, 2013; Chem et al., 2015; McAlpine et al., 2018; Cidlinská, 2019; Geschwind et al., 2022). Blood et al. (2012) explored female medical faculty members' mentoring needs, finding that women faculty members with lower academic rank and less research experience perceived the absence of mentoring to have a negative impact on their chances of improving their position within their institution. In terms of specific resources needed, early-career researchers, regardless of gender, require career guidance from senior colleagues (e.g., applying for grants and building networks). Kwiek and Roszka (2021) noted that "gender-based homophily has substantial implications for academic careers" (p. 23). Their study found that male researchers collaborated largely with other male scholars and this was also true for female researchers. Through research collaborations with senior colleagues, new opportunities can arise for early-career researchers, like being included in funding applications and new research projects. Currently there is a large knowledge gap on the availability of different types of resources for WECRs. Thus, a greater focus is needed on the process and practices of how resources are allocated to WECRs.

To be able to analyze WECRs experiences of the allocation of resources in an academic organization, it is important to distinguish between different kinds of resources. We are inspired by a resource based view, used in management research, where resources are looked upon as both tangible and intangible (Wernerfelt, 1984). It has been highlighted how intangible resources produce more competitive advantages than tangible resources do (Galbreath and Galvin, 2006). Translated to the WECRs context, tangible resources could be research funding and equipment, while examples of intangible resources could be, e.g., invitations to another researcher's network or to join research applications (see Table 1 for more examples). It is important to consider both types of resources as they have previously been found to be highly relevant for a research career (Holliday et al., 2014; Cidlinská, 2019). We argue that how resources are allocated affect career possibilities and research performance, and when allocated they have the potential to give competitive advantages for the receiving individuals (compare Barney, 1991).

### A gendered resource allocation

After finishing their PhD, a researcher enters a stage in their early research career where more independence is expected

TABLE 1 Resources for an early-career researcher can be both tangible and intangible.

Tangible resources	Intangible resources
Research project funding	Part of supervisor's applications
Funding for extending position	Part of supervisor's new research projects
	Inclusion in research networks
	Mentoring for career development
	Inclusion in the scientific environment

The former are physical resources that are made available for research, while the intangible resources are non-physical resources. Examples of both types of resources discussed by the WECRs can be seen below.

(Laudel and Gläser, 2008). Within a relatively short time period, the researcher needs to gather not only research experience but also resources in terms of research networks, funding, and close collaborations and mentorship to support their next career stage (Case and Richley, 2013; Browning et al., 2017; Smaglik, 2018). These resources are to a large degree competed for, granted, and facilitated by other researchers and administrators within their university (Bronstein and Farnsworth, 1998; Bird, 2011). How resources are allocated are therefore important determinants for the success of researchers. In this study we look at gender as an integral part of the processes of the allocation of tangible and intangible resources (compare Acker, 1990). Research shows that these resource allocation decisions in academia are biased in favor of men, with many of these gender biases that influence the success of research careers increasing (Dworkin et al., 2020; Huang et al., 2020). This unrelenting trend toward male bias extinguishes the idea that academia can achieve gender equality simply by increasing the number of female researchers at the start of their research career (Casad et al., 2020). For example, Holliday et al. (2014) studied how resource allocation was perceived by female and male researchers, finding that women experienced deficiencies in their research resource needs more than men. It has also been shown that reduced levels of support by supervisors and from the research community increased the risk that early-career researchers would consider leaving academia (McAlpine et al., 2018). Chem et al. (2015) also show that supervisor support has a big impact on furthering the research career for both men and women at the early-career stage. Thus, if resource allocation is an important factor in the retention of early-career stage researchers in academia, and this allocation is biased toward men, it should not be surprising that gender biases in academia become more pronounced after this career stage. One part in understanding the impact of current resource allocation biases in academia is to ask how WECRs perceive their working situation and future prospects in relation to resource allocation. However, this perspective is still largely missing in the current discourse on gender biases in academia.

In this study, we ask WECRs about how they view their opportunities and potential for long-term success within academia, and how this relates to the resources that they have access to. We define women employed as early-career researchers in this study as those who have begun their research career after

finishing their PhD, but who have not received tenure or form of permanent employment at the university (usually within 1–4 years after graduation). We see this dialogue with WECRs as providing valuable insights into how current resource allocations within the academic system can affect career possibilities for women.

## The organizational context

We use a situated approach to knowledge where we take into account the specific local context at the same time as we consider the national and international context in which the local is situated (Haraway, 1988). The academic institution in this study, the Swedish University of Agricultural Sciences (SLU), is one of the larger universities in Sweden and predominantly focuses on natural sciences with research and education in biology, animal science, agronomy, horticulture, forestry, rural development, and terrestrial and aquatic ecology. SLU, like many universities, currently finds itself challenged by a situation where male bias is common in relation to gender-segregated degree programs, low numbers of women working as professors, and broader gender discrimination issues (Powell, 2008, 2016; Powell et al., 2018; Grubbström and Powell, 2020). Initiatives within the organization to correct current gender biases have predominantly been focused on change at the individual (not organizational) level, such as activities intended to increase the number of women in the professorship and to resolve gender-segregated education programs by encouraging women to apply in male-dominated subjects (Annual Reports 1994–2014). There is also evidence that previous gender equality activities at the university have met multiple types of resistance from different levels within the organization (Powell et al., 2018).

