The effect of motherhood on the women's research productivity: Evidence from the faculties of social sciences and economics at the university of Bejaia

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Abstract:

Our research examines how motherhood affects female researchers' scientific productivity. We focused on women at the Faculty of Economic, Commercial and Management Sciences (SECG) and the Faculty of Social Sciences at the University of Béjaïa. A survey of 106 female researchers was conducted, and Multiple Correspondence Analysis (MCA) was used to explore relationships between motherhood, the support received from universities and families, and overall job and personal satisfaction. Results indicate that motherhood can influence a woman's scientific career, but the effect depends strongly on perceived support. Researchers with strong institutional and familial support and a satisfactory work-life balance experience fewer negative impacts, whereas lack of support or job dissatisfaction constitutes a major obstacle. This study highlights the importance of university policies that provide targeted support for mothers in research. Enhancing such support enables women to maintain productivity and contribute fully to scientific advancement.

Keywords: Research; Scientific Productivity; Motherhood; MCA (Multiple Correspondence Analysis)

Jel Classification Codes : C42 ; C93; D63; I23; J24

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Introduction:

The pursuit of gender equality in academia has become a major concern for higher education institutions worldwide. In this context, motherhood is widely recognized as a factor influencing women academics' careers, as they must balance professional and family responsibilities, which may affect their research engagement and academic experience. Although this issue has been widely studied internationally, it remains underexplored in the Algerian higher education context. Existing research has mainly focused on objective indicators of scientific productivity, while paying less attention to women academics' subjective perceptions.

This study examines the relationship between motherhood, research engagement, and academic working conditions among women academics at the University of Béjaïa (Faculties of Economic, Commercial and Management Sciences and Social Sciences). It focuses on perceived research productivity and academic experience, rather than objective productivity measures. The research question is: What is the influence of motherhood on perceived research productivity and academic experience among women academics?

The study is based on the following hypotheses:

- H1: Motherhood is associated with variations in perceived research productivity, work-life balance, and stress levels.
- H2: These effects vary according to contextual factors such as number of children and support systems.
- H3: Mothers adopt coping strategies to manage academic and family responsibilities.

A quantitative survey was conducted with 106 women academics, and Multiple Correspondence Analysis (MCA) was used to explore associations between motherhood-related factors, support mechanisms, and perceived academic experiences.

The paper is structured into three sections: theoretical background, sample description, and empirical analysis.

I. Women academics in Algeria: academic careers, research engagement and gender-related challenges

This section examines the position of women academics within the Algerian higher education and research system. Beyond their increasing participation in academia, particular attention is given to their academic careers, research engagement, and the challenges that may influence their professional experiences. Understanding these dynamics is essential for analyzing how motherhood interacts with academic careers and perceived research productivity**.** The discussion draws on both Algerian and international literature.

I.1.Evolution and numerical distribution of women researchers

Women represent approximately 47% of researchers in Algeria, a proportion higher than both the global and Arab-region averages (UNESCO, 2021). However, this numerical presence does not fully translate into scientific visibility. Women contribute to less than 30% of Algerian publications indexed in Scopus and remain underrepresented among leaders of funded research projects and patent holders (MESRS, 2022). These disparities suggest that participation in research is influenced not only by qualifications and representation but also by institutional opportunities, access to resources, professional networks, and family responsibilities. Consequently, perceived research productivity may vary according to the professional and personal contexts in which women academics evolve.

I.2. Analysis of academic rank distribution

Despite their growing presence in universities, women remain underrepresented in senior academic positions. At the University of Algiers 2, women account for only 17% of full professors, while they represent more than half of assistant lecturers (Chellali, 2022). This situation reflects the persistence of the "glass ceiling," widely documented in international literature (OECD, 2016; European Commission, 2021). Several factors contribute to this imbalance, including limited access to professional networks, implicit biases in academic evaluation, and difficulties in balancing academic and

family responsibilities (Ibarra et al., 2013; Moss-Racusin et al., 2012; Hochschild & Machung, 1989). These constraints may affect career progression and opportunities for research productivity.

