



MOTHERHOOD: CONFLICTS BETWEEN THE BIOLOGICAL AND THE SOCIAL DIMENSIONS – WHAT DOES THE BRAZILIAN ACADEMIC PRODUCTION TELL?

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ABSTRACT:

This bibliographical review presents a set of research about motherhood as a constructed social practice, the deterministic discourse of biology, and how it emerges in the training of biologists and teachers. The focus is on the Brazilian academic productions about this subject and its related aspects. About the methodological approach, the papers were raised from CAPES Portal in searches directed by descriptors previously defined. A set of 23 papers were found, and their analysis resulted in 3 thematic categories: 1. What is a mother?; 2. Breastfeeding; 3. What is a woman? - the biological discourse on stage. The results demonstrate the scarce discussion on specific topics. In general terms, discourses that speak directly about biological characteristics in women corroborate with the social place intended for them, over time, gave way to other sexist discourses, however masking under scientific neutrality. Within the production of scientific knowledge, it is evident that the purpose is to justify stereotypes in female and male bodies ways and, consequently, inequalities.

Keywords:

Maternity;
Biological determinism;
Revision.

MATERNIDADE: CONFLITOS ENTRE AS DIMENSÕES BIOLÓGICA E SOCIAL – O QUE DIZ A PRODUÇÃO ACADÊMICA BRASILEIRA?

RESUMO:

Esta revisão bibliográfica apresenta um conjunto de pesquisas sobre a maternidade como prática social construída, o discurso determinista da biologia e como emerge na formação de biólogos e professores. O foco está nas produções acadêmicas brasileiras sobre esse tema e seus aspectos relacionados. Quanto à abordagem metodológica, os artigos foram levantados do Portal CAPES em buscas direcionadas por descritores previamente definidos. Foi encontrado um conjunto de 23 artigos e sua análise resultou em 3 categorias temáticas: 1. O que é mãe?; 2. Amamentação; 3. O que é uma mulher? - o discurso biológico em cena. Os resultados demonstram a escassa discussão sobre temas específicos. Em linhas gerais, os discursos que falam diretamente sobre as características biológicas nas mulheres corroboram com o lugar social que lhes é destinado, ao longo do tempo, deram lugar a outros discursos sexistas, porém, mascarados sob a neutralidade científica. Na produção do conhecimento científico, fica evidente o propósito de justificar os estereótipos nos modos dos corpos feminino e masculino e, consequentemente, as desigualdades.

Palavras-chave:

Maternidade;
Determinismo biológico;
Revisão.

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MATERNIDAD: LOS CONFLICTOS ENTRE LAS DIMENSIONES BIOLÓGICA Y SOCIAL – ¿QUÉ DICE LA PRODUCCIÓN ACADÉMICA BRASILEÑA?

RESUMEN:

Esta revisión bibliográfica presenta un conjunto de investigaciones sobre la maternidad como una práctica social construida, el discurso determinista de la biología y cómo emerge en la formación de los biólogos y profesores. El foco son las producciones académicas brasileñas sobre este tema y los aspectos relacionados. En relación con el enfoque metodológico, se recolectaron los artículos en el Portal CAPES en búsquedas dirigidas por descriptores previamente definidos. Se encontró un conjunto de veintitrés artículos y su análisis resultó en tres categorías temáticas: 1. ¿Qué es una madre?; 2. Amamantamiento; 3. ¿Qué es una mujer? – el discurso biológico en escena. Los resultados demuestran la escasa discusión sobre temas específicos. Por lo general, los discursos que hablan directamente sobre las características biológicas en las mujeres confirman el lugar social que les atribuye la sociedad, a lo largo del tiempo, dieron paso a otros discursos sexistas, sin embargo ocultos por la neutralidad científica. En la producción del conocimiento científico, se evidencia el propósito de justificar los estereotipos en los modos de los cuerpos femenino y masculino y, consecuentemente, las desigualdades.

Palabras clave:

Maternidad;
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The present review is part of a master's degree research entitled: " *A mother supposing she had no children: Contradictions between motherhood and curricular and institutional practices in a Biological Sciences course.*"¹ It aims to listen to the life histories of teachers of a Biological Sciences course as mothers to understand how motherhood appears in their trajectories, the relationships within the institute where they teach, and their teaching practices.

Our reference for maternity studies is Andrea O'Reilly, especially from her work *Matricentric Feminism: Theory, activism and Practice* (2016), in which she presents matricentric feminism and makes considerations about the same about academic feminism. Andrea O'Reilly is a senior lecturer in the School of Gender, Sexuality and Women's Studies at the University of York in Toronto, Canada, in addition to being founder and editor-in-chief of *Journal of the Motherhood Initiative* and at Demeter Press, the first Canadian publisher dedicated to maternal studies.

