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Combined effects of gender, race, and occupational stressors on mental health

Efeitos combinados de gênero, raça e estressores ocupacionais na saúde mental

Abstract

Objective: analyze the isolated and combined effects of gender, race, and occupational stressors on the mental health of healthcare workers. *Methods*: cross-sectional study with a random sample of health workers in Bahia, Brazil. The primary exposure variables were gender, race, and occupational stressors, assessed using the Effort-Reward Imbalance (ERI) scale. The Self-Reporting Questionnaire (SRQ-20) measured common mental disorders (CMD), the outcome variable. The interaction measures were verified based on the additivity criterion by calculating the excess prevalence, excess prevalence ratio, and relative difference. *Results*: 3,343 workers participated, 77.9% were female. CMD prevalence was 21.7% higher among women, Black people, and those exposed to work stressors. Among Black women in a situation of ERI, the prevalence of CMD was three times higher compared with white men in a situation of balance (reference group). *Discussion*: black women workers accumulate social disadvantages and are more susceptible to occupations that require more significant effort and less reward. CMD prevalence was higher at the intersection of exposures. Combined effect of the factors exceeded the sum of the isolated effects, demonstrating an interaction between gender, race, and occupational stressors.

Keywords: gender; race; occupational stress; mental health; intersectionality; occupational health.

Resumo

Objetivo: *analisar os efeitos isolados e combinados do gênero, da raça e dos estressores ocupacionais sobre a saúde mental de trabalhadores e trabalhadoras da saúde.* Métodos: *estudo transversal com amostra aleatória de trabalhadores(as) da saúde da Bahia, Brasil. As variáveis de exposição principais foram: gênero, raça e estressores ocupacionais, avaliados por meio da escala de Desequilíbrio Esforço-Recompensa (DER). O Self-Reporting Questionnaire (SRQ-20) mensurou os transtornos mentais comuns (TMC), variável desfecho. As medidas de interação foram verificadas com base no critério da aditividade, pelo cálculo do excesso de prevalência, excesso de razão de prevalência e diferença relativa.* Resultados: *participaram 3.343 trabalhadores, 77,9% do sexo feminino. A prevalência de TMC foi 21,7% maior entre mulheres, negros e pessoas em situações de exposição aos estressores laborais. Entre as mulheres negras em situação de DER, a prevalência de TMC foi três vezes maior em relação aos homens brancos em situação de equilíbrio (grupo de referência).* Discussão: *trabalhadoras negras acumulam desvantagens sociais e estão mais suscetíveis a ocupações de maior esforço e menor recompensa. A prevalência de TMC foi superior na intersecção das exposições. O efeito combinado dos fatores excedeu a soma dos efeitos isolados, demonstrando interação entre gênero, raça e estressores ocupacionais.*

Palavras-chave: *gênero; raça; estresse ocupacional; saúde mental; interseccionalidade; saúde do trabalhador.*

Introduction

Gender and racial inequalities are structured differently in work characteristics and exposure to occupational risks throughout the life trajectories of men and women, whites and Blacks. These differences, in turn, can produce or worsen health problems[1]. Both gender and race determine social opportunities that define entry into the job market and structure different exposures to occupational stressors and physical and mental illness, such as common mental disorders (CMD)[2].

CMDs are characterized by symptoms such as insomnia, anxiety, fatigue, irritability, depressive mood, difficulty concentrating, and somatic complaints[3]. Although they do not constitute a specific diagnostic category, they correspond to criteria for disorders in the International Classification of Disease (ICD-10) and the Diagnostic and Statistical Manual (DSM)[4]. Therefore, they represent a serious public health problem due to their limiting nature of health and well-being and the high frequency in groups of workers in Brazil and around the world[5,6]. The literature has shown an association between occupational stressors and the occurrence of CMD among healthcare workers[2,5,6].

Occupational stressors, evidenced by the analysis of the psychosocial aspects of work, constitute exposures for mental illness[6,7]. Different instruments for measuring these aspects have been proposed, such as the Effort-Reward Imbalance (ERI) model, developed by Siegrist (1996)[8].

The ERI model assumes the centrality of the reciprocity of social relationships at work. According to the model, efforts can be equalized by the rewards received when performing activities. However, the imbalance between the efforts expended at work and the rewards received results in work stress. High efforts accompanied by low rewards are assumed to trigger negative emotions and responses sustained by stress. In contrast, the balance between efforts and rewards generates positive emotions promoting well-being, comfort, and health, as well as favoring satisfaction and pleasure in work activities[9].