I.3. Engagement of women researchers in scientific research

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I.4. Initiatives for promoting women in science

Despite progress achieved in recent decades, women researchers in Algeria continue to face several barriers. They remain underrepresented in decision-making bodies and often have less access to research funding and professional networks (Rosser, 2005; Chellali, 2022). In addition, the combination of academic responsibilities and family obligations may constrain research productivity and career advancement (Bianchi et al., 2000). These challenges can become particularly significant during motherhood, when family responsibilities overlap with academic expectations, potentially influencing professional experiences, career trajectories, and perceived research productivity.

I.5. Persistent challenges hindering the progress of women researchers

Despite progress achieved in recent decades, women researchers in Algeria continue to face several barriers. They remain underrepresented in decision-making bodies and often have less access to research funding and professional networks (Rosser, 2005;

Chellali, 2022).In addition, the combination of academic responsibilities and family obligations may constrain research engagement and career advancement (Bianchi et al., 2000). These challenges can become particularly significant during motherhood, when family responsibilities overlap with academic expectations, potentially influencing professional experiences, career trajectories, and perceived research productivity**.**

I.6. Perspectives for gender equality in research

Strengthening gender equality in Algerian academia requires both institutional and policy-level actions. Potential measures include equitable recruitment and promotion procedures, mentoring programmes, balanced representation in scientific committees, and support for women-led research projects (Shenhav-Keller, 2009; Dahlerup &Freidenvall, 2005; Johnson, 2007).Parental support policies, such as childcare services and flexible work arrangements, may also help improve work-life balance and reduce gender-related inequalities in academic careers (Grant et al., 2004). Such measures could create more favourable conditions for women academics throughout different stages of their professional and family lives.

II. Literature review: Gender, motherhood, and perceived research productivity.

Since the 1970s, feminist epistemology has significantly reshaped the study of science by challenging its claims to neutrality and universality. Scholars such as Harding, Haraway, Keller, Schiebinger, Rose, Longino, and Tuana have demonstrated that scientific knowledge is socially situated and shaped by power relations and gendered structures. Their work introduced key concepts such as situated knowledges (Haraway, 1988), standpoint theory and strong objectivity (Harding, 1986), and embodied objectivity, emphasizing the contextual nature of scientific practice. Building on these perspectives, this section reviews the literature on the relationship between motherhood and women academics' research engagement and perceived research productivity, highlighting how gendered academic structures shape professional experiences.

II.1. Epistemological foundations

Harding (1986) argues that knowledge production is shaped by social positions and that marginalized perspectives, particularly those of women, can enhance scientific objectivity through reflexivity and critical insight. Haraway (1988) rejects universal objectivity and introduces "situated knowledges," emphasizing that knowledge is always produced from specific embodied positions. Keller (1985) shows that dominant scientific paradigms often reflect masculine norms such as control and domination, while marginalizing relational and contextual approaches. Schiebinger (1999) highlights that despite increased female participation in science, institutional norms remain structurally male-centered, requiring deeper transformation. Rose (1994), Longino (1990), and Tuana (1992) further stress the social, reflexive, and collective nature of knowledge production. Together, these perspectives underline the importance of gender-aware epistemologies for understanding academic work and research practices.

II.2. Motherhood and perceived research productivity.

Research indicates that motherhood influences women academics' research engagement and perceived research productivity. Studies generally report a temporary decline in research activity after childbirth due to time constraints, caregiving responsibilities, and maternity leave (Cech & Blair-Loy, 2019; Leslie et al., 2022), followed in many cases by adaptation or recovery depending on institutional and family support (Wolfinger et al., 2008; Ceci et al., 2014). In the social sciences, women adopt strategies such as planning, delegation, and collaboration to maintain research engagement (O'Laughlin & Bischoff, 2005; Sallee, 2012). Institutional measures like return-to-work programs and tenure-clock extensions are widely recognized as important in reducing career disruptions (Mason & Goulden, 2004; Jagsi et al., 2009). More recent studies emphasize that motherhood does not only affect productivity in quantitative terms but may also influence research orientation, collaboration patterns, and academic priorities. This supports a broader understanding of perceived research productivity, including both research output and engagement (Hunter & Leahey, 2010; Huppatz et al., 2019).

