

Publication status: Not informed by the submitting author

Academic career and gender inequalities in Brazil: the effect of postdoctoral mobility abroad

Ana Maria Carneiro, Ana Maria Nunes Gimenez, André Correia Bueno, Carolina Mendes B. Ferreira, Gabriela Araujo Tetzner, Julia Suzuki, Larissa Aparecida Prevato Lopes, Luiza Maria Capanema Bezerra

<https://doi.org/10.1590/SciELOPreprints.6683>

Submitted on: 2023-08-25

Posted on: 2023-08-28 (version 1)

(YYYY-MM-DD)

The moderation of this preprint received the endorsement of:

Sergio Luiz Monteiro Salles-Filho (ORCID: <https://orcid.org/0000-0002-8727-4500>)

Academic career and gender inequalities in Brazil: the effect of postdoctoral mobility abroad¹

Ana Maria Carneiro - University of Campinas, Brazil-

<https://orcid.org/0000-0001-6688-1881>

Ana Maria Nunes Gimenez - University of Campinas, Brazil -

<https://orcid.org/0000-0002-6187-0718>

André Correia Bueno - University of Campinas, Brazil -

<https://orcid.org/0000-0002-3992-7298>

Carolina Mendes B. Ferreira - University of Campinas, Brazil -

<https://orcid.org/0009-0003-6215-5876>

Gabriela Araujo Tetzner - University of Campinas, Brazil -

<https://orcid.org/0000-0002-3702-0086>

Julia Yuki Dias Suzuki - University of Campinas, Brazil -

<https://orcid.org/0009-0001-4786-9120>

Larissa A. Prevato Lopes - University of Campinas, Brazil -

<https://orcid.org/0000-0002-5586-5189>

Luiza M. Capanema Bezerra - Agronomic Institute, Brazil -

<https://orcid.org/0000-0002-5906-4645>

Abstract:

Empirical studies have pointed out that academic mobility can increase social capital, contribute to collaborations, and directly influence overall career success (Dueñas-Fernández, Iglesias-Fernández & Llorente-Heras, 2013). However, it is also known that both academic mobility and international scientific collaborations can be negatively impacted by gender inequality. Regarding international mobility, women are underrepresented in all areas of knowledge (Momeni et al., 2022). In science, immobility or low mobility is commonly associated with slower career progression; scarce opportunities to hold coordination and management positions ("glass ceiling"); less insertion in international collaboration networks;

¹ Paper presented at the 21th International Conference of the Triple Helix Association, held in La Salle Ramon Llull University, Barcelona from the 26th to the 30th of June, 2023.

and even abandonment of science (Delicado & Alves, 2013; van der Wal, 2021). The overload of family functions and the partnering effect (Ackers, 2004) are among the obstacles that women may face, which can limit researchers' displacement opportunities (Momeni et al., 2022). This scenario justifies the importance of exploring the international mobility undertaken by Brazilian researchers to analyze, among other aspects, the possible gender imbalances in academic mobility. The population investigated in this research will be comprised of Brazilians who have done postdoctoral studies abroad. This selection is because they are more advanced in their professional and training trajectories. The phase after the doctorate makes the researcher more independent and responsible for their research agenda, which would leave them better able to conduct high-impact studies (Nerad et al., 2022). The work aims to design research that evaluates the effect of postdoctoral mobility abroad on employment in the academic career, considering gender inequality and institutional and systemic aspects (such as area of knowledge, academic productivity, and career position) (Aksnes et al., 2019). For this, a consolidated database will be built based on former postdoctoral fellows of the São Paulo Research Foundation (FAPESP) and the triangulation of a set of data sources since there is no consolidated database on mobility and employment ties in the Brazilian case. Next, a comparative study with a descriptive and exploratory design will be carried out between those who had postdoctoral fellowships abroad and those who had postdoctoral fellowships in Brazil without an internship abroad, and which aims, in the future, to enable the carrying out of a quasi-experiment.

Keywords: Academic mobility; International collaboration; Brazil; Career; Gender.

Introduction

Empirical studies have pointed out that academic mobility can increase social capital, contribute to collaborations, and directly influence overall career success (Dueñas-Fernández et al., 2013). In science, immobility or low mobility is commonly associated with slower career progression; scarce opportunities to hold coordination and management positions ("glass ceiling"); less insertion in international collaboration networks; and even abandonment of science (Delicado & Alves, 2013; van der Wal, 2021). However, it is also known that both academic mobility and international scientific collaborations can be negatively impacted by gender inequality. Regarding international mobility, women are underrepresented in all areas of knowledge (Momeni et al., 2022).

The overload of family functions and the partnering effect (Ackers, 2004) are among the main obstacles that women may face, limiting researchers' mobility opportunities (Momeni et al., 2022). This scenario justifies the importance of exploring the international mobility undertaken by Brazilian researchers to analyze, among other aspects, the possible gender imbalances in academic mobility.

The work presents the basis of a research design to evaluate the effect of postdoctoral international mobility on employment in the academic career, considering gender inequality

and institutional and systemic aspects (such as area of knowledge, academic productivity, and career position) (Aksnes et al., 2019), among others. Once the research design is applied, the evaluation will then be carried out using a sample of postdoctoral fellows of the São Paulo Research Foundation (FAPESP) together with the triangulation of a set of data sources as there is no consolidated database on mobility and employment ties in the Brazilian case. The population to be investigated in this research will be comprised of Brazilians who have done postdoctoral studies abroad. This selection is based on the premise that the postdoctoral fellows are more advanced in their professional and training trajectories. The phase after the doctorate makes the researcher more independent and responsible for their research agenda, which would leave them better able to carry out high-impact studies (Nerad et al., 2022).

Therefore, this manuscript aims to discuss the strengths and weaknesses of the database that will be built according to the variables highlighted in the literature review about the effects of gender inequality on academic mobility in academic careers. The database will contain information about employment, academic production, gender, and curriculum, as well as the completion of internships abroad. Thus, it will be possible to investigate patterns and differentiations between the academic trajectories and the characteristics of the individuals. The consolidated database will be constructed by exploring, collecting and cross-referencing information from various data sources with quality control of the selected variables.

Gender inequality in academic mobility

The bibliographic material obtained through searches in the Scopus and Web of Science databases comprised studies published in the form of articles or review articles from 2013 to 2023, based on queries related to "mobility," "collaboration/cooperation," and "academic career." The initial searches yielded 1,123 documents from Scopus and 270 from Web of Science. After excluding duplicate records (498 articles), the remaining documents underwent a screening process for refinement and categorization of the obtained studies to remove those that diverged from the research purposes and separating them into predefined sets, such as the effects of mobility on scientific production, the setting up of cooperation networks, research funding, career progression, and occupational status, among others. This study selected 25 articles published between 2017 and 2022 addressing the possible intersections between academic mobility, cooperation, academic career, and gender perspectives.