The ERI allows the incorporation of aspects relating to the most recent economic and technological development, focusing on employment relations as a central element of labor relations. This model considers the consequences of economic globalization on the work environment, given the growth of insecure and precarious work, short-term contracts, and new forms of flexible employment arrangements[9]. The work context experienced by Brazilian workers is characterized by solid competition at work, precariousness, loss of rights, and a marked wage difference between men and women[10]. The ERI model is believed to be a powerful tool to highlight gender and racial inequalities related to work and employment conditions.

Several studies have demonstrated an association between ERI and the occurrence of CMD among workers[6,11]. Additionally, some results indicate a predominance of women and Black people in more stressful jobs, resulting in greater vulnerability[2,12] and exposure to mental illness in these groups[2,13] due to gender and racial inequalities. Traditionally, these two indicators of inequalities are analyzed in separate studies, with isolated assessments of their effects on health[1,14]. Similarly, studies of occupational stressors and health rarely include analysis of other dimensions, such as race and gender; when present, the discussion is restricted to confounding analysis for adjustment purposes[7,12,15]. Therefore, the joint analysis of these factors that, in isolation, have shown consistent results of association with adverse mental health events is still a gap to be explored. From this perspective, this study aimed to analyze the isolated and combined effects of gender, race, and occupational stressors on the mental health of healthcare workers.

Methods

Study design and context

Cross-sectional study with a random sample of health workers from basic and medium complexity public services (UPAS and specialized services) from six municipalities in Bahia. The data come from a multicenter research project to investigate the working, employment, and health conditions of health workers in Bahia, carried out in 2012.

Participants

The inclusion criteria were defined as effective professional practice and having worked at the unit for at least six months. After the draw, the workers were contacted at their workplace, with up to three visits being made for the interview to be performed. Those not found after three attempts, who refused to participate in the study, or who were on leave during the data collection period were excluded from the research.

Study size

The sample of the multicenter study was defined based on successive steps: 1) a nominal list of all workers in public health services of primary care and medium complexity of the six participating municipalities, totaling 6,693 workers; 2) the sample size was estimated based on the total population and different health outcomes (the most extensive sample size estimates were considered); 3) the sample was stratified into three levels: geographic area, level of care (basic and medium complexity care) and occupational group; 4) the sample size was estimated in each stratum, being drawn using a list of random numbers from EpiInfo 6.04; and 5) the workers to compose the sample.

The sample size required for analysis was estimated using the OpenEpi software, version 3.03a, to verify whether the data available in the multicenter study had the power to evaluate the analyses proposed in this study. The association data between ERI and CMD[6] were used as a parameter for the estimate: prevalence of CMD among those exposed of 26.9%, and 15.4% among those not exposed[7], confidence level of 95%, and study power of 90%. The minimum required sample was estimated at 573 workers. In this study, to enable the analysis of gender and race strata, 3,343 workers participating in the multicenter study were included.

Data collection and bias control

In each municipality, a local research team was formed, with university researchers, undergraduate research scholarship recipients and postgraduate students, and professionals from health services involved in the project responsible for conducting the study at the site. To standardize the methodological procedures adopted in each space, a Procedures and Conduct Manual was created, and workshops were held to train and prepare the team for data collection. A structured questionnaire was used, previously tested in a pilot study. The application of the collection instrument was operationalized as follows: 1) for higher education professionals: delivery of the self-administered questionnaire; 2) for other professionals with secondary or technical education, interviews were carried out using the same data collection instrument used with professionals with higher education.

Different strategies were adopted to reduce losses: 1. interview attempts in up to three visits to the workplace at different times;

2. in case of failure in the interview (absence or refusal), after three visits, the worker was replaced by another with similar characteristics: same geographical area, level of health service, occupational group, and sex. Considering the original sample, the sample number established for each stratum was obtained from this substitution procedure. The list of substitutions (extra list) was ordered immediately after establishing the initial study sample (also using the list of random numbers), limited to 20% of the total selected. After collection, the questionnaires were double-entered to evaluate possible inconsistencies and ensure the quality of the database.

Variables

This study focused, as an outcome, on common mental disorders (CMD) and, as primary exposures, gender, race, and occupational stressors. The covariates studied were sociodemographic characteristics (age, education, children, marital status, occupation, and income) and work characteristics (weekly working hours, type of employment status, satisfaction with work, and domestic overload).