II.3. Career progression and structural constraints for mother academics

Motherhood is associated with changes in academic careers, particularly in terms of perceived research productivityand progression. While some studies report short-term declines in publication output, others highlight longer-term adaptation depending on institutional context (Cech & Blair-Loy, 2019; Ceci et al., 2014).Career trajectories are also shaped by structural constraints such as stereotypes about maternal commitment, limited mentorship, mobility constraints, and evaluation biases (Correll et al., 2007; Williams et al., 2016; Misra et al., 2012). These factors influence both actual research engagement and perceptions of scientific productivity.Recent literature therefore stresses the importance of integrating both objective outputs and perceived academic experiences when analysing women academics' careers (Hirsch, 2005; Hunter & Leahey, 2010).

II.4. Institutional support, work–life balance and subjective experiences

Women academics face both institutional conditions and subjective experiences in managing academic work and family responsibilities. At the structural level, universities provide formal support mechanisms such as flexible working arrangements, telework, reduced workloads, maternity leave, childcare services, and tenure-clock extensions (Hill et al., 2008; Kossek et al., 2011; OECD, 2021). These policies aim to improve work-life balance and ensure research continuity, although their effectiveness varies across contexts (Gornick & Meyers, 2003; Heijstra et al., 2017).At the subjective level, motherhood is associated with role conflict, stress, and pressure to meet academic expectations while fulfilling family responsibilities (Acker & Armenti, 2004; Sallee, 2012). These experiences reflect how institutional constraints are perceived and internalized by women academics, often affecting confidence and emotional well-being (Tiedje, 2004; Lundquist et al., 2012; Ward & Wolf-Wendel, 2016).

III. Survey design, population and sample

To examine the relationship between motherhood and perceived research productivity among women academics at the University of Béjaïa, a structured online survey was conducted in the Faculties of Economic, Commercial and Management Sciences and Social Sciences. This section presents the study design, target population, and sample used for the empirical analysis.

III.1. Context and objectives of the survey

Motherhood may influence women academics' careers and perceived research productivity, as researchers must balance family responsibilities with academic demands, including career interruptions and reduced time available for research activities. Understanding these dynamics is essential for promoting a more equitable academic environment. Given the limited empirical evidence in the Algerian university context, this study addresses an important research gap.

To this end, a 23-item questionnaire was developed to capture both socio-demographic characteristics and subjective dimensions of academic experience. The instrument is centered on perceived research productivity as the main analytical construct, rather than objective output indicators.

The questionnaire includes the following dimensions:

- Socio-demographic characteristics (age, marital status, number of children, age at first childbirth);
- Academic profile (research field, academic rank);
- Maternity and career conditions (maternity leave duration, flexibility of working arrangements);
- Perceived research productivity (changes in research activity, project involvement, funding opportunities, perceived research effectiveness);
- Institutional support (childcare availability, maternity policies, mentorship);
- Work-life balance and well-being (stress levels, satisfaction with professional and personal situation);

- Coping strategies (organizational strategies, support networks);
- Perceptions of gender equality policies and institutional initiatives.

To ensure clarity, relevance, and content validity, the questionnaire was reviewed by academic colleagues familiar with higher education research. A pilot test was conducted with a small group of women academics from the target population. Based on feedback, minor revisions were made to improve wording and structure. A reliability analysis confirmed acceptable internal consistency of the main constructs.

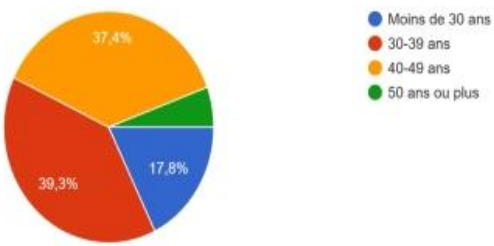
III.2. Sample and data collection

The target population includes all women academics (assistant lecturers, lecturers, and professors) in the Faculties of Economic, Commercial and Management Sciences and Social Sciences at the University of Béjaïa (May 2025). A non-probability exhaustive sampling strategy was adopted, with the questionnaire distributed via institutional mailing lists. Participation was voluntary, leading to self-selection bias, and the exact response rate could not be determined due to incomplete institutional records.

The final sample consists of 106 valid responses, covering socio-demographic, professional, and perceptual variables related to motherhood and perceived research productivity, which constitutes the core dependent variable of the study.