All studies have pointed out gender inequality in academic mobility and cooperation (Schaer et al., 2017; Tam & Araújo, 2017; Tzanakou, 2017; Uhly et al., 2017; Vohlídalová,

2017; Toader & Dahinden, 2018; Abel et al., 2019; Aksnes et al., 2019; Cohen et al., 2020; Gibb, 2020; Jenkins, 2020; Malakhov, 2020; Nikunem & Lempiäinen, 2020; Yan et al., 2020; Zhang et al., 2020; Henderson, 2021; Moratti, 2021; Robles-Belmont, 2021; Tasci, 2021; Bao, 2022; Nachatar Singh, 2022; Schittenhelm, 2022; Wendt, 2022; Zhao et al., 2022). According to Uhly et al. (2017), gender is an analytical concept or a basic principle that organizes material, social, and cultural life, both produced in social interactions and constructed through social structures and norms. Despite significant gains in the representation and participation of women in higher education, studies suggest that "glass ceilings" separate women from the academic elite, which is still predominantly male-dominated. Therefore, factors such as gender and ethnicity, which are often related to stereotypical views on the roles and responsibilities of men and women, can impact mobility (Tam & Araújo, 2017). Studies show that women tend to have fewer opportunities for mobility (Toader & Dahinden, 2018).

Women are less mobile both nationally and internationally (Abel et al., 2019). Additionally, female professors tend to move within the same geographic region at a higher rate than men, likely due to a preference for movements that result in less disruption to their social networks (Yan et al., 2020). Moreover, often, even when they manage to have mobility experiences, they cannot reap all the benefits that come from this experience (Moratti, 2021; Tam & Araújo, 2017; Nachatar Singh, 2022). In Moratti's study (2021) on access to permanent positions at a Norwegian university, it was shown that behind an apparently gender-equal image, there are specific hiring patterns: internal candidates are favored while external candidates are overlooked, and this is particularly pronounced in the case of international female candidates. Similar results were found by Nachatar Singh (2022) regarding the leadership-related challenges caused by differing university work cultures compared with their home countries. Usually, disadvantages associated with gender are cumulative and multi-layered, resulting from the effects of several variables, including the emotional, social, economic, and political contexts (Tam & Araújo, 2017).

One notable observation is that while virtual mobility has gained popularity in recent years, it cannot fully replace physical mobility. According to Cohen et al. (2020), academics who do not actively engage in building and nurturing social capital, such as through networking at conferences, attending visits, and engaging in collaborative research, are at risk of marginalization. Consequently, virtual interactions cannot provide the same depth of understanding and appreciation as physical interactions.

Gender inequality in academic mobility, especially international mobility, negatively impacts women researchers' careers. The lack of academic mobility can reduce women's competitiveness in academia (Bao, 2022). This includes slower career progression and difficulty in maintaining or obtaining academic positions. In fields where mobility for field research is crucial, such as development geography, women face difficulties in submitting funding applications because they cannot undertake long-duration fieldwork mobility, resulting in lower productivity and greater challenges in career progression (Jenkins, 2020). Women involved in family caregiving tend to participate in fewer conferences; when they do, they prefer short-term trips and nearby destinations (Henderson, 2021). In the case of mobility between institutions, a study by Yan et al. (2020) with professors in the US showed that female professors are less likely to maintain their academic rank or achieve a promotion when moving from a less research-intensive institution to a more research-intensive one. In Moratti's study (2021), mobile men are hired more often than mobile women.

The reviewed studies have shed light on various factors that influence mobility's feasibility, duration, and geographical extent of mobility. In this literature review, firstly, we underscore the significance of individual characteristics; secondly, the cultural, systemic factors and organizational aspects; and thirdly, the influence of knowledge domains.

Regarding individual characteristics, one of the major factors explaining gender inequality in mobility is related to family obligations (Abel et al., 2019; Gibb, 2020; Henderson, 2021; Malakhov et al., 2020). Malakhov, Vasil'eva, and Belov (2020) emphasize the impact of family tasks, which are unequally distributed among family members, on the work of women academics. Henderson (2021) discusses the concept of "sticky care" and the strategies women develop to engage in even short-term mobility, which involves extensive pre-planning, remote management of domestic activities, and consideration of emotional aspects.

The literature review distinguishes family obligations into two interrelated categories: parenting and partnering. Concerning parenting, specifically being a mother, particularly with young children, significantly influences the focus and research location, often constraining the level of mobility, as previously mentioned (Abel et al., 2019; Jenkins, 2020; Uhly et al., 2017; Vohlídalová, 2017). Several authors further highlight the dichotomy between academic subjectivity, which emphasizes mobility as 'essential' for one's career, and the subjectivity associated with being a 'mother' in a heteronormative discourse of the 'caregiving woman.' This dichotomy gives rise to a state of being fraught with conflicts and anxieties for the individuals involved (Cohen et al., 2020).

The pioneering study by Ackers (2004) drew attention to the effect of partnering on academic mobility. Subsequently, several studies began to include in their analyses the employment status of partners and the nature of their relationships (Abel et al., 2019; Uhly et al., 2017; Vohlídalová, 2017; Schaer et al., 2017; Toader & Dahinden, 2018; Schittenhelm, 2022; Tzanakou, 2017). The study by Uhly et al. (2017) about academic collaboration classified partner's employment status into five categories: single, unemployed partner, part-time employed partner (non-academic), full-time employed partner (non-academic), and employed partner working in academia (part-time or full-time). The partner's employment and the presence of children create a "glass ceiling" as family status affects collaboration opportunities for both men and women but in different ways. Gender differences are more pronounced for academics with children than those without children (except those with academic partners). Collaboration patterns for men and women are more similar when they are single or partnered with another academic, and they diverge more when partnered with a full-time employed non-academic partner. Both men and women benefit from having academic partners, but the benefits are greater for men (who experience higher collaboration rates). Single women collaborate more than married women with academics and without children. The partner's employment has a greater influence on women than the presence of children; in other words, women collaborate more if they have an academic husband and children than those with a non-academic husband and children (Uhly et al., 2017).

Vohlídalová (2017), analyzing dual-career academic couples, discusses how the careers of married women depend on the type of marriage, whether it is egalitarian in terms of division of responsibilities or not. Traditional partnerships, particularly within the context of contemporary research organization and family policies, create an environment much less conducive to building a successful scientific career for women compared to those in egalitarian partnerships. Women's careers in such partnerships may constantly be under threat because they are always ready to yield to their partner's career demands and the needs of their children and family.