Measurement

Gender was measured based on the answers given to the question about sex (male x female). The term "gender" was used to emphasize the fundamentally social character of distinctions based on sex, corresponding to a term to indicate a rejection of the biological determinism implicit in terms such as "sex" or "sexual difference"[16]. This study is based on the understanding of the social construction of gender, i.e., the distinction between cultural attributes allocated to each of the sexes (so-called feminine versus masculine characteristics), which guide social relationships, insertion in the job market, and patterns of illness[17,18]. In this research, we assume that the answer to the question "being a man or being a woman" corresponds to an acceptable indicator of position in the sexual division of labor and that this position establishes advantages and disadvantages concerning occupational stressors and the health situation.

Race was defined through self-reported color, respecting the self-declaration criteria, based on the standards used by the Brazilian Institute of Geography and Statistics (IBGE) and which appear on health information systems forms such as white, Black, brown(mixed-race), Asian, or Indigenous[19]. The responses were grouped into whites and Blacks/browns. National studies

often analyze Black and brown groups together, forming the Black stratum, due to the similarity of socioeconomic factors, cultural characteristics, and the fact that both face discrimination in Brazil[20]. Furthermore, combining the categories of Black and brown makes it possible to capture the vast majority of the population that identifies as Afro-Brazilian[21].

Those who declared themselves Asian or Indigenous represented a small percentage in the sample (2.6%), 44 Indigenous and 44 Asian, totaling 88 workers. Due to this quantity, these groups were not included in the interaction analyses. However, descriptively, data on sample composition and CMD estimates by race/color were kept in the analysis to give visibility to these groups that, in general, are not included in health and work studies. The presentation of these data aimed, above all, to draw attention to the need for study designs that can obtain representative samples of these populations.

Occupational stressors were measured using the Effort-Reward Imbalance (ERI)[8] scale. Effort refers to the demands of the work (quantitative and qualitative load involved in carrying it out). Work demands depend, in part, on the control structures established in organizations and the degree of social support provided by the work team. The greater the demand, the more effort it will take to meet it. The reward scale comprises three subscales: salary (financial reward), career promotion or job security (status-related reward), and esteem or recognition (socio-emotional reward). The ERI model hypothesizes that rewards moderate the negative effects of efforts, reducing levels of psychosocial stress. Excessive commitment to work is considered an intrinsic factor to the individual. This dimension is characterized by excessive effort, aiming for recognition and approval[9]. The interaction between excessive commitment and the ERI is harmful, exposing the worker to high levels of stress[22].

The reduced version of the ERI was used, including the effort (3 items), reward (7 items), and excessive commitment to work (6 items) scales, with Likert-type response options ranging from 1 to 4 points ("strongly disagree" to "strongly agree"). The scores for each scale are obtained by summing the responses to the corresponding items (effort varies from 3 to 12 points, reward varies from 7 to 28 points, and excessive commitment to work varies from 6 to 24 points)[23]. The ERI indicator is obtained using the following formula: ERI = e/(r*c), in which "e" refers to the sum of effort items, "r" corresponds to the sum of reward items, and "c" is a correction factor, considering the number of items in the numerator compared to the denominator. The results were categorized into "balance" (values < second tertile cutoff point) and "imbalance" (values ≥ second tertile cutoff point)[24]. A validation study concluded that the reduced version of the ERI questionnaire provides a psychometrically helpful tool for epidemiological studies focused on adverse effects on workers' health in a globalized economy. The reduced questionnaire version presented satisfactory psychometric properties (internal consistency of the scales, confirmatory factor analysis with a good fit of the data model with the theoretical structure). All scales and the effort-reward relationship were prospectively associated with an increased risk of mental health problems, indicating satisfactory criterion validity[23]. In the Brazilian context, two instrument validation studies showed good performance indicators[25,26].

Common mental disorders (CMD), the outcome variable, were assessed by the Self-Reporting Questionnaire (SRQ-20)—a self-administered instrument composed of 20 questions measured on a dichotomous scale (yes/no), proposed by the World Health Organization[3] for tracking mental disorders in developing countries. Its tracking nature is suitable for population studies and helps classify the mental health situation, presenting good performance indicators[27,28]. Seven or more positive responses were adopted for the level of suspicion of CMD among women, and five or more positive responses for men[29].

The domestic overload (DS) indicator was obtained from the sum of four basic domestic tasks, weighted by the number of residents in the residence, following the recommended formula (Domestic Overload) = (washing + ironing + cleaning + cooking) x (number of residents in the residence −1)[30,31]. The results were categorized into "high domestic overload" (values < second tertile cutoff point) and "low domestic overload" (values ≥ second tertile cutoff point)[32].