O'Riley believes denying motherhood is not how to make it easier than what delimits genres is destabilised. For her, it is possible to discuss gender as a construction and, at the same time, mothering as crucial to a mother's sense of self and her experience in the world. The academics who study motherhood do not reduce being a woman to that, much less say that it makes them a woman or that the mothering experience stands out from the other variables that constitute the self. They state that motherhood is central to understanding the lives of women and mothers.

In this context, it argues that there is a tension between more recent freedom achieved by women and the continued discrimination they suffer once they become mothers. Today, it is possible for more young women to grow up with new expectations about what it means to be a woman, envisioning a future that is not restricted to the domestic sphere, taking care of the house and children. O'Reilly says that, currently, in privileged contexts of race, class and sexuality, the lives of women without children are very similar to men who are also childless. Under these conditions, women and men can enter the same careers and enjoy similar leisure and self-care activities.

From this point of view, motherhood is a device constituted of scientific statements, norms, discourses, laws and other forms of enunciation that serve the purpose of normalising what mothers are, how they behave,

how they think, how they relate to the child and how they show themselves to the world. (Foucault, 2003)

Entangled in this device is also the idea of motherhood as a “biological destiny” of women, as something necessary for their completeness as individuals. The production and reproduction of this stereotype about women concerning motherhood extend beyond the expectation that they will have children and contribute to an ideal of female identity linked to caring for others to the detriment of their desires and goals. In this context, the Biological Sciences discourse has acted by naturalising feminine or masculine ways of thinking and acting. This thought places anatomical and physiological differences as responsible for gender stereotypes. This review aimed to raise bibliographies that addressed the experience of motherhood as a constructed social practice, the deterministic discourse of biology, and how it appears in the training of biologists and teachers in Brazil.

METHODOLOGICAL FRAMEWORK, ANALYSIS CRITERIA AND THEMATIC AXES

Capes (Coordination for the Improvement of Higher Education Personnel) Journal Portal was the base for the research bibliography survey. Launched on November 11, 2000, the Portal’s mission is to strengthen Brazilian graduate programs through democratising access to high-level international scientific information via the Internet. Currently, its collection comprises 45,000 titles with 130 reference bases.

Table 1 shows the descriptors used in searches on the Capes Journal Portal. From reading titles and abstracts, the researchers did initial filtering to analyse whether the works matched the master’s research theme. After this selection of articles and throughout their reading, some others were discarded for not discussing topics related to the scope of research. Texts were excluded based on the criteria listed below:

- Duplicated;
- Whose search terms were not present in the title or abstract
- That discuss gender in the legal field;
- Supported by particular contexts or artefacts, which do not allow us to draw parallels with the research topic or which demand knowledge of a specific book or film;
- Where the discussion is centered on aspects of sexuality and sexual diversity, without discussing chauvinism and sexual stereotypes, although they bring “gender” in the title or abstract;
- That are not written in Portuguese.

The author’s home institution, the grade of the graduate program in which the study was carried out, the authors’ h-index, the Qualis index of the publication journal, the number of citations of the article and the year of publication were not criteria for inclusion or exclusion of works in this review.

Table 1. Descriptors used in the survey of articles in the Capes Journal Portal²

Descriptors	Articles found	Selected articles
"Maternity device"	7	3
Maternity + Biological Determinism	68	4
"life+story" + Maternity	96	6
Maternal instinct	87	1
"Biological Determinism"	327	7
"biological discourse"	42	1
Biologists + determinismo	73	0
Biologist training + sexism	4	0
"Biologist training" + determinism	0	0
Biologist training + chauvinism	2	0
Teacher training + chauvinismo	307	1
Overall	1013	23

Source: From authors.

After filtering and reading these articles, three thematic categories rose, listed below, based on themes that emerged during the readings. Finally, the content of the selected article is presented, articulating them within their category.

Methodological framework

Content analysis is an essential tool for the interpretive exploration of documents in qualitative research and is regarded as a highlighted methodology in Science Teaching research (Ferreira e Loguecio, 2014; Lima, Alonço e Ritter, 2021). Its basis is the panoramic book Content Analysis, written by Laurence Bardin and first published in French and Portuguese in 1977. Despite all the up-to-date requirements, Bardin has been quoted as Brazil's primary reference in content analysis. (Lima, Alonço e Ritter, 2021). This method was used in the bibliographic review presented in this article. (Bardin, 2016)

After searching for papers on Capes's website, through testing many combinations of descriptors, it was possible to make the following sequence of steps: 1. Preview analysis; 2. Exploratory phase and 3. Result treatment, definition of categories and interpretation.

