











Gender division of housework and its association with generalized anxiety disorder in mothers in southern Brazil

División de género de las tareas domésticas y su asociación con el trastorno de ansiedad generalizada en madres del sur de Brasil

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ABSTRACT

Objective: To analyze the association between the division of domestic housework and generalized anxiety disorder (GAD) during the COVID-19 pandemic in mothers of preschool children. **Materials and methods:** This cohort study included mothers who had children in 2019 in the municipality of Rio Grande, southern Brazil. These women were followed up in 2020. The presence of GAD was assessed using the Generalized Anxiety Disorder 7-item (GAD-7) scale, and the division of domestic housework was evaluated with the “Division of Labor by Gender” instrument. Descriptive and bivariate analyses were conducted. Bivariate associations were tested using Pearson’s chi-square (χ^2), while multivariate analyses were performed using Poisson regression to calculate prevalence ratios (PR) with 95% confidence intervals (95% CI). **Results:** A total of 908 mothers from the 2019 Rio Grande Birth Cohort participated through an online questionnaire. The prevalence of moderate to severe GAD was 28%. A higher score on the domestic housework division scale (indicating a more even distribution of home tasks) was associated with a lower prevalence of GAD (PR = 0.84; 95% CI: 0.71–0.99). **Conclusion:** Mothers who shared household responsibilities with their partners had a reduced likelihood of experiencing GAD.

Keywords: domestic work; generalized anxiety disorder; mothers; COVID-19; mental health.

Cite as:

Reinheimer GM, Martins-Silva T, Meucci R, Völz PM, Carpena MX, Cesar JA, Minasi AS, Blumenberg C, Martins RC, Loret de Mola C. Gender division of housework and its association with generalized anxiety disorder in mothers in southern Brazil. *Rev Neuropsiquiatr.* 2025; 88(1): 5-14. DOI: 10.20453/rnp.v88i1.5921

Received: 27-11-2024

Accepted: 08-02-2025

Online: 28-03-2025

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RESUMEN

Objetivo: Analizar la asociación entre la división del trabajo doméstico y el trastorno de ansiedad generalizada (TAG) durante la pandemia de la COVID-19 en madres de niños en edad preescolar. **Materiales y métodos:** Este estudio de cohorte incluyó a madres con hijos nacidos en 2019 en el municipio de Rio Grande, en el sur de Brasil. Estas mujeres fueron seguidas en 2020. La presencia de TAG se evaluó mediante la escala de 7 ítems para el Trastorno de Ansiedad Generalizada (GAD-7); y la división del trabajo doméstico se midió con el instrumento División del Trabajo por Género. Se realizaron análisis descriptivos y bivariados. Las asociaciones bivariadas se probaron con la prueba de chi-cuadrado de Pearson (χ^2), mientras que los análisis multivariados se llevaron a cabo mediante regresión de Poisson para calcular razones de prevalencia (RP) con intervalos de confianza del 95 % (IC 95 %). **Resultados:** Un total de 908 madres de la cohorte de nacimientos de Rio Grande de 2019 participaron a través de un cuestionario en línea. La prevalencia de TAG moderado a severo fue del 28 %. Un mayor puntaje en la escala de división del trabajo doméstico (que indica una distribución más equitativa de las tareas del hogar) se asoció con una menor prevalencia de TAG (RP = 0,84; IC 95 %: 0,71-0,99). **Conclusión:** Las madres que compartieron las responsabilidades del hogar con sus parejas tuvieron una menor probabilidad de experimentar TAG.

Palabras clave: trabajo doméstico; trastorno de ansiedad generalizada; madres; COVID-19; salud mental.

INTRODUCTION

Mental health, in the context of complex social changes and health crises such as the COVID-19 pandemic, has emerged as a significant public health issue (1). Parallel to this, estimates indicate that nearly 1 billion people worldwide are affected by some type of mental disorder, with anxiety being one of the most prevalent (2), especially among women (3). During the COVID-19 pandemic, anxiety disorders accounted for more than 9 million disability-adjusted life years (DALYs), with 6 million among women and nearly 3 million among men (4). In Brazil, anxiety disorders affect 9.3% of the population (3).

Anxiety, characterized as a future-oriented mood state (5), triggers physiological, behavioral, and affective reactions that mobilize individuals to prepare for possible threats (6). Generalized anxiety disorder (GAD) is marked by persistent, excessive, distressing, and long-lasting worries, often accompanied by physical symptoms (7).