In Sweden, early-career researchers can be employed in a post-doctoral research position (Post-doc) for a maximum of only 2 years, after which their temporary employment status can only be extended for an additional 2 years. This extension is dependent on whether there are monetary resources for this, either obtained by the early-career researchers themselves or from another (often more senior) person at the department that wants to fund the researcher. After this time, the researcher must be either permanently hired (as decided by the organization) or must leave the university (Haglund, 2018). To be permanently hired, funding must be provided for the position, either by the early-career researchers themselves or by another researcher at the department. A large portion of the funding for positions (except for the positions of faculty professors and lecturers that are funded by the university) and research projects, comes from external sources, like national or European research councils. This creates an intense selection period during this time—a time during which resource allocation is likely to be crucial in determining who obtains a permanent employment position, and thus has the best chance at having a long-term career in academia, and who is forced to leave. Nationally and internationally, research cultures are characterized by hypercompetition, individualism, and

dependency on senior colleagues (Haven et al., 2020), yet at the same time, there is a need for collaboration (Naezer et al., 2019; Geschwind et al., 2022). To summarize, we consider the experiences described in this study as something affected by the local context, yet also inseparable from national and international research cultures.

## Materials and methods

### Research design

Since our focus is on understanding individuals' experiences a qualitative exploratory research design was adopted. Focus groups made it possible for WECRs to describe their own experiences and reflect upon others' experiences. This study is inspired by the tradition of qualitative research from scholars such as Patricia Hill Collins (1986, 1999, 2013), who has raised the notion of the "outsider within" higher education. Mapping her experiences as a Black working-class woman in academia "by doing a sociology that had no name" (2013, 80), Hill Collins was able to begin theorizing how other Black women in higher education might experience being "outsiders within." While the context and individuals in our study are different from those in Hill Collins' work on the experiences of Black women in higher education in the United States, Hill Collins' groundbreaking work asks the research community to consider what other unaccounted for and unacknowledged discriminatory phenomena exist among groups of people who are underrepresented in leadership or senior positions in higher education. Furthermore, we have to take responsibility for our own situatedness within the research and how this might affect the interviewees, the questions being posed, and data being collected and interpreted (Berger, 2015). Relevant researcher positioning that should be acknowledged here includes for example gender, age, affiliation, and personal experiences. All authors are women with personal experiences from a career in academia, and all are some years older than the focus group participants. The author's experiences are from different universities within and outside of Sweden, and they work in different departments at the university. Hence, the author group has both an insider and an outsider perspective which allowed for interpretations from several angles (Milligan, 2016). In addition, a reflexive perspective permeated the process of conducting this study, from writing research questions to interpreting the empirical material (Creswell and Poth, 2018, pp. 228–230).

### Collection of empirical material

We recruited the participants for the focus groups from one of the largest departments within the university. This department generally holds a comparably large (approximately 15–20) and stable proportion of WECRs. Focus group participants were selected for their experiences and rich knowledge using a

TABLE 2 WECRs' focus group code, participant code, and doctoral degree completion at the university where the study was based, and time spent as post-doctoral researcher.

Focus group	Participant code	Doctoral degree at SLU	Experience level as post code doctoral researcher
A	A1	No	New
	A2	No	Medium
	A3	No	Medium
	A4	No	Medium
B	B1	No	New
	B2	Yes	Medium
	B3	No	Experienced
	B4	No	Medium
C	C1	No	Experienced
	C2	Yes	Experienced
	C3	No	New
	C4	No	New

new, less than 2 years; medium, between 2 and 3 years; and experienced, more than 3 years

purposive sampling technique. The selection was based on two principles for qualitative studies, namely 'intensity' (material which could offer rich cases that manifest the phenomenon) and 'convenience' (empirical material collected in an environment close to the researcher to save time and effort). WECRs who had finished their PhD and were currently on a fixed-time contract research position (usually 2 years) were eligible to participate in this study. These researchers were contacted *via* email and invited to participate. All 12 researchers who were contacted initially agreed to participate, and their background information was collected (i.e., country in which a doctoral degree was completed and years of experience as an ECR). Prior to conducting the focus group, a guide with main questions and sub-questions was created. The discussion was guided by the following three themes with sub questions within each theme: (i) The organization and the career, (ii) The resources and the career, and (iii) Changes to improve the career possibilities.

Three focus groups (A–C) were established with four individuals randomly placed in each group. The group size was deemed suitable to allow speaking time for all in a comfortable setting. Additionally, the experience from previous group discussions allowed adjustments and clarification of questions asked. The participants showed a variation in terms of how long they had been researchers (from newly recruited post-PhDs, to researchers coming to the end of their current time-fixed research position period). Their countries of origin were varied, and included countries from Europe, Oceania, Asia, and North America (see Table 2). Prior to the participants' meeting within the focus groups in this study, they did not receive information about the specific questions or themes that would be discussed, as we wanted their spontaneous thoughts and reflections at the time of the focus group.

The focus groups were conducted in December 2020 in a digital format that the participants had many months of

experience with due to the COVID pandemic. All conversations were in English as this is the working scientific language within this department. Each discussion lasted for 1.5h, and the discussions were audio-recorded and subsequently transcribed verbatim (Kvale and Brinkman, 2009). The questions were open-ended with the intention to explore the participants' views of reality and allow the researcher to generate theory (Hesse-Biber and Leavy, 2011). The more open-ended, the better, as this study follows the interactive process in order to understand the participants (Creswell and Poth, 2018, 24). Furthermore, during the focus group, when discussing the allocation of resources within the university, we presented numbers on how many women vs. men were employed in different research positions (PhD level to tenured professors) within their department and faculty. We encouraged the participants to draw from their own experiences and reflect how past and present situations affected their possibilities for a long-term research career within academia. All participants were ensured anonymity. The discussions were done in an accepting and supportive way to allow for all the participants to freely express themselves. During these discussions, the following conditions occurred: all participants contributed; there was no predetermined order of speakers; the amount of talk was equally distributed; and the interviewees could openly share personal experiences from their research careers. Both before and during the discussions, all participants were encouraged to share their thoughts, opinions, and experiences. This made it possible to collect a large amount of empirical audio recorded material that could be used in the analyses.