Data analysis

Initially, the absolute and relative frequencies of general and stratified sociodemographic, work, and occupational stressors characteristics were estimated by gender and race to explore the sexual and racial division of health work. Next, the prevalence of CMD was estimated, considering gender, race, and occupational stressors. At this stage, prevalences, prevalence ratios (PR), and 95% confidence intervals (95% CI) were calculated using Poisson regression with robust variation. The adjustment was made for the covariates of interest: age, education,

marital status, having children, employment status, weekly working hours, satisfaction with work, income, and occupation.

The interaction analysis involved the construction of dummy variables to define exposures. The distribution of CMD prevalence was analyzed according to the exposure groups investigated: 1. reference group (men, white, and in an E-R balance situation); 2. intersectional categories (gender exposure: white women in an E-R balance situation; race exposure: Black men in an E-R balance situation; ERI exposure: white men, in a stressful situation); and 3. combined intersectional categories (gender and race exposure: Black women in an E-R balance situation; race and ERI exposure: Black men in a stressful situation; gender and ERI exposure: white women in a stressful situation; and gender, race, and ERI exposure: Black women in stressful situation).

CMD prevalence was estimated separately and combined for each group of variables, taking the group with no exposure as a reference. Adjustment was performed for the covariates of interest. The interaction measures were verified based on the additivity criterion by calculating the excess prevalence (EP = $P_{exposure} - P_{no\ exposure}$) and excess prevalence ratio (EPR = PR − 1), which demonstrate whether the effect combined of the factors is greater than the sum of their isolated effects and the relative difference [(PR − 1 / EPR01 + EPR10) − 1],

which identifies the departure from the expected behavior for the isolated action of the factors. The formulas were adjusted, considering the analysis with three exposure factors[33]. Data analysis was performed with SPSS 24.0 and OpenEpi.

Ethical considerations

The requirements of Resolution 466/2012 and 510 of the National Health Council were respected, with approval from the Ethics Committee, under protocol number 081/2009 (CAE 0086.0.059.000-09) on November 30, 2009. All participants signed an informed consent form.

Results

The sample consisted of 3,343 people, predominantly women (77.9%), self-reported race/color as Black or brown (80.9%), up to 40 years of age (58%), technical, secondary, or primary education level (71.4%), without a partner (57.5%), and with children (69.6%). Regarding work characteristics, the majority had worked in their current job for more than five years (57.7%), had effective employment status (65.4%), had no other job (75.7%), maintained a total weekly working day of up to 40 hours (77.2%), and showed satisfaction with work (74.9%) **(Table 1)**.

Table 1 Sociodemographic, work characteristics, occupational stress, and common mental disorders (CMD) among healthcare workers. Bahia, Brazil. 2012 (n = 3,343)*

Characteristic	n	%
Sex		
Male	737	22.1
Female	2,597	77.9
Race/color		
White	539	16.4
Black/brown	2,655	80.9
Asian	44	1.3
Indigenous	44	1.3
Age		
Up to 40 years	1,925	58.0
Over 40 years	1,393	42.0
Education		
With higher education	940	28.6
No higher education	2,352	71.4
Marital Status		
With partner	1,413	42.5
Without a partner	1,915	57.5

(Continue)

Table 1   Continuation...

Characteristic	n	%
Has children		
Yes	2,311	69.6
No	1,011	30.4
Income		
Up to 2 MW**	1,864	67.7
More than 2 MW.	905	32.7
Occupation		
Physician	156	4.7
Nurse	227	6.8
Others with higher education	257	7.7
Nursing technicians	434	13.0
CHA/CEA***	1,035	31.1
Other for indirect assistance	1,223	36.7
Status		
Effective	2,166	65.4
Temporary	1,144	34.6
Weekly Journey		
Up to 40 hours	2,524	77.2
More than 40 hours	746	22.8
Satisfaction with work		
Yes	2,497	74.9
No	835	25.1
Domestic Overload		
Low	1,777	55.5
High	1,423	44.5
Occupational stress (Effort-reward balance)		
Balance	1,981	61.4
Imbalance	1,245	38.6
Common mental disorder		
No	2,537	78.3
Yes	702	21.7

* Response rates varied depending on the loss of information for the variables analyzed. **Minimum wage (MW) in force in 2012: 622.00. ***CHA: community health agents. CEA: community endemic disease agent.

More than a third of workers were in a situation of ERI (38.6%). Almost a quarter of the population (21.7%) was suspected of having CMD **(Table 1)**.

Gender and racial inequalities were explained in socioeconomic and work characteristics. Women and Black people had the worst social indicators: lower level of education, lower income, allocation to more exhausting jobs with less social recognition, and more significant domestic overload **(Table 2)**.