The home environment, shaped by the dynamics of labor division, may be associated with the persistence and development of GAD, particularly among women and, more specifically, among mothers of young

children during the COVID-19 pandemic. This is because, in addition to the increased prevalence of GAD, these mothers were responsible for managing the household, caring for children, the elderly, and people with disabilities (8). The pandemic directly affected Brazilian women's work and income, altering labor relations and forcing many to leave their jobs while simultaneously increasing their burden of unpaid work. For women working from home, constant pressure and the accumulation of responsibilities placed their physical and mental health at significant risk (9). Before the pandemic, this situation was often referred to as a "triple workday," but during the pandemic, it seemed almost "infinite" (10).

A systematic review of 12 studies found that mothers are primarily responsible for domestic work and childcare, highlighting a clear gender inequality in the division of family responsibilities between mothers and fathers (11).

Considering that the unequal division of domestic work is a historical issue and that these inequalities may have been exacerbated during the COVID-19 pandemic, the present study aims to analyze the association between the division of domestic work and

GAD during the pandemic among mothers who had children in 2019 in the municipality of Rio Grande, southern Brazil.

MATERIALS AND METHODS

This population-based cohort study was conducted in the municipality of Rio Grande, located along the southern coastal strip of Rio Grande do Sul, Brazil. The municipality has a population of 191,900 inhabitants (12), and in 2010, its Municipal Human Development Index (MHDI) was 0.744 (13). In 2019, Rio Grande recorded 2,521 live births (14).

We invited all 2521 mothers who gave birth in maternity hospitals in Rio Grande, RS, Brazil, between January 1 and December 31, 2019 (pre-pandemic) to participate in a standardized questionnaire administered by trained interviewers. This original study included mothers who had twins or resided in rural areas of the municipality. Given that our cohort study was designed for long-term follow-up of mothers and their infants, and due to the distinct logistics required for following up with twins and rural residents, we focused on mothers with liveborn singletons residing in the urban area of the metropolitan region. This subset formed the baseline for the 2019 Rio Grande Birth Cohort, consisting of 2,051 mothers.

We planned two additional follow-ups with these mothers using the WebCOVID19 project, which collected data through computer-assisted web interviews. We collected data for Wave 1 (WEBCOVID-1) between May and June 2020, and Wave 2 (WEBCOVID-2) between August and December 2020. At each data point, children were around 12 and 18 months, respectively. Trained research assistants contacted eligible mothers via phone or instant messages through WhatsApp, Facebook, or Instagram. Mothers who agreed to participate answered a web-based survey through an electronic link generated by the REDCap application.

The outcome of GAD was assessed using the Generalized Anxiety Disorder 7-item (GAD-7) instrument, a brief tool for evaluating anxiety. It follows DSM-IV criteria developed by Spitzer (15) and validated by Kroenke (16). The original GAD-7 items and instructions were translated into Brazilian Portuguese and validated in 2006 (17).

The GAD-7 has demonstrated consistent performance, as well as criterion, construct, factorial,

and procedural validity (15). The initial item pool included 9 items reflecting all the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) symptom criteria for GAD and 4 items based on a review of existing anxiety scales. A 13-item questionnaire was created to ask patients how often, during the last 2 weeks, they experienced each symptom. Response options were “not at all,” “several days,” “more than half the days,” and “nearly every day,” scored as 0, 1, 2, and 3, respectively. The GAD-7 includes the 7 items with the highest correlation with the total 13-item scale score ($r = 0.75-0.85$). Receiver operating characteristic analysis with these items showed an area under the curve (0.906) comparable to scales with the full 13-item set (15).

The GAD-7 measures anxiety through 7 questions about symptoms described in DSM-V: feeling nervous, inability to control worry, excessive worrying, difficulty relaxing, restlessness, irritability, and fear of impending doom (18). It is a self-administered questionnaire where respondents rate each symptom on a 4-point scale based on their experience over the past two weeks (0 = nothing; 1 = several days; 2 = more than half the days; 3 = almost every day). The total score ranges from 0 to 21 pts, indicating anxiety severity: minimal/none (0-4 pts); mild (5-9 pts); moderate (10-14 pts); and severe (15-21 pts) (18). In this study, moderate/severe anxiety is classified as yes.