III.3.1. Demographic profile, research field, and academic level

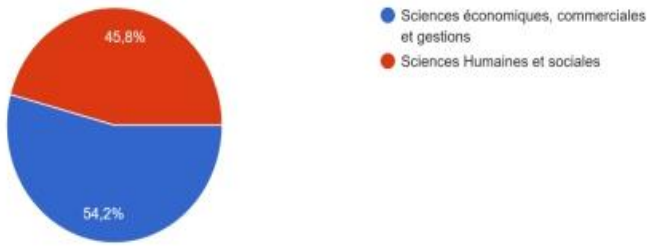
Figure (1): Age of Respondents



Source: Compiled by the authors based on survey data.

Figure 1 shows that the majority of respondents are aged between 30 and 49, with 39.25% in the 30-39 group and 37.38% in the 40-49 group. Participants under 30 represent 17.76%, while those aged 50 and above account for 5.61%. Overall, the sample is mainly composed of women in mid-career stages (30-49 years), which ensures that the analysis focuses on a group actively engaged in academic responsibilities and research activities, while also allowing variation across different career stages.

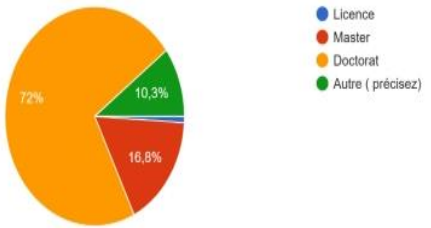
Figure (2): Research field



Source: Compiled by the authors based on survey data

Figure 2 shows respondents' primary research fields, with 54.2% in Economic, Commercial, and Management Sciences and 45.8% in Human and Social Sciences. This relatively balanced distribution across the two major disciplines at the University of Béjaïa will be considered in the subsequent analysis;

Figure (3): Academic level



Source: Compiled by the authors based on survey data

The analysis of academic level shows that most respondents are doctoral candidates or hold a doctorate, followed by those with a Master's degree, while Bachelor's degree holders are a minority. This high level of qualification indicates a population actively engaged in research and subject to publication and scientific contribution requirements linked to their academic rank.

IV. Methods and empirical strategy: Multiple Correspondence Analysis (MCA)

To explore the relationship between motherhood and women academics' research engagement and perceived research productivity at the University of Béjaïa, we applied MCA. This exploratory statistical technique is used to analyze associations between categorical variables and to identify underlying structures in complex survey data. It allows for a graphical representation of relationships between variables and respondents, facilitating the identification of patterns in academic experiences related to motherhood.

IV.4.1. Objectives of MCA

In this study, MCA is used as an exploratory tool to better understand how different dimensions of motherhood and academic life are interrelated. It serves three main objectives.

- First, it enables the identification of respondent profiles by grouping women academics who share similar characteristics and experiences. These profiles may reflect, for example, differences in timing of motherhood, use of maternity leave, perceived institutional support, and levels of perceived research productivity.
- Second, MCA helps reveal associations between categories of variables by positioning them in a common factorial space. This makes it possible to observe how certain characteristics tend to co-occur, such as combinations of motherhood timing, work-life balance difficulties, and perceived changes in academic engagement.
- Third, MCA is used to explore latent structures underlying the data. Rather than focusing on isolated variables, it highlights

broader dimensions that organize women academics' experiences, providing a global and synthetic understanding of motherhood-related academic trajectories.

IV.4.2. Application of MCA to the collected data

The application of MCA to the survey data allows for the identification of underlying patterns in women academics' responses regarding motherhood, institutional conditions, and perceived research productivity. The analysis focuses on the interpretation of factorial axes, the distribution of categories, and the positioning of individuals within the factorial space. This approach helps to identify meaningful structures that are not easily observable through simple descriptive statistics.

IV.4.2.1. Eigenvalues and inertia

The results presented in Table 1 show the explanatory power of the factorial axes derived from MCA. The first two dimensions, F1 (0.4135) and F2 (0.2307), account for 13.12% of total inertia and 48.23% of adjusted inertia (F1 = 38.48%, F2 = 9.75%). These results indicate that the first two axes capture a meaningful proportion of the variability in the data and are therefore retained for interpretation. Axis F1 represents the main structuring dimension of the data, reflecting differences in perceived institutional support, work-life balance, and perceived research productivity. Axis F2 captures secondary variations related to coping strategies and institutional arrangements. MCA was conducted using clearly defined categorical variables derived from the survey, following standard procedures for categorical data reduction and pattern detection, ensuring interpretability and reproducibility of results. All variables were selected based on their theoretical relevance to motherhood and academic experience, and results are interpreted within the conceptual framework of perceived research productivity.