The definition of categories might be previous or later, depending on the researcher's interests. In this bibliographic review, we have defined the categories after the preview analysis and the exploration, considering the thematic context and mainly focused on the relationship between mothering and biological determinism. Regarding this assumption, three categories emerged, as shown in the following chart:

Chart 1. Thematic categories

Thematic category	Definition
1. What is a mother?	Motherhood is not a universal identity and practice. Many cultural issues include this condition and process. (O'Reilly, 2016)
2. Breastfeeding	Breastfeeding is the more evident skill under the biological perspective that identifies a woman as a mother. This category might demonstrate the relationship between biological determinism and motherhood because it is considered a natural act for all mammals,
3. What is a woman?	The biological discourse defines, from the genitalia of the body, who might be a woman in a deterministic way. The debate around the differences between sex and genre contributes to establishing boundaries between a biological female body, that might be a mother, and the spectrum of genres.

Source: From authors.

In the next section, the results are presented under a rigorous analysis that connects the thematic categories and the selected articles about motherhood.

ANALYSIS RESULTS

Category I: What is a mother?

Collier de Mendonça (2021) translated the book named XXX into Brazilian Portuguese and presents concepts from Andrea O'Reilly, a full professor at the University of York (Toronto), who coined the term Motherhood Studies to demarcate Motherhood Studies as a distinct and autonomous discipline in North America. The other articles in this session illustrate O'Reilly's ideas even though they do not quote her straight. Alzuguir and Nucci (2015), Souza (2018), Freire de Oliveira-Cruz et al. (2021), and Moreira and Nardi (2009) present the reality of groups of mothers, exposing expectations and idealisations about them and the anguish and contradictions that accompany them, showing that motherhood is not universal. Marcello (2005) and Matias et al. (2021) speak of motherhood in its historicity, highlighting its character of social construction. Castro (2015) talks about subversions that accompany groups of mothers who get involved in social movements and assume the role of "mothers of everyone." Rios and Gomes (2009) conducted a literature review on couples' decisions to have children.

O'Reilly proposes ten ideological assumptions that shape patriarchal motherhood and make mothering oppressive for women. They are:

1. Essentialisation: Motherhood as the foundation of female identity;
2. Privatisation: situates maternal work in a restricted way to the reproductive and domestic spheres;
3. Individualisation: transforms mothering into a work of individual responsibility, focused solely on the female figure;
4. Naturalisation: reinforces maternal work as guided by instincts by assuming that all women are born instinctively knowing how to be a mother.
5. Biologisation: emphasises blood ties, positioning the biological mother as the authentic one;
6. Normalisation: places the nuclear family as a milieu for maternal practices, where the wife is the caregiver of the children, and the husband is the economic provider;

7. Specialisation: advocates that experts guide the upbringing of children;
8. Intensification: Child upbringing is guided by child-centred specialists, with methods that demand great maternal effort, being emotionally and financially costly for mothers. This ideology maintains gender hierarchies because it places child nurture as domestic, private and feminine work. Thus, it reinforces the subordination of women and relieves men, politicians and the State from providing the assistance that mothers and children need.
9. Idealisation: reinforces the expectations of mothers about themselves and society by establishing unattainable maternal models;
10. Depoliticisation: places the upbringing and education of children as private activities without socio-political relationships or implications.

Such assumptions weaken the importance of mothering, socially devalue maternal work, and promote unattainable maternal models. Consequently, they overload mothers and reinforce the feeling of guilt, physical fatigue and psychological stress. Despite this, O'Reilly (*ibid.*) believes that in the same way these assumptions were culturally constructed, they can be deconstructed, as they are neither natural nor inherent to mothering practices.

Moreira and Nardi (2009) interviewed 14 women, mothers and workers with different origins and social insertions. In the accounts of the trajectories of these women, the authors found similar concerns, dilemmas and difficulties in dealing with their children. Although such women come from different social contexts, they are all permeated by statements that configure the norm within maternity, whether aiming to achieve these established standards or using them as a parameter to evaluate themselves as “good” or “bad” mothers. Such statements concern the perfect number of children a woman should have, the ideal age to have children and the excellent financial conditions.

Social networks seem to showcase what can be called “good” and “bad” examples of what it means to be a mother. The content posted here can be helpful to continue to propagate oppressive and patriarchal ideas about motherhood and give indications of which thoughts about motherhood are present in society.