A cut point of 10 was identified that optimized sensitivity (89%) and specificity (82%). Although GAD and depression symptoms often co-occurred, factor analysis in the original study confirmed them as distinct dimensions (15). Additionally, GAD and depression symptoms had different but independent effects on functional impairment and disability. There was a high level of agreement between the self-report and interviewer-administered versions of the scale (15). It is important to note that this scale is not diagnostic; it only indicates whether a person may be at risk of having GAD.

Our primary independent variable was division of domestic housework, analyzed using the instrument developed by Batalova & Cohen (19), called “division of labor by gender”. This instrument includes an index of four tasks: i) washing clothes; ii) doing household shopping; iii) planning meals; and iv) caring for a family member when they are ill. For each activity, there were five response options: “always you”; “most of the time you”; “equal division of the task”; “most of the time your partner”; “always your partner”. Each

response is valued from 1 (when the mother always performs the task) to 5 (when the partner always performs the task). By summing the variables and dividing by 4, an average final scale ranging from 1 to 5 is produced, with higher scores indicating greater domestic contributions by the partner (19). An additional response option, “other people perform the task”, was included, but in these cases, the mother was excluded from the analysis.

We assessed both the outcome and the main independent variable in WEBCOVID-2, and used baseline covariables including newborn’s sex (male; female); maternal age (0 to 20; 20 to 24; 25 to 34; 35+ years); self-reported race/skin color (white; brown; black); maternal schooling (≤ 4 ; 5 to 8; 9 to 11; ≥ 12 years); and family income ($\leq 1,500.00$; 1,501.00 to 2,699.00; $\geq 2,700.00$ reais). We included these variables as potential adjustment factors based on the possibility that they could be confounders. In a direct acyclic graph, we assumed that they may directly influence the likelihood of obtaining a higher score on the GAD-7 and the probability of having a higher or lower division of labor within the household.

We performed all analyses with STATA version 16. We did descriptive analysis followed by bivariate analysis to examine the relationship between the outcome and independent variables, including demographic and socioeconomic characteristics using Pearson’s chi-square (χ^2). We assessed multivariate models using Poisson regression with robust adjustment of the variance, and calculated prevalence ratios (PR) with 95% confidence intervals (95% CI). It is important to note that, although the original study design was a cohort study, this analysis utilized data on anxiety and division of labor measured at the same time point (WEBCOVID-2), with covariables assessed at an earlier study point.

The research project was approved by the Health Research Ethics Committee of the Federal University of Rio Grande, under protocol 15724819.6.0000.5324. All participants signed the Informed Consent Form, guaranteeing the confidentiality of the answers, voluntary participation, and the possibility of leaving the study at any time.

RESULTS

The eligible sample consisted of 2,052 mothers who gave birth in one of two maternity hospitals in the municipality of Rio Grande in 2019. Of these, 1,040 were interviewed in 2020, with 99 refusals and 913 losses.

The final sample consisted of 908 women (follow-up rate = 44.2%). Among the interviewees, 48.5% were between 20 and 24 years old, 81.8% self-identified as white, 55.0% had 9 to 11 years of schooling, and 43.1% were in the third tertile ($\geq 2,700.00$) of family income. Regarding child’s sex, 51.2% of the mothers reported having male children.

Table 1 indicates that the prevalence of moderate to severe GAD was 28%. This prevalence was higher among women aged 20 to 24 years (52.8%), those who self-identified as white (80.7%), those with 9 to 11 years of schooling (60.6%), and those in the second tertile of family income (34.9%). The distribution of the domestic work division score indicates that 85.9% had a mean score lower than 3, indicating that the mother performed more domestic work than the partner. Mothers who were in the highest category had scores between 3.0 and 4.2. It should be noted that GAD was lower among mothers who received more support from their partners in domestic activities (13.9%).

Table 1. Characteristics of the demographic and socioeconomic variables, division of domestic work, and generalized anxiety disorder.