In the case of heterosexual couples, Schaer et al. (2017) discuss new gender dynamics that would be more favorable for reducing gender asymmetries in academic mobility. However, in cases where couples have one or more children, it can alter the configuration of the relationship in terms of gender, causing partners to adhere more closely to "traditional" conceptions of motherhood and fatherhood. The article reinforces the diversity of gender perspectives but also points to the significant influence of parenthood on shaping the

relationship in terms of gender, causing partners to adhere more closely to "traditional" conceptions of motherhood and fatherhood.

Besides gender, parenting and partnering, the reviewed studies point out the relevance of other variables, such as institutional affiliations (Abel et al., 2019; Yan et al., 2020; Wendt et al., 2022; Aksnes et al., 2019), academic position or function (Wendt et al., 2022; Aksnes et al., 2019), employment stability (Nikunem & Lempiäinen, 2020), academic performance (Aksnes et al., 2019; Abel et al., 2019; Jenkins, 2020), age (Vohlídalová, 2017; Uhly et al., 2017; Nikunem & Lempiäinen, 2020; Zhao et al., 2022; Wendt et al., 2022; Aksnes et al., 2019), income (Uhly et al., 2017), doctoral training, especially abroad (Uhly et al., 2017; Wendt et al., 2022; Robles-Belmont, 2021) and religion (Tam & Araújo, 2017).

The age variable in some studies is defined as the researcher's chronological age, while in others, it refers to academic age and serves as a proxy for career seniority (Uhly et al., 2017). It can be calculated from the first publication (Zhao et al., 2022) or determined based on criteria such as academic position and date of completion of the doctoral degree (Schaer et al., 2017).

When considering the career stage and revisiting the discussions on traditional partnerships, generational differences emerge regarding women's attainment of academic seniority by women as shown by Vohlídalová (2017). Older female researchers from previous generations, who were in traditional partnerships with children, often achieved comparable or even higher levels of seniority than their partners. This was due to the lower pressure for productivity and academic performance that existed in the past. In stark contrast, younger generations must employ various strategies to effectively balance their career and personal life (Vohlídalová, 2017).

As Nikunem & Lempiäinen (2020) highlighted, women must demonstrate their employability to a greater extent, compensating for potential gender biases. For instance, if mobility and being recognized as a "world-class" researcher are perceived as masculine traits, women must be "hyper-performative" to gain recognition in these areas.

Zhao et al. (2022) identified that in the case of return migration in Germany, both men and women who returned remained in academia for a longer period than external researchers and those who did not move. The average age of the repatriated researchers was up to 6 years older than those who did not move, suggesting substantial differences in their experience levels. Although the study found that both male and female academics benefited from the return, the impact was more positive on the careers of male researchers, with 64.6% of male repatriates becoming senior professionals.

The study of Uhly et al. (2017) used this variable as a proxy for social capital and prestige accumulation. The higher the income, the higher chance for international collaboration.

Regarding academic performance, Aksnes et al. (2019), analyzing data from researchers in Norway, observed notable gender differences in international collaboration when examining aggregated data. However, when considering field, academic position, and productivity, the gender difference is smaller. The main challenge seems to be female researchers' lower productivity, which hinders their academic careers' development. Female researchers are, on average, less productive and publish less than male researchers. This pattern appears to be universal across fields and countries, with the magnitude of the difference varying.

Now we analyze the cultural and systemic intermediary effects of different countries and organizational aspects in the academic mobility of women. The main ones identified in the systematic review of the literature are cultural, which refers to traditionalism in some societies (Vohlídalová, 2017); the working conditions offered through inclusion policies, whether public policies at a national level (systemic level) or universities' internal policies (organizational level) (Moratti, 2022; Nachatar Singh, 2022); and the effects in different areas of knowledge (Wendt et al.; 2022; Aksnes et al.; 2019).

Even in countries considered more egalitarian, such as Norway and Australia, there are systemic and cultural barriers to advancing gender equality. Wendt et al. (2022) report that the international recruitment of researchers at universities in Norway contributed to the advancement of gender equality in the positions of full or associate professors. However, women continue to be a minority in the areas of Science, Technology, Engineering and Mathematics (STEM), in which there has been a greater recruitment of international researchers.

Another study conducted in Norway by Moratti (2021) at the Faculty of the Norwegian University of Science and Technology (NTNU) showed no significant differences between genders in the positions of full or associate professors. From 2007 to 2017, data showed a small advantage of women over men. However, women outside the university, including those from other countries, are disadvantaged, which becomes a gender issue. The farther a woman is from the university, the less chance she has of getting a position. However, it also leaves some questions since international candidates for positions in this university were more affected. It should also be noted that these positions are intensive in teaching, not research, with the highest number of women.

The author found evidence that most job offers were filled by female candidates who already resided in the country. In contrast, job offers for male and female candidates from other countries were intended for hiring men. As the positions occupied by women residing in the country are intensive in teaching and administrative activities, the priority is to hire women who need short geographic mobility (same country or nearby locations). The opposite situation occurs in more research-intensive positions, in which men with availability for mobility are privileged. Thus, women have an advantage over men when running as internal candidates and a disadvantage when running as external candidates (Moratti, 2021).

Nachatar Singh (2022) analyzes the case of female researchers with leadership positions in universities in Melbourne, Australia, and finds that they had difficulties understanding institutional policies, as well as facing cultural changes and managing their time. One of the reports of the study is from a female academic who had difficulties in speaking assertively in situations that required leadership due to the culture of her country of origin. The author also points out that women are more in charge of care work and tend to have more impact on their careers when they are mothers, especially on maternity leave. In addition, they occupy more administrative positions, which harms them in terms of academic productivity in research.

Regarding institutional policies, Jenkins (2020) calls attention to the existence of intangible costs in the personal, emotional, and financial spheres, besides their family life, brought about by the work conflict of research and maternity, from the experience of geographers who carry out field research in countries different from their origin, as already mentioned. These costs must be considered both in the family environment and by funding organizations and those that host the academic to favor the advancement of knowledge and professional development of academics.

As noted, studies on couples in dual careers (traditional or egalitarian, as Vohlídalová (2017) qualifies) have been related to gender equality in Europe, given that these studies present results and discussions that support policymakers in the field of gender inequality. In more recent years, programs have been established to host couples in dual careers in countries such as Germany, Switzerland and Denmark, with the objective of meeting the growing demand for international mobility of academic partners (Tzanakou, 2017).

Thus, the existence of institutional programs for talent management, gender equality and social engagement to support family needs are an important element in the academic's decision to accept or not a job position abroad. In the US, well-established academic partner hosting programs, and European countries, such as Germany, Switzerland and Denmark, have

implemented similar programs in recent years. In general, these programs seek to contribute to the balance between the academic's professional and personal life to the formation of a diverse academic workforce of international excellence (Tzanakou, 2017).