Table (1): Eigen values

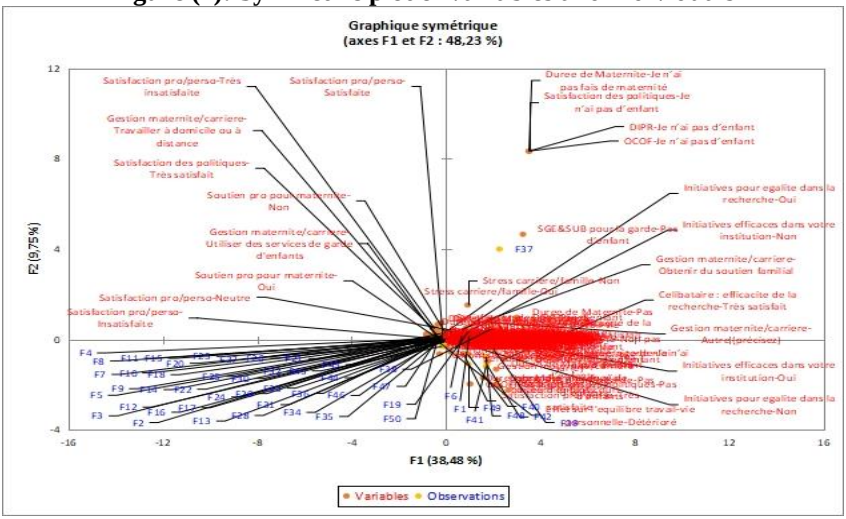
Valeurs propres et pourcentages d'inertie :				
	F1	F2	F3	F4
Valeur propr	0,4135	0,2307	0,1957	0,1571
Inertie (%)	8,4226	4,7004	3,9873	3,2009
% cumulé	8,4226	13,1230	17,1102	20,3111
Inertie ajust	0,1486	0,0377	0,0248	0,0137
Inertie ajust	38,4773	9,7538	6,4164	3,5433
% cumulé	38,4773	48,2310	54,6474	58,1908

Source: Compiled by the authors using XLSTAT software.

IV.4.2.2. Interpretation of the MCA

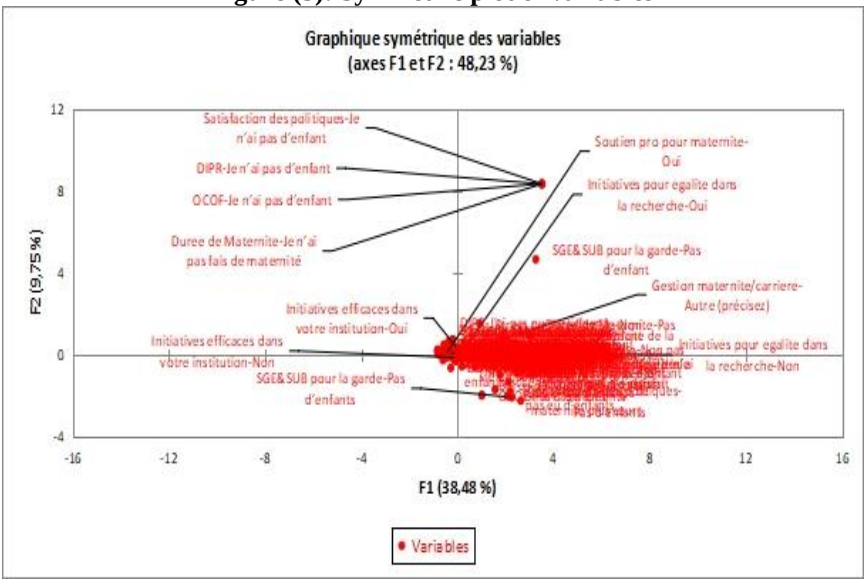
The final sample consists of 106 women academics. The analysis covers socio-demographic and professional characteristics, as well as self-reported variables related to motherhood and perceived research productivity. It first presents the main structural features of the sample (age, academic field, academic rank, marital status, and number of children), followed by perceptual variables related to work–life balance, institutional support, and perceived changes in research engagement. This descriptive overview provides the empirical basis for the MCA by summarizing the main characteristics of the respondents and the variables included in the analysis. It also facilitates the interpretation of the associations identified by the MCA among the different categories of variables and helps contextualize the profiles emerging from the factorial dimensions.