Variable	Anxiety ¹				p-value ²
	No		Yes		
	n	%	n	%	
Newborn gender					0.187
Male	326	49.8	139	54.7	
Female	328	50.2	115	45.3	
Maternal age					0.307
<20	58	8.9	19	7.5	
20-24	307	46.9	134	52.8	
25-34	265	40.5	89	35.0	
>35	24	3.7	12	4.7	
Self-reported race/skin color					0.830
White	538	82.3	205	80.7	
Brown	78	11.9	34	13.4	
Black	38	5.8	15	5.9	
Maternal schooling in years					0.014
≤4	17	2.6	7	2.8	
5-8	63	9.6	32	12.6	
9-11	345	52.8	154	60.6	
≥12	229	35.0	61	24.0	
Family income (tertiles)					0.002
1°	160	24.8	78	31.3	
2°	184	28.5	87	34.9	
3°	302	46.7	84	33.8	
Division of housework					0.128
<2	166	31.9	69	35.4	
2-3	248	47.7	99	50.7	
>3	106	20.4	27	13.9	

¹ Anxiety was defined as having a score greater than or equal to 10 on the GAD-7 scale, which represents having moderate or severe anxiety.

² p-value from Pearson's chi-square (χ^2).

In the adjusted analyses, it was observed that for each additional point in the total score of the division of labor, the odds ratio (OR) of having moderate to severe anxiety decreased by 25% (OR=0.75; 95%CI [0.59-0.96]). When the division of labor is considered

as a categorical variable using mothers with less than 2 points on the scale as a reference, mothers with 3 points or more on the exposure had a 51% lower odds ratio (OR) for anxiety (OR=0.49; 95%CI [0.24-0.99]) (See Table 2).

Table 2. Adjusted analysis of the association between the division of domestic labor and the moderate/severe generalized anxiety disorder of the study mothers.

	Anxiety ¹	
	Unadjusted PR (95%CI)	Adjusted ² PR (95%CI)
Total Division of housework score ³	n=703 0.82 (0.69-0.98)	n=703 0.84 (0.71-0.99)
Categorical division of labor		
<2	1	1
2-3	0.98 (0.75-1.25)	0.99 (0.77-1.30)
>3	0.69 (0.47-1.02)	0.70 (0.47-1.04)

¹ Anxiety was defined as having a score greater than or equal to 10 on the GAD-7 scale, which represents having moderate or severe anxiety.

² Logistic regression analysis adjusted for variables evaluated in the baseline study: child's sex, maternal age, race/skin color, schooling, and family income.

³ This is the continuous form of the variable division of labor, therefore the PR should be interpreted as the amount of risk increase on having anxiety for each unit augment in the division of labor score.

PR: prevalence ratio; 95%CI: 95% confidence interval.

DISCUSSION

The present study found a significant association between a higher score on the domestic work division scale and a lower chance of being screened with moderate to severe anxiety. The overall prevalence of moderate to severe GAD in the sample was 28%.

Consistent with these findings, other studies also show high anxiety rates among women during the COVID-19 pandemic. Serafim et al. (20) reported a 34.9% prevalence of anxiety among women during social isolation. The pandemic has significantly affected women's mental health due to increased responsibilities, including professional duties, domestic chores, and childcare.

A study conducted by Musse et al. (21) between May and June 2020 found that women had a higher frequency of moderate to severe anxiety symptoms (45% with GAD-7 scores ≥ 10). The prevalence of anxiety symptoms increased during the COVID-19 period, adversely impacting women's mental health and leading to changes in risky behavior.

GAD in women, particularly mothers, may be explained by reduced resilience to pandemic-related changes and the increased workload resulting from additional caregiving responsibilities. The closure of schools and other support networks left many women solely responsible for their children's education, school activities, and leisure (22). Additionally, a significant portion of mothers faced challenges such as job loss and financial strain.

In this context, the division of domestic work—care for the home and family—became even more relevant, revealing previously invisible issues related to maternal mental health (23). The COVID-19 pandemic exacerbated labor division inequalities, creating new challenges. Working from home and school closures increased domestic responsibilities, disproportionately affecting women. Balancing professional duties, household chores, and childcare heightened anxiety, particularly in dual-income or single-parent households. The blurring of boundaries between work and home life contributed to stress, burnout, and mental health problems, underscoring the need for stronger support systems and a fairer distribution of domestic tasks to reduce psychological strain (22-23).

Historically, domestic work in Brazil has been primarily undertaken by women, who balance productive activities, household responsibilities, and motherhood (24). The role of caregiving remains unevenly distributed between women and men (25). According to a survey by the Brazilian Institute of Geography and Statistics (26), women spend nearly twice as much time (21.3 hours per week) on household chores, childcare, and elderly care compared to men (11.7 hours per week).