In the article by Freire de Oliveira-Cruz *et al.* (2021), the interpretative analysis was carried out through Content Analysis of comments on a Facebook post where a mother exposed, through photos, her daily life with her two children. From the points of view exposed in these comments, it becomes possible to analyse positions that support the hegemonic/oppressive conception of motherhood in opposition to processes of resignification or resistance to this structure. Among the ideas that predominate in the analysed comments is the high responsibility of women for the work of care.

Although, at times, internet users identified with the routine of the author of the post and demonstrated an understanding of the functioning of society regarding women's work, they still understand this social structure as posed and timeless, as if it were not possible to problematise precepts that position the woman as solely responsible for the house, children and even husbands. However, many still point to the love of their children as a reward for this hard work and sacrifice. This work also highlights the direct attacks on the author of the post and the lack of empathy shown in direct criticism, questioning her choices, competence, and affection. This scenery indicates that social networks can be a negative space to treat motherhood by asking for hegemonic motherhood.

Alzuguir and Nucci (2015) analyse reports of childbirth and breastfeeding shared on a blog called “Active Maternity - Mammal Village”. These two themes consider the similarity between humans and other animals present in the narratives of these events. They are privileged fields of enunciation of “mammal mothers” identity.

These mothers defend what they call “active motherhood”, which refers to adopting scientific guidelines on the care of babies to make choices and question the loss of protagonism in the care of children, valuing the dimension of an instinctual pleasure of women as mothers. The main discussion points for these mothers are the defence of natural and humanised childbirth and prolonged on-demand breastfeeding. In these two contexts, the notion of a female extension of the animal kingdom is meaningful.

The authors emphasise the paradox present in these practices, which, while presenting themselves as resistance to the capitalist logic of reproduction and standard practices of middle-class mothers, are also captured by the capitalist system by appealing to women's individual choices and restricting the possibilities of "choice" for those who have financial resources and a support network to dedicate themselves to their children's early childhood. According to the authors: "mammals do not question the political dimension of motherhood concerning the scarcity of public policies to support mothers from different social strata for early childhood care." (p. 234)

Finally, Alzuguir and Nucci (2015) question whether this discourse would not be an update on the hygienist discourse and the responsibility of mothers to preserve social well-being through the care of their children:

The discourses of naturalisation of motherhood have been appropriated by a more conservative trend that, supported by scientific reductionism, intensifies the sexual division of labour and the valorisation of a particular family model formed by biological mother and father. (Alzuguir & Nucci, 2015, p. 235)

On the other hand, social networks, where women mothers can share their experiences, can be spaces that serve to reinforce stereotypes and expectations about mothers and open up possibilities for building new subjectivities and other discourses about motherhood. Souza (2018) analyses comments on three posts made on Facebook by maternity pages that provide discussions and reflections on the topic. The theme of the analysed posts is the feeling of guilt of mothers, and their content revolves around warding off this feeling.

The author goes back to the encouragement of breastfeeding started in the 19th century in Brazil, where the discourse of social medicine attributed a status of nobility to the role of breastfeeding and acted to modify the physical, moral and sexual conduct of the bourgeois family, focusing on guiding the role of the woman-mother, held responsible for nurturing and instructing future generations of Brazilians. In this context, the ideology of guilt, devotion and sacrifice are normalised in the maternal condition, being silenced under the justification that love for children made such a condition "worth it".

The analysis of the comments reveals that the feeling of guilt for not doing enough for their children is still very present. However, having spaces to talk about their experiences as mothers opens the possibility to build new subjectivities and construct discourses that can break imposing, hierarchical and misogynistic conceptions as the only possibilities. Moreover, it makes it possible to deconstruct the idea that motherhood is always pleasurable, rewarding and harmonious, propagated even by other mothers.

Marcello (2005) and Matias *et al.* (2021), when showing narratives that promote fissures in the ideals about mothers and motherhood, show that the ways of being a mother are historical and, therefore, are not given by nature, which opens the possibility of building new subjectivities and new forms of mothering.

Marcello (2005) discusses how the device of motherhood is organised in the media to produce peculiar modes of female subjectivation. She analyses articles from *Veja* magazine about Xuxa Meneghel, Vera Fischer, Cássia Eller and Luciana Gimenez between 1992 and 2003.

To understand the production of subjectivation processes, Marcello focuses on what Foucault calls "technologies of the self", privileging three of them in the discussion. The first concerns how the subject-mother controls herself in her attitudes, and the second concerns self-organisation, the idea that to exercise the mother role designated by the maternity device, the mother-subject must be organised and prepared for the tasks. Finally, there are two ways the device contains itself to promote the mother's look at herself and, from this, to enunciate themselves as authors of their talks and motherhood.