Studies focusing on the effects of knowledge fields have focused on different perspectives: propensity to collaborate (Uhly et al., 2017; Aksnes et al., 2019; Zhao et al., 2022); academic mobility (Malakhov, 2020; Robles-Belmont, 2021); academic mobility and performance (Jenkins, 2020); return migration (Zhao et al., 2022); and associations with international recruitment (Wendt et al., 2022).

According to Aksnes et al. (2019), the area of knowledge is the factor that most influence the propensity to collaborate internationally, and there are gender differences in all fields. However, women are in greater numbers in fields where international collaboration is lower (e.g., humanities). Uhly et al. (2017) identified that academics in the STEM, business, economics, and life sciences fields have significantly higher odds of international research collaboration when compared to the social and behavioral sciences, while Zhao et al. (2022), in their study of academics from Germany, found that in the health and physics fields, the likelihood of collaborating was higher than the overall averages. In contrast, engineering, computer science, and economics researchers had lower collaboration than the average.

When examining the academic mobility of women in specific fields of knowledge, Malakhov (2020) found that in Russia, the fields with the lowest female participation in international mobility were natural sciences and engineering, while medical sciences, social sciences, and humanities showed better representation. Furthermore, Robles-Belmont (2021) highlights gender asymmetries in academic mobility and areas of knowledge among members of the National System of Researchers in Mexico, with a predominance of males in most areas.

As mentioned, Jenkins (2020) raises a critical point in her reflection, suggesting that motherhood directly influences scientific productivity and career advancement, particularly in fields where mobility is central to research activities.

Methodologies in the reviewed articles

In this study, a comprehensive effort was undertaken to systematically analyze the methodologies employed in the reviewed studies due to its focus on research design. Among the 22 studies that conducted empirical analyses, 12 utilized qualitative designs (Vohlídalová, 2017; Jenkins, 2020; Henderson, 2021; Gibb, 2020; Tam & Araújo, 2017; Nikunem & Lempiäinen, 2020; Nachatar Singh, 2022; Schaer et al., 2017; Tzanakou, 2017; Cohen et al.,

2020; Bao, 2022; Schittenhelm, 2022), nine employed quantitative designs (Abel et al., 2019; Yan et al., 2020; Moratti, 2021; Uhly et al., 2017; Zhao et al., 2022; Wendt, 2022; Aksnes et al., 2019; Malakhov, 2020; Robles-Belmont, 2021), and one study utilized mixed methods (Toader & Dahinden, 2018).

The main qualitative methods employed were semi-structured and in-depth interviews (Vohlídalová, 2017; Tam & Araújo, 2017; Nikunem & Lempiäinen, 2020; Nachatar Singh, 2022; Schaer et al., 2017; Tzanakou, 2017; Cohen et al., 2020; Bao, 2022; Schittenhelm, 2022), self-ethnography and fieldwork diary (Gibb, 2020; Jenkins, 2020) and diary-interview method (Henderson, 2021).

These qualitative methods are particularly relevant for analyzing the mobility effects in four situations. Firstly, the interviews help to understand how each type of relationship (partnering) affects mobility decisions and the consequent effects on their career (Vohlídalová, 2017; Schaer et al., 2017; Cohen et al., 2020). Schittenhelm (2022) calls attention to the intersections between gender and citizenship in terms of the gender roles and power imbalance between life partners regarding the benefits derived from migrating opportunities in the European Union.

Secondly, the interviews allow for new interpretations of how academic women deal with family obligations before, during and after mobility experiences, whether short such as conferences (Henderson, 2021) or medium-term, such as field research (Jenkins, 2020).

Thirdly, it is possible to observe mobility as a mechanism of curriculum enrichment for southeast asian women, which allows them to overcome social disadvantages that gender causes in their homeland - Vietnam, Thailand, Cambodia, Indonesia, East Timor, Phillipines and Myanmar - in the study of Tam & Araújo (2017), or Chinese women in the study of Bao (2022).

Fourthly, interviews are a rather appropriate method to investigate the level of employment stability and the relationship with mobility (Nikunem & Lempiäinen, 2020), as well as the performance in leadership positions (Nachatar Singh, 2022).

The quantitative studies used bibliometric methods (Abel et al., 2019; Zhao et al., 2022; Malakhov, 2020), curriculum database analysis (Yan et al., 2020; Robles-Belmont, 2021), personnel register database analysis (Wendt, 2022; Aksnes et al., 2019), recruitment processes (Moratti, 2022), and survey data (Uhly et al., 2017; Malakhov, 2020).

Some studies make use of integrated databases, such as curriculum and institutional profiles as per the Carnegie Classification of Institutions of Higher Education to analyze the effect of mobility in the retention of individual academic ranking (Yan et al., 2020); b)

personnel register database and demographic information to analyze the effect of international recruitment in terms of gender equity in the Norwegian academic career (Wendt, 2022); c) bibliometric database and personnel register database to analyze the factors that influence the propensity to collaborate (Aksnes et al., 2019); and d) bibliometric database and survey to understand the migration patterns of Russian scientists (Malakhov, 2020).

Integration of databases is particularly useful for adding on individual information (such as gender, age, position and institutional affiliation) (Aksnes et al., 2019) or institutional (such as the research intensity of the institution) (Yan et al., 2020).

Bibliometric studies have the advantage of comprehensiveness of scope, which can include various subjects and a large contingency of studies and authors. For instance, the study by Zhao et al. (2022) analyzed bibliometric data from the Scopus database, encompassing eight million publications by 1.1 million researchers who were affiliated with institutions in Germany between 1996 and 2020. Without aggregating information from other databases, the authors were able to identify the gender and proxies for the disciplines associated with the publications and researchers, the career stage (calculated based on years since the first publication), and the timing of researchers' departures from and returns to Germany (based on institutional affiliation). With this information, they reconstructed the life stories of the researchers.

Surveys demand a bigger effort to be developed and can reach smaller samples if compared with bibliometric studies. However, surveys can provide tailored information, as the study of Uhly et al. (2017) based on the 2007 Changing Academic Profession Survey.

Finally, only one study employed a mixed methods methodology. By employing a mixed methods approach, combining survey and biographical-narrative interviews with academics who had experienced mobility, as well as carrying out semi-structured interviews with their partners, Toader and Dahinden (2018) were able to explore the dynamics of family configurations during the decision-making process and how these configurations evolved in the context of international mobility. Their findings revealed that women still tend to have lower rates of international mobility than men. However, in certain locations, this gender disparity is less pronounced due to the implementation of institutional policies that support work-life balance.

Research design

The research design is based on a quasi-experiment to evaluate the effect of postdoctoral international mobility on employment in the academic career. The

quasi-experiment will compare two samples of post-doctoral fellowships from the São Paulo Research Foundation (FAPESP).

One of the major challenges in investigating the impact of mobility on researchers' academic careers, taking into account individual, institutional, and systemic aspects, is the lack of a comprehensive database that consolidates this information. In the Brazilian context, various information about researchers is available from government secondary sources. However, they are scattered and disconnected, making it difficult to develop studies that utilize these variables.