An online survey by Dorna et al. (27) with 360 mothers of children under 12 years old in Brazil during the pandemic found that increased domestic tasks significantly raised the number of hours mothers dedicated to unpaid work. Isolation intensified home and childcare responsibilities, adding to women's

family and professional burdens. Similarly, Carneiro et al. (28) surveyed 2,841 participants and found that women experienced significant mental health impacts, particularly anxiety symptoms. The study also highlighted that women were primarily responsible for domestic work and reported greater difficulty balancing work, family, and personal development.

A major limitation of this study was a follow-up loss of over 50%, which is typical in online studies but remains significant from an epidemiological

perspective. Non-participants were primarily low-income mothers burdened with heavy domestic workloads and mental health issues. This loss may affect the external validity of the results, limiting their applicability to mothers of lower socioeconomic status in Brazil. Included mothers were older, more educated, and had higher income (See Table 3). Additionally, cultural differences across regions may influence perceptions of labor division, further impacting the generalizability of the findings.

Table 3. Comparison of mothers with and without data on anxiety and division of labor in the 2019 Rio Grande birth cohort, based on baseline sociodemographic characteristics.

Variable	Data on anxiety and division of labor				p-value
	Included		Missing		
	n	%	n	%	
Newborn gender					0.899
Male	465	51.2	602	50.9	
Female	443	48.8	580	49.1	
Maternal age					<0.001
<20	77	8.5	191	16.2	
20-24	441	48.6	609	51.5	
25-34	354	39.0	345	29.2	
35 or more	36	4.0	37	3.1	
Self-reported race/skin color					<0.001
White	743	81.8	858	72.6	
Brown	112	12.3	197	16.7	
Black	53	5.8	127	10.7	
Maternal schooling in years					<0.001
≤4	24	2.6	67	5.7	
5-8	95	10.5	260	22.0	
9-11	499	55.0	676	57.2	
≥12	290	31.9	179	15.1	
Family income (tertiles)					<0.001
1°	238	26.6	497	43.4	
2°	271	30.3	357	31.2	
3°	386	43.1	291	25.4	

p-value comparing those included and not included.

The instrument used to measure the division of domestic work by gender did not include certain tasks relevant in the pandemic context, such as childcare, as it was not originally designed for this purpose. Developing more detailed instruments that

account for daily hours spent on childcare and specific domestic activities is recommended. Furthermore, this study did not measure workload intensity, which could have been an important factor in moderating the association we examined.

The division of labor variable did not exhibit a normal distribution, with mothers predominantly clustered in lower score categories, indicating the highest domestic workload. Mothers with a score of 3 or higher represented a group where household tasks were nearly equally distributed between the couple, with a slightly higher burden on the mother's partner. Compared to mothers with scores below 2—who bore almost all domestic responsibilities—those with more equal distribution were half as likely to exhibit anxiety symptoms.

On the other hand, this is the first study in Brazil to assess this association among women during the COVID-19 pandemic. This birth cohort study is well-suited to investigate the potential impacts on family health and well-being during the pandemic period.

CONCLUSIONS

We demonstrated that a higher score on the division of labor scale correlates with a lower likelihood of developing anxiety symptoms. In other words, an unequal division of domestic work can adversely affect women's mental health. Given the vulnerability of individuals during health crises such as the COVID-19 pandemic, it is essential to reconsider family dynamics and the distribution of domestic tasks. The pandemic has highlighted issues related to the invisibility of domestic work, the historical confinement of women to the domestic sphere, and the importance of protecting women's mental health.

It is imperative to review and establish public policies that recognize women's multitasking roles, not only during atypical events like the COVID-19 pandemic but consistently. Health professionals must be prepared to provide care for women's mental health, offering emotional support and encouraging family members—particularly partners—to appreciate women's roles within the family unit.

Conflict interest: The authors declare that they have no conflict of interest.

Funding: National Council for Scientific and Technological Development - CNPq, Process 433426/2018-7; Municipal Health Department of Rio Grande/RS.

Author contribution:

GMR: conceptualization, visualization, writing – original draft, writing – review & editing.

TMS: data curation, supervision, investigation.

RM, JC: methodology, writing – review & editing.

PMV: formal analysis, writing – original draft.

MXC: data curation, supervision, investigation, writing – original draft.

ASAM: data curation, investigation, writing – original draft.

CB, RCM: data curation, supervision, investigation, writing – original draft.

CLM: conceptualization, methodology, formal analysis, writing – original draft, writing – review & editing.

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