## Analysis

Following transcription, the discussions were analyzed within the framework of access to tangible and intangible resources as well as in relation to the participants' own suggestions for factors relevant for a successful research career. The discussions were thematically coded and categorized. The analysis was inspired by six-step process of thematic analysis of Braun and Clarke (2006, 2019) with focus on intense analysis to identify themes in the empirical material: (1) familiarization of the data; (2) generation of initial codes; (3) search for expression of themes (resources, support, and suggestions for change); (4) review of the themes in relation to the findings; (5) definition and naming the findings; and (6) production of a report. Quotations from these discussions were then selected to succinctly and clearly illustrate the themes. Where quotations are given in the text below, these are labeled in relation to the focus groups (A–C), and participants are numerically-coded within each of these groups (1–4). In this text, the senior researcher that was responsible for the WECRs' position and/or closest senior collaborator is referred to as "supervisor" even though it may not accurately describe their formal working relationship. Thus, we use the term supervisor to indicate the person who could be expected to mentor the participants in this study. In our analysis, we focus on gender, but we are aware that

different aspects of the participants' identities can intersect with other axes of social difference such as ethnicity, age, sexuality, ability, citizenship, and geographical background. Like with gender, belonging to a social minority makes people more vulnerable to victimization (Naezer et al., 2019). However, our approach entailed that we did not strive to separate and assess how much each aspect influences the perception of resource allocation. Instead, we want to highlight different examples of experiences to deepen the understanding of the complexity of WECRs' situations in academia.

## Findings

With the aim of exploring how women employed as early-career researchers understand their situation in relation to a successful research career and the support and resources given, the findings were sorted among the three broad themes discussed.

### How the male norm and resource allocation impacts the researchers' perceptions of a future career

Within this theme, three sub-themes were identified (Figure 2). Several of the researchers perceived that the inequality in academia started from the beginning of their career, with women in research not being the norm. They suggested that it is implicit that for one to be a *competent* researcher, you have to be a male. This norm implied to the WECRs that they had a weaker position from the start. The perceived predominating image of a successful researcher was a mismatch in how they visualized themselves, and doubts were shared regarding whether they could compete against the large presence of self-confident men: "When you are only seeing men of course that's going to mean something for how you [see] the possibility for yourself to reach those positions" (focus group participant B2). One of the interviewees described the experience of struggle:

It's a bit of a feeling of what's the point, what sacrifices do I have to make? And for what? I'm still fighting against or competing against all these men. I don't know if I am willing to make sacrifices without, I don't know... the hope (focus group participant A3).

The WECRs found themselves positioned in an academic setting where they felt they did not have a place, or future, because they were women. This lack of a clear context or norm for them as researchers made it very difficult for them to imagine how they could fit in within the organization and become successful scholars.

The participants expressed that they saw that men in senior positions predominantly gave resources to other men. The pattern

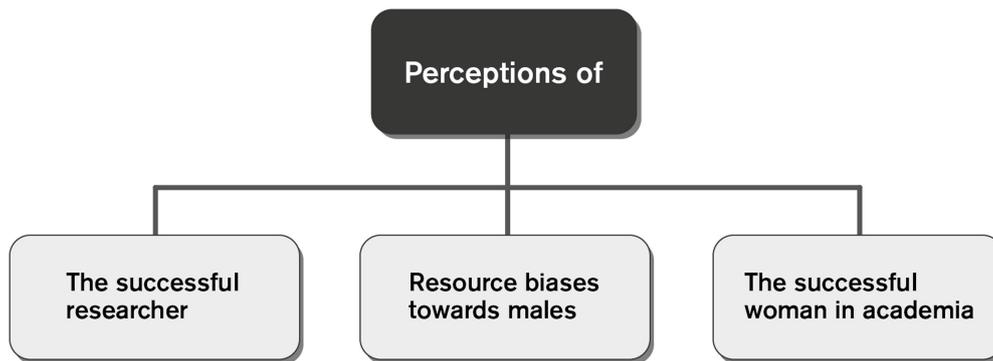


FIGURE 2

Sub-themes that emerged from the focus group discussions of the women employed as early-career researchers (WECRs) views on their research career with the present allocation of resources and attitudes.

emerging from the participants' discussions and experiences was that resources allocated by the university were heavily biased toward men. As one observed,

... some people that I know in this department did PhD here, left for a postdoc and then it seems like folks were invested in bringing them back. And the people I know for whom that is the case are Swedish men (focus group participant C1).

When discussing how the allocation of resources in terms of positions within the university affects how they see their own research career, the participants expressed unified thoughts on this. They believed that the present resource allocation structure sends them a clear message that their chances of becoming successful in their academic career (at least at this university) are low. As two of them explained,

... those figures show to me, maybe I'm too negative but I'm still here so I'm not that negative, but it shows that I'm not welcome...I must be stupid to keep on (laugh) doing this, but I still do. Sometimes if you're in a very bad mood, it feels like you're screwed from the start. But then again, you still have to push. But, that takes energy that could go to other places (interviewee C2).

... You see males dominate in these positions. ... you kind of think "Ah, maybe there are more difficulties for female scientists to actually go further". Because you see other female scientists, they are great, [but] they didn't manage to arrive in this position. And then you automatically will think, there will be some more difficulties for me to actually go further (interviewee B4).