Addressing this research gap, we discuss how to develop a comprehensive database encompassing information on academic curriculum, gender, race, international mobility, employment relationships, and income of former postdoctoral fellows of the São Paulo Research Foundation (FAPESP) between 2012 and 2017. Consequently, this section provides an in-depth analysis of each database's characteristics.

We consider that database development constituted this study's main challenge. The complexity lies in integrating vast amounts of information from different databases, each with its specificities and requiring treatment and standardization procedures. In addition to the data provided by FAPESP, the data sources planned to develop the consolidated database are: (i) formal employment records from the Annual Social Information Report (RAIS) of the Ministry of Labor and Social Security; (ii) curricula vitae available on the Lattes platform of the National Council for Scientific and Technological Development (CNPq); and (iii) affiliations indicated in the scientific production through a bibliometric study of the Web of Science and Scopus databases.

The starting point for the development of the consolidated database is the data provided by FAPESP regarding the former postdoctoral fellows, as they determine the size of the study population and provide information about individuals, enabling the cross-referencing of information between databases, such as name and Taxpayer Identification Number (CPF in its acronym in Portuguese). The information made available by FAPESP is based on the population of individuals awarded postdoctoral fellowships in Brazil between 2012 and 2017, which is used to setting up the sample of those who pursued mobility abroad through the Research Internships Abroad Program (BEPE in its acronym in Portuguese). A sample of those not pursuing mobility abroad will also be made for comparison purposes. The selected time frame is relevant for examining scientific output and labor market integration in the years following the completion of the postdoctoral period. Therefore, in addition to name and CPF, other information is also provided by FAPESP

databases, such as gender, race, institutional affiliation in Brazil, marital status, internships abroad, responsible researcher abroad, and field of knowledge, among other variables.

The subsequent step is to cross-reference the data from FAPESP with those from Lattes and RAIS using the name and CPF available in the three databases.

The Lattes curriculum provided by CNPq is a rich and standardized source of information about the academic and professional careers of Brazilian professors, researchers, and students from public and private organizations (Mena-Chalco & Cesar Junior, 2013). As it provides a standardized curriculum widely used throughout the country, the Lattes curriculum is also used as a national standard for assessing the competence of candidates applying for scholarships and grants, as well as in selection processes that evaluate qualifications. It can also support evaluating Brazilian research and postgraduate programs (Amorin, 2003; Correa et al., 2017). In this sense, the information available in the Lattes is constantly updated, and although it is manually filled in by individuals and subject to errors, the scientific information tends to be of high quality (Silva & Smit, 2009; Bin et al., 2022).

The tool used to extract the relevant information from Lattes will be the script *Lattes*, which is open-source software designed for the automatic extraction and compilation of Lattes curricula (Mena-Chalco & Cesar Junior, 2009; Mena-Chalco & Cesar Junior, 2013). Some of the variables of interest include the different stages of academic education (undergraduate, master's, doctoral), international mobility (during the educational stages, postdoctoral studies, or as a visiting scholar), bibliographic and technical productions, professional activities (type of employment, workload, and academic position), participation and development of research projects, among other information.

On the other hand, the RAIS database is an annual administrative registry established in 1975 by Decree No. 76,900 (Brasil, 2022). The purpose of the RAIS is to support the generation of statistics on formal employment and the labor market in private and public organizations for governmental entities (Brasil, 2022; Paixão et al., 2012). Thus, the triangulation of FAPESP data with the RAIS is relevant for obtaining information on the formal employment relationships of former postdoctoral fellows and, consequently, for developing a temporal series regarding the career progressions of the selected researchers. The main variables available at RAIS, which are part of the research design, are gender, race, type of employment relationship, the reason for the job termination, economic activity sector of the organization and average nominal earnings².

² It should be noted that the average nominal earnings variable will be updated for 2022 using the IPCA (National Consumer Price Index), thereby avoiding distortions in the analysis.

Therefore, the microdata from the RAIS database provides comprehensive information on formal employment in Brazil. However, it does not cover informal occupations. In this regard, the Lattes platform is a valuable complementary source, particularly for capturing informal employment relationships such as postdoctoral positions, consulting work, and project participation.

Furthermore, the triangulation of these three databases enables the investigation of data entry errors and missing information in researchers' records. This will be particularly advantageous for analyzing variables such as gender, age, and race.

Lastly, a bibliometric analysis will be conducted to retrieve the complete scientific output of the postdoctoral fellows by utilizing Scopus and Web of Science databases. The aim is to assess the performance of both mobile and non-mobile fellows. The data collection will utilize the researcher's name and institutional affiliation as search parameters. The scientific publications documented in the Lattes curriculum will be merged with those obtained from Scopus and Web of Science.

Results and Discussion

As highlighted, the information from Fapesp represents the basis for the research because it delimits the study population, the period, and some key variables, such as the identification of the individual (name and CPF), which will later be used for triangulation with the RAIS and Lattes databases, as well as in the bibliometric study.

Currently, access to the microdata of the FAPESP database has not been obtained. Hence, we relied on the publicly available data from the BEPE program and Post-Doctoral Fellowships in Brazil provided by FAPESP³. The collected sample encompasses 5,585 individuals who utilized postdoctoral fellowships between 2012 and 2017, of whom 4,579 did not engage in an international internship and 1,006 did.

BEPE post-doctoral internships abroad are available only for those with a post-doctoral fellowship in Brazil. Therefore, we had to clean the data to separate fellows who, besides having a post-doctoral fellowship in Brazil, also got the internship abroad. After cleaning, the number of fellows was reduced to 4,735 (Table 1).

Table 1: Size and composition of each FAPESP program after cleaning the database

Year	Only post-doctoral	BEPE (B)	Total of post-doctoral	% of mobile fellows (B / C)	% of non-mobile fellows
------	--------------------	----------	------------------------	-----------------------------	-------------------------

³ Available at: <https://bv.fapesp.br/en/>

	fellowship in Brazil (A)		fellowships (C)		(A / C)
2012	581	47	628	7.5%	92.5%
2013	740	117	857	13.7%	86.3%
2014	704	182	886	20.5%	79.5%
2015	662	205	867	23.6%	76.4%
2016	601	234	835	28.0%	72.0%
2017	467	195	662	29.5%	70.5%
Total	3,755	980	4,735	20.7%	79.3%

Source: Own elaboration using data from FAPESP.

After the data-cleaning process, the established patterns in the knowledge areas per program were examined, and it was observed that the distribution dynamics among the programs were observed to be similar (Table 2). Investigating differentiations in the dynamics of academic mobility (Malakhov, 2020; Robles-Belmont, 2021), scientific production (Jenkins, 2020), propensity for collaboration, and gender inequality (Uhly et al., 2017; Aksnes et al., 2019) by major field of knowledge is a highly promising research area.