Figure (4): Symmetric plot of variables and individuals



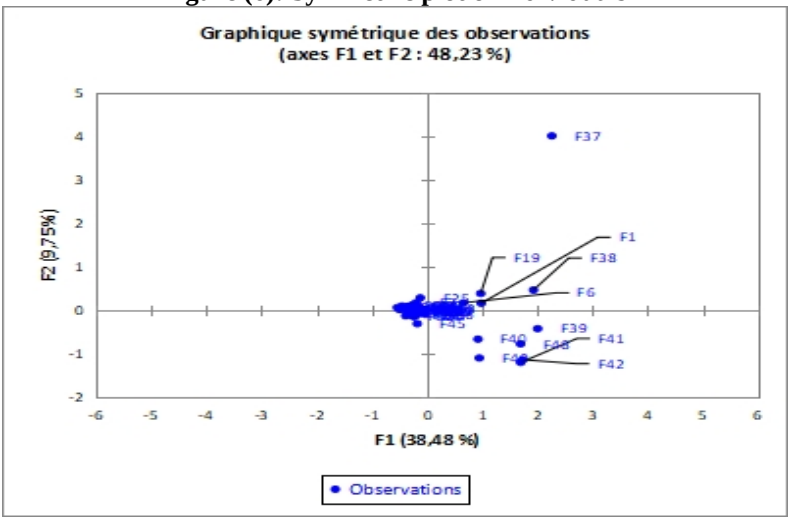
Source: Compiled by the authors using XLSTAT software.

Figure (5): Symmetric plot of variables



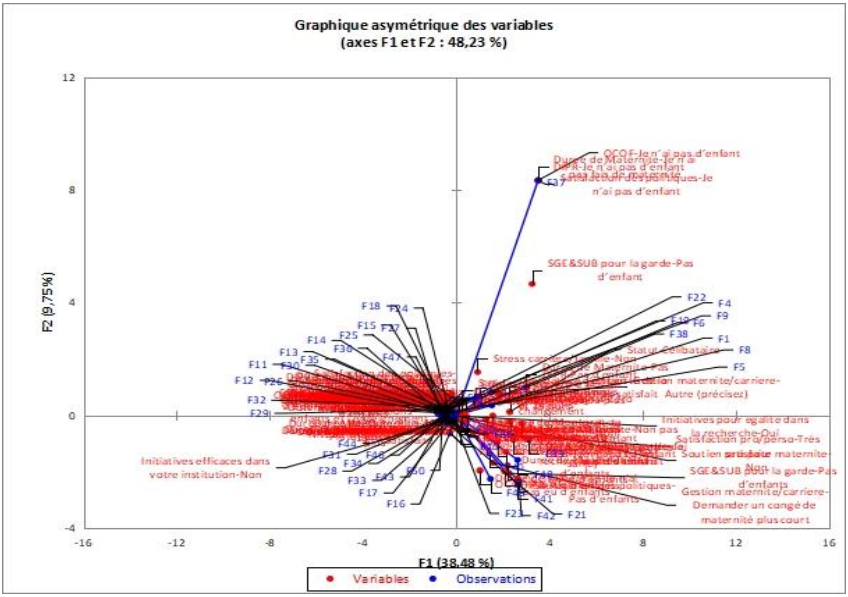
Source: Compiled by the authors using XLSTAT software.

Figure (6): Symmetric plot of individuals



Source: Compiled by the authors using XLSTAT software**.**

Figure(7): Asymmetric plot of variables and individuals



Source: Compiled by the authors using XLSTAT software.

The Multiple Correspondence Analysis (MCA) results, presented through symmetric and asymmetric plots (Figures 4–7), examine the relationships between motherhood, institutional context, and perceived research productivity. Axis F1, the main dimension, opposes two distinct profiles. On one side, respondents report higher levels of perceived institutional and family support, better work-life balance, and more positive academic experiences. On the other side, respondents report lower levels of support, greater difficulties in balancing professional and family responsibilities, and greater reliance on coping strategies such as remote work. This axis reflects variation in perceived academic conditions associated with motherhood rather than objective scientific productivity.