The possibility of securing the resources that lead to being offered a permanent position at the university plays an important role when these WECRs consider whether to continue their research career. Notably, these women observe that permanent positions are

male-dominated, and so not only do they perceive that the possibility of themselves getting one of these positions as low, but also, they believe that working toward obtaining one of these positions would take a disproportionate toll on them because of their gender.

## Unequal workload and characterization of women

The WECRs brought up the heavy toll of combining demanding research work with the additional costs associated with gender-based inequality within the organizational system (e.g., not being invested in and acknowledged). Additionally, they also recognize that the university's support for them at their career stage is virtually non-existent when compared to their colleagues who are PhD students, since at SLU no institutionally-targeted courses or support are offered specifically to early-career researchers:

... there's so many courses for PhDs, so many resources and things. And you get to this post-doc and it's just like, you should be able to work all this out, I'm like "Ow! (interviewee A3).

The idea of not being able to focus solely on their research to become successful, but also continuously having to deal with male bias, showed that the participants viewed their future as a very difficult one if they would remain in academia. The discussion also reveals that a successful woman in academia is expected to have a special character: 'I'm so sick and tired of having to do this. Because why do we have to do this? Why cannot the system change?' (interviewee C2). One of the interviewees also commented on the perceived need for a strong character and the differences between men and women:

... sometimes you are just like tired of fighting everything and you don't care that much? ... at least what I know, other women in science they usually have this fame of having [a] strong character. They are always super strong because

obviously they have to be strong, because they have to fight everything. [- - -]

Yeah, yeah, totally. And then if you do it, you're seen as the, like, strong character that gets pissed off or whatever. And if a man does it, it's just like a common, normal interaction. He's just claiming what he deserves (interviewee C4).

A woman that would be successful in this type of environment was depicted as a superhero, but one that still would suffer from having demonstrated the strengths that made it possible to remain. This problem is compounded since these perceptions are being formed during a career stage that also occurs without much organizational support. At this stage in their career, the WECRs suddenly discover that they must now compete for other types of intangible resources, and that unlike courses and support structures during their doctoral education, the resources for early-career researchers are not equally accessible to women and men.

## Resources from senior researchers and their impact on workload

In the analyses, five different kinds of resources from senior researchers were identified (Figure 3). When the participants discussed their experiences of having been offered resources in terms of money, networks, and mentoring, their experiences were similar. They had not been included in their supervisors' networks, and several felt that building a research network was up to themselves. No one experienced being offered tangible resources in terms of monetary support to extend their position or as support to initiate new research projects. In one case there had been discussions on the subject, but nothing was decided. When more intangible resources such as mentoring aimed at aiding the researchers' career was discussed, this was clearly very rare: "I've been included in some collaborations but it's never been any money for the things I do or for my ideas and it's more... lucky if I get a co-authorship" (interviewee C2). Further, they expressed thoughts on how it was possible that no resources were given, and a lack of understanding from senior researchers of the importance of this:

I don't know when you reach this professor level, whether you actually forget how difficult it is to fight for [laughs] these things. Or you simply don't have energy to care about young, early-career people, to think they actually need more support or to be included in more projects (interviewee B4).

This was expressed also as an inherent view that supervisors potentially could have that women, and especially female researchers from other countries, would not remain close to the supervisor's research group:

I think, as a foreigner and also a female student, or young scientist, we face more difficulties because you are foreign and

they don't think that you're going to stay. "Why didn't you go back to country [...]? Why are you still here?" So I face more difficulties. I am a woman, I'm also a foreigner here so I strongly sense this. And then actually it triggers me to fight even harder because I know I have to because otherwise nobody would think: "Ah, you know, we have this we offer for you, we support you". Because they don't think that you're going to stay or you're going to continue. So, then I have to fight for my own right, my own career path. (interviewee B4).

The lack of both tangible and intangible resources provided by their supervisors was apparent throughout the discussion groups. In many cases, the different types of resources and their importance had not even been discussed between the supervisors and these WECRs. This left finding the resources necessary for establishing a research career up to the WECRs themselves, which meant finding and competing for resources in a system where they felt a lack of support both due to male bias and also if they were from another country.

The participants perceived their workload as staggering. Several felt a constant pressure to perform, both in terms of the amount of work that had to be achieved and quality of the research. There was a constant pressure to show oneself worthy as a researcher and to be seen as such by more senior researchers. Male colleagues at a similar rank were perceived as not having to perform at the same level. Several participants expressed that at meetings, junior male researchers could pretend that they knew what they were talking about and have ill-prepared presentations, but this did not affect their regard by the senior researchers: "What I'm saying is at least it's an impression that males, for example, can go into [a] meeting less prepared and still do well" (interviewee A2). One of the interviewees expressed her concerns about her future:

I'm halfway through my post-doc and I'm thinking about the next step and I want to keep going and I want to prove myself so that I can get [to] the next step and get the support to keep going. And if they're not going to support me, if they think I'm not capable [and I am] a waste of their time, I want to kind of show them I'm valuable and I need help to keep going. (interviewee A3).