In addition to potential differentiations in dynamics by major field of knowledge, other topics discussed throughout the literature reviewed can contribute to the proposed research design, such as the relationship between systemic aspects, gender inequality, and mobility, as well as the effect of mobility on dimensions related to researchers' careers, such as access to employment, collaboration, and academic performance. Several variables can contribute to investigating these dimensions, including maternity leave, income, employment type, sector of economic activity, race or ethnicity, gender, co-authorship, and scientific production.

The selected databases contain some variables related to family obligations, such as maternity leave, available at RAIS and Lattes. In this last base, the field for inserting this information was only included in 2021. This may indicate that the number of observations with this information is not significant for analysis.

Table 2: Distribution of fellowships according to Knowledge area

Knowledge Area	Only post-doctoral fellowship in Brazil	BEPE	Only post-doctoral fellowship in Brazil (%)	BEPE (%)

Agronomical sciences	388	78	10.3%	8.0%
Biological sciences	1011	324	26.9%	33.1%
Physical Sciences and Mathematics	884	229	2.5%	23.4%
Humanities	332	94	8.8%	9.6%
Applied Social Sciences	94	11	2.5%	1.1%
Health sciences	510	108	13.6%	11.0%
Engineering	355	73	9.5%	7.4%
Interdisciplinary subjects	38	17	1.0%	1.7%
Linguistics, Literature and Arts	143	46	3.8%	4.7%
Total	3,755	980	100%	100%

Source: Own elaboration using data from FAPESP.

The variables related to employment are available in the RAIS database and the Lattes platform, as mentioned. However, there is a challenge to triangulate these data because their structures are distinct. Institutional affiliation can be used to characterize the different patterns of academic mobility, as well as the research intensity of the institution (Yan et al., 2020). Meanwhile, information about individuals' earnings can be used as a proxy for recognition and social capital, elements important for forming collaborative networks (Uhly et al., 2017).

Collaboration measurement can be performed by analyzing bibliometric information, which involves identifying individuals participating in the study and their institutional affiliations. The bibliometric study will provide insights into the collaboration tendencies of women compared to men among the sampled Brazilian mobile researchers, as highlighted by Abel et al. (2019). The bibliometric study can also shed light on other aspects, including the journal's field of knowledge and academic productivity (Zhao et al., 2022; Malakhov et al., 2020), thereby contributing to characterizing mobility patterns among Brazilian researchers.

A comparison of variables highlighted in the literature review and available in the database of our study is presented in Table 3 below. We were able to include most of the variables and aspects that are considered relevant in the literature reviewed in a direct way or using proxies (e.g. marital status and maternity leave as proxy for parenting and parenting). Information such as relationship types, partner status, and dual-career couples, equally important for studying the relationship between international mobility and gender inequality, cannot be identified through secondary information. In this sense, it is necessary to plan for the application of questionnaires and interviews, like those conducted by Vohlidalová (2017), Tam & Araújo (2017), Nikunem & Lempiäinen (2020), Nachatar Singh (2022), Schaer et al. (2017), Tzanakou (2017), Cohen et al. (2020), Bao (2022) and Schittenhelm (2022).

As observed, there are still challenges to overcome in obtaining the information necessary for the inclusion of variables in the proposed database of this study. As already elucidated in the literature, there are still obstacles, particularly regarding race or ethnicity (Paixão et al., 2012) and how it intersects with other variables such as gender and income (Noronha, 2018; Santos et al., 2018). Other cases include inconsistent completion of variables and the recent inclusion of the variable, such as maternity leave in the Lattes curriculum and researchers' marital status and race or ethnicity in the FAPESP database.

Table 3: Variables seen in the literature and available in the database by dimension and source

Dimension	Variables seen in the literature	Variables available in database	Source
Individual characteristics	Gender, race or ethnicity, age	Gender, race or ethnicity, age	Fapesp, RAIS
	Date of doctoral degree	Date of doctoral degree	Lattes, Fapesp
	Institutional affiliation	Institutional affiliation	Fapesp, Lattes, RAIS
		Economic activity sector	RAIS
	Academic or work position	Academic or work position	Lattes
		Professional occupation	RAIS
	Parenting, partnering and family obligations	Maternity leave	Lattes, RAIS
		Marital status	Fapesp
	Partner's employment status	-	
	Collaborative research	Co-authorship	Scopus, Web of Science, Lattes
		Joint research projects	Lattes, Fapesp
	Academic performance	Academic performance	Lattes, Scopus, Web of Science
Academic mobility	Academic mobility	Fapesp, Lattes	
Cultural, systemic and organizational aspects	Gender equality programs or policies	-	-
	Mobility programs	Mobility programs	Fapesp, Lattes
	Mobility countries (origin and destination)	Mobility countries (origin and destination)	Fapesp, Lattes, Scopus, Web of Science
	Cultural aspects related to gender, race or ethnicity, parenting and partnering	-	-
Knowledge areas	Knowledge areas	Knowledge areas	Fapesp, Lattes, Scopus, Web of Science

Source: Own elaboration.

Conclusion

The research design presented in this study is part of an ongoing effort to investigate the effects of mobility on the careers of researchers funded by FAPESP, with a particular focus on gender. The existence of gender asymmetries in accessing academic mobility

emphasizes the disparities between men and women in terms of career advancement opportunities, given the significance of international experiences in researchers' curriculum vitae. Therefore, it is crucial to deepen our understanding of gender inequalities in international mobility and academic careers, particularly within the Brazilian context.

The research design presented in this study stands out for its originality, grounded on three key factors. Firstly, it seeks to advance knowledge on international mobility by examining its impacts on the careers of Brazilian scientists and academics, with a specific focus on gender inequality. This is an area that has received limited attention thus far. Secondly, unlike previous studies that often focused on specific knowledge areas or a select group of destination countries, this research aims for comprehensiveness. It does not preselect areas of knowledge or countries of destination, offering a broader perspective. Thirdly, the study adopts a triangulation approach, integrating multiple databases, validating research data, and enhancing overall reliability.

The research holds significant potential to generate results that can inform the development of public policies that address disparities in professional opportunities for male and female academics. It is expected to inspire Brazilian policymakers to prioritize gender equity and consider the various factors that impact the professional trajectories of Brazilian academics. This, in turn, will contribute to the implementation of equity, diversity, and inclusion plans and policies, promoting gender equity in the provision of academic mobility opportunities by funding agencies.

Furthermore, in addition to quantitative studies, it is recommended to incorporate mixed methods in future research agendas. This would include the application of questionnaires and interviews to gather specific insights into the academic trajectories of both men and women, supplementing the quantitative findings with qualitative data.