Axis F2 captures a secondary dimension related to adaptation processes and institutional arrangements, distinguishing respondents experiencing persistent work-life balance difficulties despite existing support mechanisms from those benefiting from more flexible maternity-related arrangements. The individual map shows a concentration of respondents near the center, suggesting heterogeneous but relatively moderate profiles, with clearer differentiation along Axis F1 and more specific variations along Axis F2.

V. Results and discussion:

The MCA reveals heterogeneous profiles among women researchers at the University of Béjaïa. The results suggest that motherhood is associated with different academic experiences depending on the institutional and family contexts reported by respondents. Rather than indicating a uniform pattern, the analysis highlights variations in perceived research productivity, work-life balance, and academic experiences.

Axis F1 represents the main dimension structuring the data. On the positive side of the axis, respondents are associated with higher levels of perceived family and institutional support, greater satisfaction with their professional and personal situations, and a more positive perception of their research engagement. On the negative

side, respondents are associated with lower perceived support, higher levels of stress, and greater difficulties in balancing academic and family responsibilities. These profiles also tend to be linked with a stronger reliance on individual coping strategies.

Axis F2 captures a secondary dimension related to adaptation mechanisms and institutional arrangements. The distribution of categories along this axis suggests that the availability of specific support measures does not necessarily eliminate perceived work–life balance difficulties. At the same time, respondents reporting more flexible maternity-related arrangements tend to be associated with more favorable perceptions of their academic experience.

Overall, the MCA highlights associations between motherhood-related conditions, support mechanisms, and perceived research productivity. The results suggest that perceived academic experiences vary according to the support environment reported by respondents.

Given the exploratory nature of MCA and the use of self-reported indicators, these findings should be interpreted as patterns of association rather than evidence of causal relationships or objective differences in scientific productivity.

Conclusion:

This study examined the relationship between motherhood and women researchers' scientific productivity within the Faculties of Economic, Commercial, and Management Sciences (SECG) and Social Sciences at the University of Béjaïa. Based on a survey of 106 women researchers and Multiple Correspondence Analysis (MCA), the findings show that motherhood is associated with differentiated professional experiences, strongly shaped by institutional and family support rather than producing a uniform effect.

The MCA results indicate that supportive institutional environments, such as gender-sensitive policies, flexible working arrangements, and supportive organizational cultures, combined with strong family support are associated with more stable research

engagement and better reconciliation between academic and family responsibilities. In contrast, limited institutional support and weaker family assistance are linked to more constrained academic experiences, higher stress levels, and greater reliance on individual coping strategies.

The results also show that childcare services, while helpful for improving work-life balance, are not sufficient on their own. Their effectiveness depends on integration within broader institutional support systems, including flexible policies, mentoring, and fair evaluation practices. This highlights the need for a comprehensive institutional approach to support women researchers who are mothers.

Based on these findings, several policy-oriented recommendations can be formulated:

- **Support infrastructure**: Strengthen on-campus childcare facilities and family support services in order to reduce time-related and logistical constraints associated with motherhood.
- **Organizational flexibility**: Promote flexible working arrangements, including adaptable schedules and hybrid work options, to facilitate the continuity of research activities.
- **Targeted mentorship and support networks**: Develop structured mentoring programs and peer-support systems to reduce professional isolation and improve access to research opportunities and funding.
- **Evaluation criteria adaptation**: Sensitize promotion and evaluation committees to career interruptions related to maternity and caregiving responsibilities, ensuring more equitable assessment of academic trajectories.

Despite its contributions, this study presents certain limitations. Its focus on two faculties at a single university limits the external validity of the findings, particularly regarding other disciplines such as the exact sciences, where organizational constraints may differ. Moreover, the reliance on a quantitative survey design does not fully capture the subjective, emotional, and lived dimensions of motherhood experiences in academia.

Future research could address these limitations by extending the analysis to a national level and incorporating qualitative methods such as semi-structured interviews or focus groups. Such mixed-method approaches would allow for a deeper understanding of coping strategies, institutional barriers, and career trajectories among women academics. Ultimately, this would contribute to the development of more effective, evidence-based policies aimed at supporting the integration of motherhood and scientific careers in Algerian higher education institutions.

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