The constant pressure to perform and the importance of being seen by senior scholars as a hard-working researcher producing quality research in an environment without much support left the researchers in a lonely and stressful position. At the same time, they experienced that there were different rules for men and women at the same career stage. Male early-career researchers could produce less work with lower quality and still be valued at the same level. As the seniors assessing the post-doc researchers also were the ones that could potentially provide resources, the senior scholars' approval was important not only for the existing work situation, but also potentially for the possibility for a future

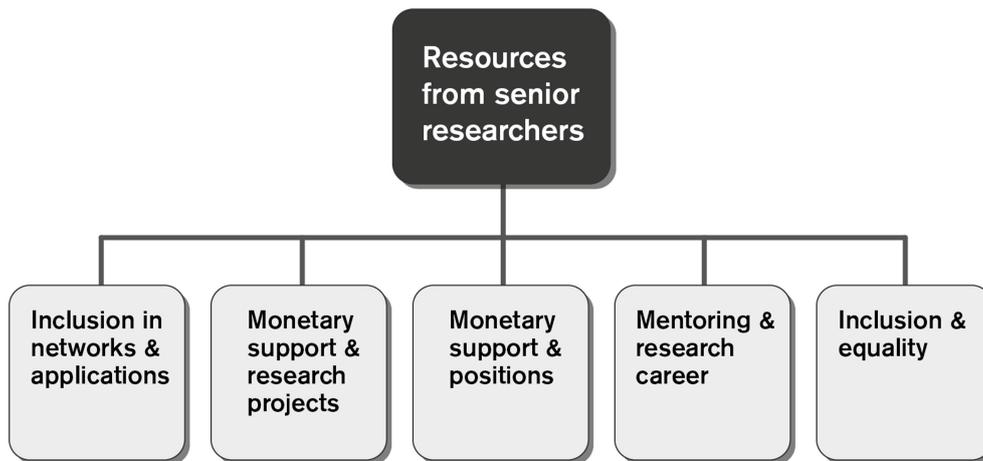


FIGURE 3

Sub-themes that emerged from the focus group discussions of the WECRs' present situation regarding support, resources, and inclusion.

career in research. Further, the groups discussed their experiences of inclusion in their supervisor's research group. One of them explained, "This feeling that everything can just slip out from under you and if you are not doing the best stuff, showing the best stuff" (interviewee A3). Another interviewee had similar experiences of being excluded:

He said we will make a date but he never came back. I don't know if it was because I was highly pregnant, that [it] didn't look good on camera or whether it was because my Swedish was not good enough to be in the film or whether he talked to the senior leaders that realized I was not appropriate. And then, instead, they asked another male student, a newly graduated PhD student not related to the project whatsoever... so they went for him instead (interviewee C3).

Here, the overwhelming perceptions were that the study participants felt socially included, but some felt that they were not intellectually included. In other words, some of the WECRs experienced that they were not treated as intellectual equals as male colleagues were treated at the same stage. These intangible resources in the form of support that show recognition that the WECRs has potential and is a valuable intellectual partner is crucial. However, it can be difficult to attract the leadership's attention to the lack of these more intangible and invisible resources.

## Informal support networks

It was found that external and informal female research networks gave support to some of the researchers in different ways. The study participants were not introduced to these networks by the supervisors; rather, these networks were discovered or created by the study participants themselves. These networks provided much-needed support for the study

participants, and offered intangible resources such as advice on funding applications and sounding boards for research problems:

They would share with you "Hi, I have this material sent" and you can learn, for example, how to write a good proposal or how to write a manuscript or how to work more efficiently. So I do get a lot of support from [my] friends, all female, but I don't get this sharing information or tips or help from male co-workers. I think it's, here I sense a [it's a] bit different, I actually like it when I am around female scientists and we actually can do things together and it's very nice really [- - -] Yeah, I also got like mentally support from most of my female colleagues and friends. So, [I get] confidence and support there. ... Maybe females are better in these things but I just personally experience I get more support. Also, I gained confidence because I got people that believe I could actually do a good job and they believe I'm good enough to continue. And then [I] kind of [can] tell myself: "Yeah, continue, you're good enough (interviewee B4).

These women-based networks helped fill resource gaps that were not provided by the participants' supervisors. In addition to the resources and support from the all-women's networks, they also provided a forum where the WECRs felt that they belonged, and where members understood challenges facing women in academia. These intangible resources in the form of support networks helped shape the participants' views in a positive way regarding their ability to succeed in academia.

## Targeted changes needed to improve women's career possibilities—participants' own views

Finally, the groups discussed what, in their view, needs to be changed to make it possible for them as WECRs to continue

pursuing a research career. From these discussions, six different sub-themes emerged (Figure 4). There was a certain bleakness when they reflected on academia today and a feeling of tiredness concerning the number of talks and institutional policies that were waved about, but an obvious lack of what was considered meaningful action, as one of them stated: “I do feel like awareness or talking about it is present, but the gap between talking and action is actually getting wider” (interviewee B2). Yet another formulated:

It's more, these things have been so bad for so long, are there any companies that have good strategies? I don't know, I feel like everything is so tokenistic [like a] support group, which is good but we need more, to make change. I don't know how much talking about these things over and over again does (interviewee A3).

The participants showed a lack of confidence that the university could handle the present inequalities within the organization. The perception was that the present ways of addressing inequality were more about discussions rather than concrete actions with clear results. The university's ways of addressing equal opportunities were interpreted by the study participants as meaning that their career opportunities were as low as ever.

The researchers brought up a multitude of factors that were linked to actions for change. Their suggestions are clustered in three parts and are described in more detail in the section that follows. *Firstly*, a new “normal” has to be established in terms of who is seen as institutionally valued researchers. That can partly be changed *via* the allocation of resources so that women in research would receive the same amount of resources in terms of funding and positions as male researchers. As one of the interviewees expressed: “It helps to have some role models then, when you are alone and tired and sad” (interviewee C2). Yet another of the interviewees suggested quotas for hiring:

I'm a big fan of quotas for hiring. I was a bit against it when I first thought about being hired for, because of being a woman and the stigma and that people will think that's why I got employed. But things aren't changing! Things aren't changing until we get women in these positions and the only way we are going to do that is if we have quotas, I think (interviewee A3).