By encompassing these elements, the research design aims to contribute to understanding and promoting gender equality in academic mobility, fostering an inclusive and supportive environment.

Funding

This research was supported by a grant from the São Paulo Research Foundation, Grant Number 21/15091-8.

CRediT author statement [Contribuição de autoria]

Ana Maria Carneiro: Conceptualization, Methodology, Writing - Original Draft, Writing - Review & Editing, Supervision. Ana Maria Nunes Gimenez: Conceptualization, Writing - Review & Editing. André Correia Bueno: Conceptualization, Methodology, Data Curation, Writing - Original Draft. Carolina Mendes B. Ferreira: Writing - Original Draft. Gabriela Araujo Tetzner: Methodology, Writing - Original Draft. Julia Yuki Dias Suzuki: Writing - Original Draft. Larissa A. Prevato Lopes: Writing - Original Draft. Luiza M. Capanema Bezerra: Writing - Original Draft.

Declaration of Conflict of Interest

All authors declare that they have no conflicts of interest.

References

- Abel, G.J., Muttarak, R., Bordone, V., & Zagheni, E. (2019). Bowling Together: Scientific Collaboration Networks of Demographers at European Population Conferences. *European Journal Population*, 35, 543–562. <https://doi.org/10.1007/s10680-018-9493-1>
- Ackers, L. (2004). Managing relationships in peripatetic careers: Scientific mobility in the european union. *Women's Studies International Forum*, 27(3), 189-201. <https://doi.org/10.1016/j.wsif.2004.03.001>
- Aksnes, D. W., Piro, F. N., & Rørstad, K. (2019). Gender gaps in international research collaboration: a bibliometric approach. *Scientometrics*, 120(2), 747–774. <https://doi.org/10.1007/S11192-019-03155-3>
- Amorin, C. V. (2003). Organização do currículo: plataforma Lattes. *Pesquisa Odontológica Brasileira*, 17(suppl. 1), 18-22. <https://doi.org/10.1590/S1517-74912003000500004>
- Bao, L. (2022). Connecting the past and the future: Academic geographical (im)mobility of Chinese women academics throughout doctoral education. *Frontiers in Psychology*, 5(13). <https://doi.org/10.3389/fpsyg.2022.987060>
- Bin, A., Salles-Filho, S., Spatti, A. C., Mena-Chalco, J. P., & Colugnati, F. A. B. (2022). How much does a Ph. D. scholarship program impact an emerging economy research performance?. *Scientometrics*, 1-26. <https://doi.org/10.1007/s11192-022-04487-3>
- Brasil. (2022). Ministério do Trabalho e Previdência. Nota Técnica MTP: Relação Anual de Informações Sociais, ano-base 2021. Brasília: MTP, 2022. http://pdet.mte.gov.br/images/RAIS/2021/Nota_T%C3%A9cnica_RAIS_2021.pdf
- Cohen, S., Hanna, P., Higham, J., Hopkins, D., & Orchiston, C. (2019). Gender discourses in academic mobility. *Gender, Work & Organization*, 27(2), 149-165. <https://doi.org/10.1111/gwao.12413>
- Corrêa, T. S., Suzuki, M. B., Cintra, P. R., & Costa, L. S. F. (2017). O fim do scriptLattes? Uma análise de suas funcionalidades, alternativas para o presente e perspectivas para o futuro. *Revista do EDICC-ISSN 2317-3815*, 3. <https://revistas.iel.unicamp.br/index.php/edicc/article/view/5208>
- Delicado, A., & Alves, N. A. (2013). “Fugas de Cérebros”, “Tetos de Vidro” e “Fugas na Canalização”: mulheres, ciência e mobilidade. In Araújo, E.; Fontes, M. & Bento, S. (eds). Para um debate sobre Mobilidade e Fuga de Cérebros. *Centro de Estudos de Comunicação e Sociedade*, 8-31. Retrieved January 26, 2023, from http://www.lasics.uminho.pt/ojs/index.php/cecs_ebooks/issue/view/120/showToc
- Dueñas-Fernández, D., Iglesias-Fernández, C., & Llorente-Heras, R.. (2013). The Returns

- obtained from International Mobility by Doctorate Holders. Some evidence from Spain. *International Journal of Business and Social Science*, 04(12). Retrieved January 26, 2023, from http://ijbssnet.com/journals/Vol_4_No_12_Special_Issue_September_2013/6.pdf
- Gibb, C. (2022) The home-based postdoctoral mother in the neoliberal university. *Gender, Place & Culture*, 29(2), 248-272. [10.1080/0966369X.2021.1975102](https://doi.org/10.1080/0966369X.2021.1975102)
- Henderson, E.F. (2021). Sticky care and conference travel: unpacking care as an explanatory factor for gendered academic immobility. *High Education*, 82, 715–730. <https://doi.org/10.1007/s10734-020-00550-1>
- Jenkins, K. (2020). Academic motherhood and fieldwork: Juggling time, emotions, and competing demands. *Transactions of the Institute of British Geographers*, 45(3), 693-704. <https://doi.org/10.1111/tran.12376>
- Malakhov, V.A., Vasil'eva, I.N., & Belov, F.D. (2020). Structure of international migration of researchers. Case study of Russia. *Economic and Social Changes: Facts, Trends, Forecast*, 13(5), 232–246. [10.15838/esc.2020.5.71.14](https://doi.org/10.15838/esc.2020.5.71.14)
- Mena-Chalco, J. P., & Junior, R. M. C. (2009). scriptLattes: an open-source knowledge extraction system from the Lattes platform. *Journal of the Brazilian Computer Society*, 15(4), 31–39. <https://doi.org/10.1007/bf03194511>
- Mena-Chalco, J. P., & Junior, R. M. C. (2013). Prospecção de dados acadêmicos em currículos Lattes através de scriptLattes. *Bibliometria e Cientometria: reflexões teóricas e interfaces*, 109-128. [http://doi.org/10.13140/RG.2.1.5183.8561](https://doi.org/10.13140/RG.2.1.5183.8561)
- Momeni, F., Karimi, F., Mayr, P., Peters, I., & Dietze, S. (2022). The many facets of academic mobility and its impact on scholars' career. *Journal of Informetrics*, 16(2), 101280. <https://doi.org/10.1016/j.joi.2022.101280>
- Moratti, S. (2021). A woman's place is in the 'home'? Gender-specific hiring patterns in academia in gender-equal Norway. *Journal of Sociology*, 57(4), 916–934. <https://doi.org/10.1177/1440783320960530>
- Nachatar Singh, J. (2022). Leadership challenges and opportunities experienced by international women academics: A case study in Australia. *Journal of University Teaching & Learning Practice*, 19(1), 140-159. <https://doi.org/10.53761/1.19.1.09>
- Nerad, M., Bogle, D., Kohl, U., O'Carroll, C., Peters, C., & Scholz, B. (Orgs.). (2022). Towards a Global Core Value System in Doctoral Education. *UCL Press*. <https://doi.org/10.14324/111.9781800080188>
- Nikunen, M., & Lempiäinen, K. (2020). Gendered strategies of mobility and academic career. *Gender and Education*, 32(4), 554-571. [10.1080/09540253.2018.1533917](https://doi.org/10.1080/09540253.2018.1533917)
- Noronha, C. L. A. (2018). Análise longitudinal da mobilidade ocupacional dos estrangeiros no mercado de trabalho formal brasileiro. *Repositorio.ufmg.br*. <http://hdl.handle.net/1843/BUOS-B87FJA>
- Paixão, M., Rosseto, I., & Moncores, E. (2012). Investigação sobre a qualidade da variável cor ou raça na RAIS através de um estudo comparativo com a PNAD e o IBGE. *36 o Encontro Anual da ANPOCS*, 1-28.
- Robles-Belmont, E. (2021). Mobility of the Members of the National System of Researchers of Mexico in their Academic Training in Latin America. *Journal of Scientometric Research*, 10(1s), s71–s77. [10.5530/jscires.10.1s.23](https://doi.org/10.5530/jscires.10.1s.23)
- Santos, C. H. M. dos, Ambrosio, É. L., Martins, F. dos S., Mendonça, I. R., & Mattos, L. M. de. (2018). O Que pode dar errado quando se usam os microdados da Rais para análises do emprego público por ente federado? : Um inventário dos problemas conhecidos e algumas soluções. [Http://www.ipea.gov.br](http://www.ipea.gov.br). <https://repositorio.ipea.gov.br/handle/11058/9885>
- Schaer, M., Dahinden, J., & Toader, A. (2017). Transnational mobility among early-career