From the materials analysis, Marcello finds that the movement of mothers to look at themselves starts from expertise and normativity elaborated and historically constructed by the device of motherhood. In this way, the knowledge and normativity articulated by this device are historical. In the same way, the modes of subjectivation and the practice of being a mother are also historical.

Matias *et al.* (2021) characterise the maternity device and illustrate its statements from narratives taken from social networks, magazine articles or news sites related to maternity. It also demonstrates the possibilities of reinventing motherhood from narratives that counter the maternity device's presuppositions by opposing the norm. The narratives presented are that of a family composed of a woman, two men and a child; another from a single mother who is a call girl and does not hide it from her daughter; and, finally, that of a heterosexual and transsexual couple, where the father was the one who gestated the child. Such narratives are said to be potent for transformation because they create tactics that subvert, refuse, invert and destabilise the configuration of the maternity device and its elements.

Castro (2015) takes up Nancy Chodorow's (2006) thinking about expectations around women regarding childcare. In addition to expecting women to care for children of all ages naturally, there is a belief that women's "mothering" qualities can and should extend to non-mothering work.

Castro talks about the "mother of everyone", a type of mother who symbolically assumes motherhood, becoming the mother of many people. These women emerge in contexts of poverty and break the dichotomies between public and private. These are women who defend their peers in social movements for human rights. He quotes the actions of mothers who fight for justice after having their children murdered by the State, such as May Mothers, Copacabana Mothers, Rio Mothers and Acari Mothers.

Castro (2015) problematises that we know the stories of these women as militants, as mothers of many, but not about how they were or are women, subjects of desires. In their public struggle, these women subvert not only the idea of motherhood as restricted to the private but also the disciplining that reduces the mother to the consanguineous or kinship family.

The author states that although these women do not break with the disciplining of the mother as a private domain nor with their representation as asexual women.

Rios and Gomes (2009) carried out a bibliographic survey in national and international databases with articles, dissertations or theses produced in the last ten years on the decision of couples not to have children.

The authors highlight the scarce production on the subject in Brazil and that the topics most addressed in the research were the motivations behind this choice, whether these motivations are linked to aspects of childhood and family of origin, the quality of life and marital relationship of those who chose not to have children; and the prejudice and stigma with these people. The authors point out that the studies surveyed highlight a political dimension of women's active choice to have children or not.

Category II: Breastfeeding

As a strong symbolism that unites the biological and the social, breastfeeding was discussed in some selected articles. It was recurrent in the works to reconcile the biological aspects of breastfeeding and its benefits for the mother and the social elements, trying to consider the reality of breastfeeding women and relevant factors for the decision to breastfeed. In general, the intention of understanding how it is possible to take more effective actions to encourage it accompanies this social view of breastfeeding.

Cadoná and Strey (2014) analysed 11 folders and a poster that make up the National Breastfeeding Campaign, prepared by the Brazilian Society of Pediatrics between 1999 and 2010, with the collaboration of the Ministry of Health since 2004. These materials look like devices that aim to reach Brazilian mothers who have children in the lactation period by raising awareness of adhering to breastfeeding through the presentation of a series of advantages for their children's health, placing mothers as the main responsible for the success of this practice.

The research investigates which ways of being mothers are imprinted in these materials, what kind of subjects they intend to form, what position the father occupies in the speeches given and what they mean by "taking care of a child".

Such campaigns reinforce breastfeeding as a natural act of love for the child and make mothers individually responsible for this care and the consequences that choosing to do so or not can bring to the child's future and the entire population. Although seen as a natural act for all women, the campaigns also draw the attention of health professionals to correctly guide them on the most appropriate techniques for breastfeeding, reinforcing the child's position and holding in the mouth. These campaigns constitute regulatory mechanisms of mothers' lives, establishing standards of normality on maternal practices, and ignore that women are different individuals, living in other contexts that permeate the act of breastfeeding, and the choice to do it or not and until when to do it.

Dutra et al. (2012) conducted a study with 50 pregnant women from Campina Grande - Paraíba to identify which social representations they built about breastfeeding. To this end, the collection instrument was to test the free association of words to the expression "to breastfeed". The research is based on the Social Representations Theory, which studies the rules that govern social thought, identifying the worldview of individuals and groups and their positions. Data analysis indicated that breastfeeding is associated with three senses: affection, food and health.

The researchers emphasise the importance of health professionals looking beyond the biological aspect of breastfeeding, understanding nursing mothers' dimensions of being a woman and their feelings and fears to help them. They also say that the expectation of these professionals about breastfeeding being a natural and spontaneous process overshadows breast complications, as it can lead women to hide their problems due to the sacrifice expected to play the role of mother or out of fear of social disapproval for not being able to breastfeed exclusively.