Having more women role models holding senior positions would show the WECRs that it was possible for them to succeed in academia. For them, they need to see with their own eyes that WECRs are rewarded for their competence by being allocated resources and positions; such actions would help them continue through difficult times, knowing that they also could reach senior levels and be awarded with positions within academia.

*Secondly*, removing the existing bias in supporting men over women was recommended, which could lead to a more even

distribution of research resources between women and men. There were several points discussed on how this could be done within the university: an equal resource allocation between women and men in research as a goal within the university; equity in all hiring processes of senior positions; an equality officer with influence on decisions in all faculty and administration groups where strategic decisions are made; and continuous, transparent updates on what the allocation of research resources (including positions) is for women and men. The interviewees suggested: “When recruiting new people, the equal opportunities officer should be involved, which, I think [they are] not necessarily” (interviewee A3) and “It's nice to see these summaries [of the allocation of resources]. I did the exact same summary a little more than a year ago” (interviewee C2).

They suggested an obligatory gender training for all leaders (both within research and administration) within the university, as two of them explained:

I think everyone [should] think about these issues, to think whether they have a bias. Especially for the professors or people who actually sit at the top of this career path because they [have] more power to make changes. But we have to make them listen, to hear, to understand. Maybe there should be activities or seminars organized and then they see [and] need to think: Is really what I believe or what I think a good standard for scientists or for a group leader? (interviewee B4).

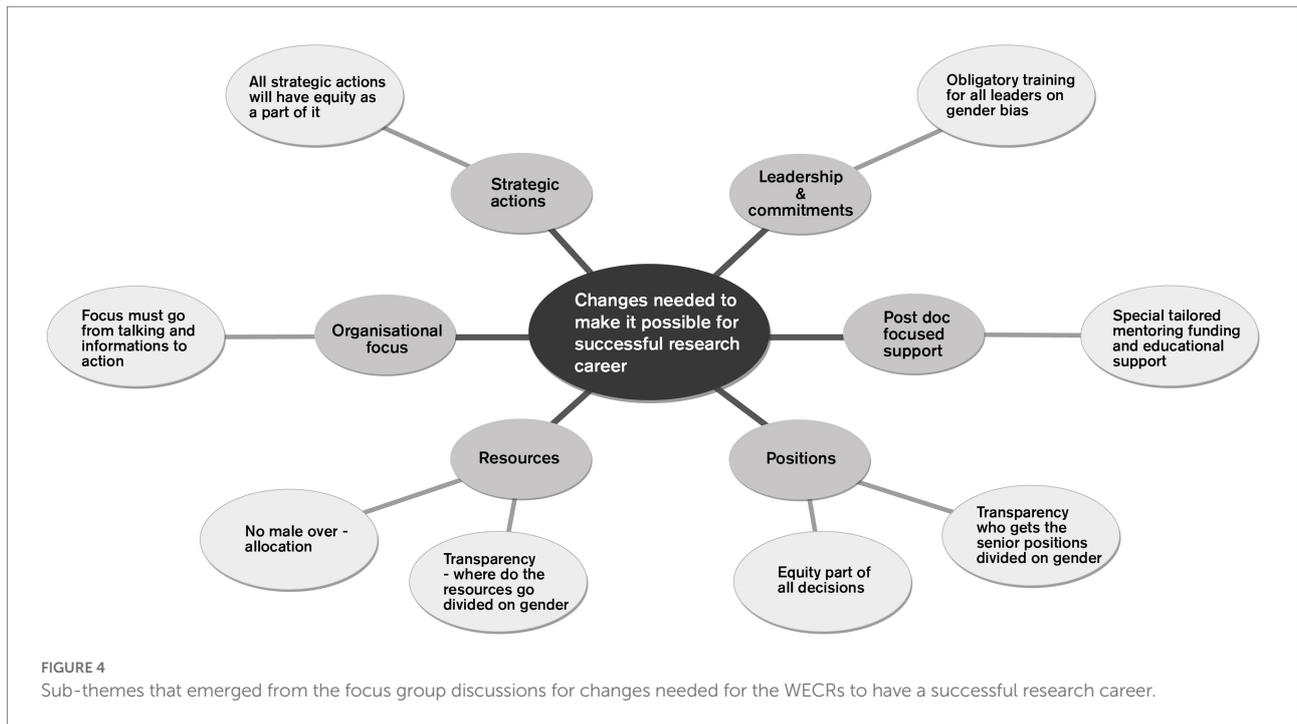
When we have discussions about gender issues, it's usually younger people participating and a majority of women. And this is a big, big problem so there should be something like continuous training. ... it should really be targeted at senior researchers and with a mechanism that ensures that male senior researchers are participating (interviewee A1).

Additionally, they suggested focusing support for early-career researchers, and focused monetary support to WECRs specifically:

If there were some kind of monetary support for young researchers that might help them in the future. And, of course, there should be competition for it and not everybody can get it but, now there is nothing (interviewee C2).

*Thirdly*, they discussed the need for an active inclusion of women in scientific discussions, as one of the focus group participants expressed:

We can have as much discussions in female environments as we want and still we face the same [issues]. I think maybe something like obligatory seminars for faculty professors about this problem. Let them discover that they have this default thinking that they are unconscious [of], that they don't think about this, that they don't invite [women] to nice tasks like intellectual discussions, they don't invite women. Why? Why? (interviewee B3).



To conclude, the suggestions by the researchers spanned a broad spectrum of activities focused on different levels of the organization, from university leadership to the individual level at the department. Common for all suggestions were that support for their execution needed to be present from the university itself at some level, and none could be controlled by the researchers themselves.