- academics: gendered aspects of negotiations and arrangements within heterosexual couples. *Journal of Ethnic and Migration Studies*, 43(8), 1292-1307. [10.1080/1369183X.2017.1300254](https://doi.org/10.1080/1369183X.2017.1300254)
- Schittenhelm, K. (2022). Negotiating unequal mobility opportunities: Young academics' mobility in the EU and their partner-related living arrangements. *Geoforum*, 133, 117-127. <https://doi.org/10.1016/j.geoforum.2022.03.020>
- Silva, F. M., & Smit, J. W. (2009). Organização da informação em sistemas eletrônicos abertos de Informação Científica & Tecnológica: análise da Plataforma Lattes. *Perspectivas Em Ciência Da Informação*, 14(1), 77-98. <https://doi.org/10.1590/s1413-99362009000100007>
- Tam, T.N.T.P., & Araújo, E. (2017). Unfolding various academic mobility experiences of Southeast Asian women. *Gender, Place & Culture*, 24(12), 1768-1786. [10.1080/0966369X.2017.1398137](https://doi.org/10.1080/0966369X.2017.1398137)
- Tasci, G. (2021). Reflections on women in internationalization. *Cypriot Journal of Educational Science*, 16(2), 703- 724. <https://doi.org/10.18844/cjes.v16i2.5648>
- Toader, A., & Dahinden, J. (2018). Family configurations and arrangements in the transnational mobility of early-career academics: Does gender make twice the difference?. *Migration Letters*, 15(1), 67-84.
- Tzanakou, C. (2017). Dual career couples in academia, international mobility and dual career services in Europe. *European Educational Research Journal*, 16(2-3), 298-312. <https://doi.org/10.1177/1474904116683185>
- Uhly, K.M, Visser, L.M., & Zippel, K.S. (2017). Gendered patterns in international research collaborations in academia. *Studies in Higher Education*, 42(4), 760-782. [10.1080/03075079.2015.1072151](https://doi.org/10.1080/03075079.2015.1072151)
- van der Wal, J.E.M., Thorogood, R., & Horrocks, N. P. C. (2021). Collaboration enhances career progression in academic science, especially for female researchers. *Proceedings of the Royal Society B*, 288(1958). <https://doi.org/10.1098/RSPB.2021.0219>
- Vohlídalová, M. (2017). Academic couples, parenthood and women's research careers. *European Educational Research Journal*, 16(2-3), 166-182. <https://doi.org/10.1177/1474904116668883>
- Wendt, K., Gunnes, H., & Aksnes, D.W. (2022). International migration of researchers and gender imbalance in academia-the case of Norway. *Scientometrics*, 127, 7575-7591. <https://doi.org/10.1007/s11192-022-04365-y>
- Yan, E., Zhu, Y., & He, J. (2020). Analyzing academic mobility of U.S. professors based on ORCID data and the Carnegie Classification. *Quantitative Science Studies*, 1(4), 1451-1467. https://doi.org/10.1162/qss_a_00088
- Zhang, M., Zhang, G., Liu, Y., Zhai, X., & Han, X. (2020). Scientists' genders and international academic collaboration: An empirical study of Chinese universities and research institutes. *Journal of Informetrics*, 14(4), 1751-1577. <https://doi.org/10.1016/j.joi.2020.101068>
- Zhao, X., Aref, S., Zagheni, E., & Stecklov, G. (2022). Return migration of German-affiliated researchers: analyzing departure and return by gender, cohort, and discipline using Scopus bibliometric data 1996-2020. *Scientometrics*, 127, 7707-7729. <https://doi.org/10.1007/s11192-022-04351-4>

This preprint was submitted under the following conditions:

- The authors declare that they are aware that they are solely responsible for the content of the preprint and that the deposit in SciELO Preprints does not mean any commitment on the part of SciELO, except its preservation and dissemination.
- The authors declare that the necessary Terms of Free and Informed Consent of participants or patients in the research were obtained and are described in the manuscript, when applicable.
- The authors declare that the preparation of the manuscript followed the ethical norms of scientific communication.
- The authors declare that the data, applications, and other content underlying the manuscript are referenced.
- The deposited manuscript is in PDF format.
- The authors declare that the research that originated the manuscript followed good ethical practices and that the necessary approvals from research ethics committees, when applicable, are described in the manuscript.
- The authors declare that once a manuscript is posted on the SciELO Preprints server, it can only be taken down on request to the SciELO Preprints server Editorial Secretariat, who will post a retraction notice in its place.
- The authors agree that the approved manuscript will be made available under a [Creative Commons CC-BY](#) license.
- The submitting author declares that the contributions of all authors and conflict of interest statement are included explicitly and in specific sections of the manuscript.
- The authors declare that the manuscript was not deposited and/or previously made available on another preprint server or published by a journal.
- If the manuscript is being reviewed or being prepared for publishing but not yet published by a journal, the authors declare that they have received authorization from the journal to make this deposit.
- The submitting author declares that all authors of the manuscript agree with the submission to SciELO Preprints.