Faleiros *et al.* (2006) conducted a literature review with articles published in different databases between 1990 and 2004 to analyse different factors that may influence mothers' choice to breastfeed, duration of breastfeeding and reasons for weaning. Based on the premise that the World Health Organization recommends exclusive breastfeeding up to 6 months of age and complementary breastfeeding up to 2 years of age, the authors seek to understand to what extent this would be feasible in Brazil and more developed countries.

From the articles, the authors found some factors as significant influencers in decisions about breastfeeding. For example, the woman's age, income, schooling, number of children, and marital status are cited factors that significantly influence the decision to breastfeed and early weaning. This article, despite presenting different factors that influence the decision to breastfeed, recognising that this act cannot always be pleasant and natural for women, has these factors to be considered by health professionals to make breastfeeding a pleasant moment.

Santos Monteiro *et al.* (2011) ask, "Is early weaning a reality that characterises the contemporary world?" Throughout the 20th century, women moved away from breastfeeding due to a disincentive from health professionals, pressure from the milk and food industries, changes in women's lifestyles and general misinformation. In Brazil, in the 1980s, a campaign began to sensitise politicians, health authorities, the media and community leaders to favour breastfeeding. In 1981, the National Breastfeeding Program was launched.

From this historical and social trajectory, we see that breastfeeding is a practice permeated by social, political and economic interests and values that can shape it in different periods. In this web of interests, the woman becomes the object of investment to shape her desires and behaviours in the face of the role of breastfeeding. In the official discourse of public programs and policies and society in general, pro-breastfeeding actions prioritise children and emphasise biological characteristics of the female body to perform the role of a nursing mother but do not invite women to dialogue to expose the concreteness of the act of breastfeeding and the anxieties and difficulties that permeate it, even because of the fear of being judged on her conduct as a mother.

Category III: What is a woman?

The articles in this section discuss sex and gender, questioning biological assumptions, sometimes considered unquestionable because they are assumed to be given by nature, used to naturalise and maintain the distinctions and hierarchies between masculine and feminine.

Giffin (1991) and Citeli (2001) articulate ideas from several authors regarding the discussion of the biological and the social in the field of analysis of the female condition. Giffin (1991) goes through several strands of studies and highlights that, despite scientific evidence of man's biological role in reproduction and the genetic constitution of children, this did not imply a social definition of paternity, with rights and duties attributed to men. According to the author, "the biological equivalence between the sexes "did not catch on" at the level of the social construction of genders" (p. 198).

The author also problematises the global trend for the use of contraceptive pills, opposing that, although they have allowed the exercise of sexuality while avoiding pregnancy, they also have negative consequences that have been poorly studied on health, and in addition to having increased dependence on the medical system, they do not favour equal responsibilities of men and women concerning contraception and child care.

Although the article was written in 1991 and, currently, the debate about the negative consequences of birth control pills is more widespread, the questions raised by Griffin are still very relevant, as many women continue to use this method because they are unaware of the risks or do not have access or information about others. In addition, we continue with the overload of women and the exemption of men with responsibility for contraception and parental care.

On overcoming this paradigm of male and female roles in the public and private spheres, Giffin says:

Reversing the social/scientific definition of reproduction as a "women's issue" implies (...) claiming greater responsibility for men in biological and social reproduction - from problems of the development and use of male contraceptive methods to issues of social valorisation of reproduction, passing through socio-sexual relationships and relationships with children. The apparent tension between "greater control by women" and "greater responsibility by men" is overcome only by the ideal of shared and balanced participation in both spheres - production and reproduction - that will replace the historical, not necessarily universal, framework in which the female gender is responsible for reproduction, but not its control. (Giffin, 1991, p. 198)

Citeli (2001) divides three main lines of studies on women, gender and science developed in Anglophone countries in the last 30 years.

The first line concerns studies that investigate and interpret the presence or absence of women in scientific activities and seek to bring visibility to them. The second consists of epistemological investigations about what is meant by gender within science and raises questions about the possibility and capacity of science to explain nature. The third comprises studies focusing on the social contexts where scientific knowledge is structured and seeks to identify gender biases in the knowledge produced by various disciplines, especially Biology.

Dinis (2013) and Oliveira and Noronha (2016) discuss the concepts of sex and gender. Oliveira and Noronha (2016) present some concepts and ideas of Judith Butler. In the author's book "Gender Trouble", they bring the problematisation that she makes of sex as a result of nature, prior to the law and indeterminate by politics and culture. In contrast, gender would be the social subordination established over sex. For Butler, the so-called "natural" discourses that classify bodies with concepts of anatomy, biology and nature move away from the possibilities of critical questioning, from investigations of the conditions of their formation and their consequences for the current distribution of power. If sex acquires a character of the essence, it becomes intangible, beyond the reach of power relations or political debate about them.