## Discussion

The idea that meritocratic principles are used to objectively evaluate a researcher's quality in academia has been refuted in many studies (van den Brink et al., 2010; Herschberg et al., 2018; Kang and Kaplan, 2019; Bourabain, 2021). Still, this notion of meritocracy remains as the backbone for a university's allocation of resources (Nielsen, 2015; Powell, 2016). This idea is likely a major component explaining the lack of activities to create real change from the current state toward having a university where women and men have equal possibilities for a successful research career. It is in this situation that WECRs currently find themselves. Thus, it is within these limitations and the outcomes of gender biases that influence their work and affect their views on their possibility for achieving a successful research career. This study contributes with a deepened understanding of how resource allocation is gendered by studying WCRs' experiences. It is clear that intangible resource allocation in the form of inclusion, being valued scientifically, mentoring and being invited to networks are crucial resources for WECRs and that the participants in our study experience that these resources are unequally distributed among men and

women. Below we discuss the consequences and the significance of this skewed distribution of resources.

## The feeling of standing alone

The participants were very interested in sharing their experiences and thoughts. The question on how resources are allocated was central to their own future in science. At the early-career stage these researchers are vulnerable, as they have passed the stage where they are formally supported by supervisors and the university but do not yet have tenured support of a senior position. It is within this narrow timeframe that they are expected to form the foundation from which they develop and advance their own research careers. During this stage, they are generally not offered research- or pedagogical development from the university, and the stark reduction in support from their previous career stage (i.e., PhD studies) left these WECRs feeling quite alone and without support. It was within this situation, and with evidence that the organizational structures differentially allocate resources in favor of men, that the participants questioned if this was an organization that was suitable for them.

## Scientific respect and women role models

During the discussions, it was apparent that the inequality in academia was perceived to be similar in other countries where some had experience. The lower chances of managing to secure resources—and thereby a successful career—in spite of working

to their capacity and constantly having to outperform men just to be recognized, left the WECRs feeling close to despair and resignation. The lack of senior female researchers (i.e., what the post-docs would have interpreted as evidence that women can succeed in the system) made them think that career advancement and security was similarly not possible for them. The function of role models should not be underestimated, especially in the natural sciences, as it is crucial for early-career researchers to have positive female role models, not superheroes, but women they can relate to (Cidlinská, 2019). At the same time, their views on how senior female researchers were treated cast a shadow on what it could mean for them to have such a position. Their perceptions are not unique to them or to this organization, but reinforce what we know about how female researchers are more likely than men to face disparaging remarks about their qualifications and their potential, with their accomplishments being often undervalued (van den Brink and Benschop, 2011; Van den Besselaar and Sandström, 2017; Bliithe and Elliott, 2020; Andersson et al., 2021). Gender stereotypes also come into play regarding how women are expected to behave, where women's non-normative behavior (e.g., being assertive) is punished (Heilman et al., 2004; Brescoll, 2011). These negative situations accumulate during the time that the researcher spends in academia (Bronstein and Farnsworth, 1998).

Because some WECRs in this study did not feel as included as their male colleagues in scientific discussions, they concluded that their competence was not regarded to the same degree, nor valued as equal. This situation has also been seen in other institutions where female researchers who felt undervalued were more likely to experience feelings of isolation in their departments, and be excluded from informal scholarly networks (Fox, 2010; Gardner, 2013; Bourabain, 2021). In some cases, the prevailing institutional culture leads female researchers to perceive that their chances of building a successful career are low; institutional cultures may also contribute to female researchers feeling or being silenced and undermined in scientific discussions (Fotaki, 2013).

## The value of informal women-networks to provide resources

A lack of support from current supervisors in terms of monetary resources, access to networks, or career mentoring resulted in several of the researchers feeling vulnerable and isolated from their research group or supervisor during a sensitive stage in their career. Such situations appear to be common (Christian et al., 2021), and may negatively impact women's opportunities to have a successful academic career (Bourabain, 2021). However, a number of participants received much-needed support from voluntary women-based research networks. In these networks, the participants received support related to grant application writing, career advice, and how to deal with day-to-day situations in academia. In an environment that feels exclusionary, those who share feelings of marginalization often seek support

from each other in a forum that allows them to affirm each other's values and challenge negative views of their identities (Ong et al., 2018). For many women, this means establishing egalitarian, encouraging, and reciprocal relationships (Kaepfel et al., 2020). Previous research has established that women find motivation through encouragement, rather than through challenge, in contrast to men (Mayer et al., 2008), and that they seek those who champion, accept, and affirm them (Levesque et al., 2005). These behaviors are more often found in supportive professional relationships with peers rather than in hierarchical relationships (Ion and Belloch, 2013; Kaepfel et al., 2020), showing the value of these groups in academia. These relationships have concrete outcomes beneficial to both the individual and the organization in terms of enhanced careers, publications and promotions (Mayer et al., 2008).

## High workload, limited opportunity for pay-off

The bias in the university's allocation of resources and supervisor support where male researchers are favored was clear to the WECRs. This was further reinforced to many of them by the perceived lack of resources and support to themselves as they progressed through their projects; they became increasingly aware that to be able to compete for resources they had to find their own way (see also Powell, 2018). In addition, they felt that to succeed, they had to produce research not only of both high quality and quantity, but at a level above their male colleagues at a similar career stage. They also acknowledged that even by doing so, this was still unlikely to pay off in terms of resources and positions because of gender bias within the organization. Facing this, calculations of the likelihood of success and what trade-offs they need to make becomes a conscious or unconscious act in order to succeed. Many perceive they have a very low chance for a career pay-off in spite of an extremely high work effort (the latter also affected their ability to maintain a life outside academia), which is a belief supported by other studies (White, 2003; Zaccchia, 2020). Because they observed that the same effort was not needed for male colleagues, the study participants concluded that their possibility for a successful career in the system was slim unless something within the organization would change to specifically address this bias.

## Development of the academic system

Within the formal appointment system of a university, there are several instances where informal networks, favoritism, and homophilia steer the outcomes in a way that favors men (Nielsen, 2015). As Huang et al. (2020) showed, women disappear from academia at high rates at all career stages. Therefore, focusing on junior researchers alone will not be sufficient to reduce the career gender imbalance (Casad et al., 2020). One existing major

problem is that staff in powerful positions continue to believe in women-centered explanations for gender differences in academic advancement (Dever and Morrison, 2009; Bird, 2011; Powell et al., 2018), when it is the gendered barriers within the system that have to be eliminated. Indeed, in her reflections of the “outsider within” phenomenon facing Black women in higher education, Collins (1999) emphasizes that problems of discrimination should be considered in light of the structural challenges that produce such exclusion. In line with Hill Collins’ emphasis on the intersectional nature of exclusion and as noted by some WECRs, the problem of bias against WECRs cannot be divorced from other intersecting factors of discrimination such as ethnic origin, migration status, and family situation; although not the initial focus for this study, this is an area that future studies should explore further to better understand the intersectional nature of exclusion facing WECRs.

The cumulative impact of existing male bias at all stages and in all aspects of academia dramatically decreases the number of possible women in senior positions that can and are allowed to work as mentors, and this subsequent lack of support and mentoring from women in senior research positions further maintains or exacerbates the cycle of low retention and poor advancement of other women pursuing research careers in academia. The myth of science as being gender-neutral saturates the perceptions of the academic research system among scientists as well as administrators (Nielsen, 2015; Kang and Kaplan, 2019). Appointments and promotions will come to “the deserving” based on merit alone – a view that is deeply flawed (van den Brink and Benschop, 2011; Nielsen, 2018; Andersson et al., 2021; Powell and Arora-Jonsson, 2021). One of the prevalent criticisms against the use of financial incentives to promote gender equality is based on this faulty image of how academic recruitment and promotion works. It is clear that none of the current ways of how to address the favoring of male researchers is working, since there has been no general change in how resources are allocated in recent years (European Commission, 2019; Sweden Higher Education, 2019, 2020, 2021; Huang et al., 2020), despite evidence that male bias has increased (Llorens et al., 2021). Such a gaping lack of resolute activities that successfully change the current situation of male bias to achieve a non-gender-biased academia is quite astonishing, given that academia is tasked to solve society’s current problems. The ability for a WECR to succeed in her career when compared with her male colleagues is an important marker for the quality of an academic organization’s structure. If there are behaviors and procedures within academia that disadvantage women and these are not remedied, the message communicated is that discriminatory practices are acceptable.

## Development of the field

This paper contributes to studies on the importance of resources when early-career researchers are contemplating their research careers. The presence—or absence—of resources may

be one of the major determinants of whether WECRs can pursue a career in academia. This does not entail only resources spent on this career stage, but also how resources (and positions) are allocated within academia. Not only at Swedish universities, but around the world, there are policies to strengthen gender equality and women’s opportunities for successful careers. Bondestam and Lundkvist (2020) analyze the measures taken over the past 30 years in Sweden; they found that these measures proved to be of little importance, ineffective, and leading to persistent inequality. This is the same conclusion that the WECRs in this study have done and in line with other women academics (Täuber, 2022). This furthers our understanding of both the direct and indirect values of resources, as *whom* resources are spent on in the organization gives a very strong signal as to who the organization wants as a member. The study participants’ own access to resources, both tangible and intangible, gave them an indication of how they are viewed and valued by the organization and by senior researchers. How WECRs experience this multilayered effect of a university’s resource allocation has been little addressed in previous studies. We suggest that choices made within organizations regarding the allocation of resources, the presence of a non-biased academia, and the opportunity for women to hold senior academic positions are likely tightly linked.

This small-scale qualitative study has increased our understanding of WECRs’ experiences, their views of a successful research career, and how these are linked to resources. The results have a general interest given that academia internationally faces similar systematic biases (McAlpine et al., 2018; Huang et al., 2020). However, each organization has its specific conditions that also must be taken into consideration to understand WECRs’ situation. Experiences from other groups of researchers, such as men in the early career, senior women in research that have managed to secure resources, and the intersectional nature of bias facing WECRs would also be interesting to explore. In addition, it is important to bear in mind the possible bias in the study. As the authors work at the same university as the study is undertaken, it might have been easier to access the field; the interviewees might have perceived that the insider understands all aspects of their situation and therefore left information out; or, the analysis and interpretation might have been affected by previous experiences of the environment or topic. However, all benefits but also risks have been deeply considered.

Future research is highly needed on how different types of resources support early-career researchers so they can see themselves as members of the research community and are able to advance their careers to the same extent as men. Furthermore, research on what is invisible, unplanned, implicit, and ongoing alongside the visible and formal, the hidden curriculum (Elliot et al., 2020), could shed light on what early career researchers’ experiences and experiences look like. Further, previous research on all women’s networks and friendships and their positive impacts as possible support systems (Webster and Boyd, 2019; Kaepfel et al., 2020), offer interesting avenues to explore concerning how these would fit into a changing and proactive

academic system. Our study points to the importance to acknowledge intangible resources, resources that could be more hidden and hard to measure. New insights into how intangible resources are valued by WECRs and how such resources can be distributed among early-career researchers are important steps in developing a more gender equal higher education.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors upon reasonable request.

## Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

## Author contributions

ÅB: conceptualization, investigation, data curation, analysis, writing—original draft, and visualization. CA, AD, and AG:

methodology and writing—review and editing. All authors contributed to the article and approved the submitted version.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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