Dinis (2013) highlights that, although the distinction between sex and gender means an advance, by recognising a social and cultural dimension in the construction of gender and moving away from a strictly biological understanding, this distinction also contributes to covering up other possibilities for the construction of sexual and gender identities, as they often also fall into the female/male binarism.

Ramos and Lencastre (2014) present concepts about what constitutes the masculine and feminine in works in human ethology, sociobiology and evolutionary psychology. The authors warn that these disciplines run the risk of closing the gap between causes and effects on biological tissues. However, when pre-

senting concepts in these areas, they fall back on deterministic and prejudiced lines, citing, for example, the excess or lack of testosterone in women as responsible for a more dominating or submissive behaviour and associating homosexuality as a consequence of abuse in childhood.

Duarte (2018), from the exhibition on the human brain at the Museum of Tomorrow, analyses how culture and human experience are presented in this vital space for scientific dissemination. The author considers Biomedical Sciences' tendency to produce an understanding of the human from a biological and reductionist perspective. In the case of the exhibition, he criticises the idea of subordinating culture and human experience to mere results of brain activity when it has more to do with interactions between processes internal and external to the human body. Finally, he concludes that how the human being is presented in the Museum's exhibition makes them a by-product of their organs.

Such a view about our behaviours being inflexibly and immutably conditioned to the brain, whether by its physiology and/or anatomy, also appears in Nucci's work (2018). The author reflects on the relationship between feminism and science based on the production of an interdisciplinary group of researchers called NeuroGenderings. The current scientific discourse no longer talks about female inferiority but reinforces the difference between men and women based on physiological, psychological, intellectual and behavioural characteristics that are particular to the two sexes; the brain is used as the "privileged place" to explain the differences between men and women. While there is research that seeks to continue propagating such differences, there are feminist critics inside and outside Neuroscience who seek to question the sexism and misogyny behind the discourse of biological differences between the sexes.

The feminists in this network seek to examine the production of knowledge in neuroscience to combat what they call neurosexism, which consists of stereotypes regarding masculinity and femininity that would be present in much of neuroscientific production, as well as in the dissemination of this knowledge. They seek to produce neuroscience knowledge that jeopardises the naturalisation of these differences, which have negative social consequences for women.

While this group of scientists proposes to investigate the sexist and misogynist bias behind the production of knowledge in the biological area, Ferraro (2020) argues that biological discourse can also understand ways of life that escape the ideals of masculine and feminine. The author argues that, as Biology is founded on and by biodiversity, its epistemology comprises queer ways of existence as "singular arrangements responsible for the constitution of these subjectivities – individuation processes related to forms of desire, modes of affection and performances" (p. 179).

Using open questionnaires, Souza and Dinis (2010) investigated the conceptions about gender and sexuality that appear in the training of future Biology teachers in the Biological Sciences course at UFPR.

In the answers obtained, the students rejected exclusively biological or cultural perspectives concerning gender and sexuality, which indicates a formation that reconciles the two dimensions. However, the scarce or succinct justifications given by the students indicate that there may need to be a solid theoretical consistency to take such positions. Still on the justifications, despite rejecting biological determinism, students approach "biological foundationalism", which consists of the primacy of biology to other human dimensions, as a coat-holder of cultural differences: the biological data would be the objective or material basis on which gender differences are built.

The students also stated that the discussions about gender took place mainly in undergraduate courses. Despite this, they feel they need to prepare to approach the topic in the classroom as teachers.

Finally, the authors reinforce that it is essential to think about policies that take us beyond the internalisation of a politically correct tolerance, which little questions binarist understandings that maintain exclusions.

Rohden (2007) talks about the eugenic policies present in Brazil in the first decades of the 20th century, motivated by nationalist and racist ideas, which preached the aggrandisement of the nation through

its whitening. There was a government concern with the quantity and what they considered the “quality” of the population. In this sense, discussions began on sterilisation and contraception for those considered “degenerates”, who represented poor, non-white and non-heterosexual people, and the increase in birth rates among the richest and whitest.

The specialities dedicated to women and reproduction took as a fundamental goal to improve the reproduction of citizens and thus became allies of the State. Women are seen as responsible for the future of “human capital”, and assistance is seen as essential to reach a “stronger race”. From this perspective, doctors began to insist on educating women to fulfil their “natural destiny”. An education conceived as a “relearn”, starting from medicine, their “original role”.

Are our mothers all the same?

The results of the article search stage already demonstrate the scarce discussion on specific topics discussed here. In general terms, the searches that related the formation of biologists with biological determinism and chauvinism did not bring relevant results.

It is also observed, from the survey carried out, that the discourses that spoke directly about biological characteristics in women corroborate with the social place intended for them, over time, gave way to other sexist discourses, however, camouflaged under scientific neutrality.

Within the production of scientific knowledge, the investment was in seeking ways to justify stereotypes and, consequently, inequalities in female and male bodies.

The entire apparatus that constitutes sex, in addition to the genitals, such as hormones and behaviour, are still placed as data of nature and, therefore, unquestionable, universal and timeless. We saw that there is a movement to question sex as nature, in opposition to gender, which would be a construction. Sex itself, as part of knowledge produced within the enterprise of science, can also be seen as a construction.

The conflict between naturalisation and construction extends to other biological concepts. Motherhood, homogenised for centuries as if there was only one possible and correct way to be a mother, is put in check when faced with works that expose mothers’ conflicts, anxieties and experiences from different contexts. When these mothers talk about their frustrations for not following an “ideal mother” script, we have proof that this “ideal mother” is not part of all women’s instinctive and universal nature. Still, the myth of maternal love prevails and torments women-mothers with guilt for feeling incapable of following what is considered to be their nature as a woman.

Breastfeeding also proved to be a relevant field of enunciation for bringing women closer to nature. The act of breastfeeding, observed in other female mammals, was and still is used to reinforce this belief of instinctive mothering, of mothering as a biological destiny. On the other hand, the investment made in breastfeeding exposes a contradiction in the biomedical discourse since. However, it is considered a natural act for all mammals; breastfeeding campaigns seek to convince women to breastfeed and invest in showing them what is the correct way to do it. Being a natural and instinctive act, why would it be necessary to convince women about the benefits of breastfeeding for them to breastfeed, and why do they not know how to do it instinctively, being essential to teach them?

In this context of the approximation of motherhood with the field of instinct, the visceral, the animal, we observe that, at the same time, there is a movement of women who appropriate this discourse as a form of empowerment. To regain control over their bodies, these women rely on the instinctive nature of mothering, that their body knows how to gestate, give birth and raise their offspring.

Although with a new aspect, this endeavour is similar to the speeches given long ago that sought to make mothers exhaustively responsible for the care and development of their children. If before the medical discourse spoke about the virtues of the women who breastfed their children and how the future of the

nation was in the hands of these women, this new representation of motherhood can internalise in women the responsibility of resorting to their instincts to raise children, to relieve the role of public authorities and parents and, again, making women exhaustively responsible for the care.

Some of the survey works addressed the production of biological knowledge and the sexist bias present in the same. Scientific advances in the biomedical field and gender discussions in the Social Sciences did not necessarily imply a movement to discuss and pay attention to gender stereotypes that biological knowledge can help to reinforce. Although there are movements of scientists that seek to address these issues and bring other possibilities of doing and thinking about science when it comes to gender, this still seems restricted to groups of women scientists, not being something widely disseminated in the scientific community.

FINAL REMARKS

The requirement to discuss, within the biological sciences community, not only the participation of women in scientific work but also the gender bias in the production of knowledge is visible. Engaging in this type of discussion in favour of change must not be just for women. In this context, thinking about new goals in the training of biologists is necessary when anti-sexist training is sought, which challenges stereotypes about women and masculinity and, consequently, combats gender violence in its various forms.

Concerning motherhood, it seems crucial that more and more spaces where mothers can share their stories and experiences without judgment be created and disseminated. It is fundamental that the universal ideal of motherhood, which establishes an unreal and unattainable model of a mother, be rethought, giving rise to new ways of mothering that are not so demanding and, exhausting and oppressive for women.

DECLARAÇÃO SOBRE DISPONIBILIDADE DE DADOS

O conjunto de dados que dá suporte ao artigo está disponível no dataverse Scielo EPEC.

DECLARAÇÃO DE CONFLITO DE INTERESSES

As autoras relatam não existir conflito de interesses na publicação do artigo.

DECLARAÇÃO DE AUTORIA

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NOTES

1 Available at <https://www.geprana.com/dissertacoes-e-teses>

2 Descriptors were established in Portuguese language. The authors have chosen to present them here in English as the language version of this paper.

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Paloma Blanco Anaya

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CECIMIG would like to thank National Council for Scientific and Technological Development (CNPq) and Research Support Foundation of the State of Minas Gerais (FAPEMIG) for the funding forediting this article.