The exposure variables (gender, race, and occupational stressors) were independently associated with mental illness. The prevalence of CMD was higher among women (22.8%), among Black/brown people (22.4%), and among workers in a situation of ERI (32.0%). When adjusting for the covariates of interest, only exposure to ERI remained statistically associated with CMD (**Table 3**).

Table 2 Sociodemographic and work characteristics according to gender and race/color. Health workers. Bahia, Brazil. 2012 (n = 3,343)*

Characteristic	White Man (n=146)*	%	Black Man (n=577)*	%	White Woman (n=392)*	%	Black Woman (n=2,163)*	%	p-value**
Education									
With higher education	90	63.4	138	24.2	192	49.9	503	23.5	< 0.001
No higher education	52	36.6	433	75.8	193	50.1	1,633	76.5	
Age									
Up to 40 years	82	56.2	343	59.7	223	57.5	1,241	57.7	< 0.812
Over 40 years	64	43.8	232	40.3	165	42.5	909	42.3	
Marital Status									
With partner	60	41.4	231	40.2	163	41.8	928	43.0	< 0.667
Without a partner	85	58.6	344	59.8	227	58.2	1,231	57.0	
Children									
No	64	43.8	186	32.3	133	34.0	609	28.3	< 0.001
Yes	82	56.2	389	67.7	258	66.0	1,542	71.7	
Income									
Up to 2 MW ***	47	37.7	303	62.1	174	53.4	1,312	73.6	< 0.001
More than 2 MW.	79	62.3	185	37.9	152	46.6	470	26.4	
Occupation									
Physician	34	23.6	47	8.2	42	10.8	31	1.4	
Nurse	13	9.0	14	2.4	57	14.6	140	6.5	
Others with higher education	26	18.1	38	6.6	59	15.1	125	5.9	< 0.001
Nursing technicians	4	2.8	22	3.8	58	14.9	346	16.0	
CHA/CEA****	15	10.4	135	23.5	85	21.8	785	36.3	
Other for indirect assistance	52	36.1	575	55.5	89	22.8	733	33.9	
Weekly Journey									
Up to 40 hours	85	58.6	404	70.9	292	76.0	1,688	80.5	< 0.001
More than 40 hours	60	41.4	166	29.1	92	24.0	412	19.5	
Employment status									
Effective	63	44.4	364	63.6	211	54.4	1,494	69.6	< 0.001
Temporary	79	55.6	208	36.4	177	45.6	653	30.4	
Satisfaction with work									
Satisfied	108	74.0	424	73.5	302	77.6	1,618	74.9	< 0.526
Dissatisfied	38	26.0	153	26.5	87	22.4	542	25.1	
Domestic Overload									
Low	123	87.9	421	79.7	247	65.0	906	45.1	< 0.001
High	17	12.1	107	20.3	133	35.0	1,104	54.9	

* Response rates varied depending on the loss of information for the variables analyzed. **Pearson's chi-square test. ***Minimum wage (MW) in force in 2012: 622.00. ****CHA = community health agents. CEA = community endemic disease agent.

Table 3 Prevalences, prevalence ratios, and 95% confidence intervals for common mental disorders (CMD) according to gender, race, and occupational stress. Health workers, Bahia, Brazil, 2012 (n = 3,343)*

Exposure	CMD		Crude analysis		Adjusted analysis**	
	n	P(%)	PR	95% CI	PR**	95% CI**
Gender						
Men	129	18.0	-	-	-	
Women	575	22.8	1.26	1.06 ;1.50	1.11	0.90 ; 1.36
Race						
White	92	17.7	-	-		
Black/Brown	579	22.4	1.26	1.03 ; 1.54	1.13	0.89 ; 1.43
Asian	10	22.7	1.28	0.72 ; 2.28	1.51	0.84 ; 2.73
Indigenous	8	19.5	1.10	0.57 ; 2.11	1.35	0.70 ; 2.60
ERI						
Balance	302	15.7	-	-		
Imbalance	391	32.0	2.04	1.79 ; 2.33	1.89	1.61 ; 2.22

* Response rates varied depending on the loss of information for the variables analyzed.

**Measures adjusted for education, having children, employment status, weekly working hours, occupation, income, and domestic overload. P= prevalence; PR= prevalence ratio; 95%CI = 95% of Confidence Interval; ERI = Effort-Reward Imbalance

The prevalence of CMD varied between groups, considering the effects of a single exposure and combined exposures. White men in a situation of E-R balance (reference group) had a lower prevalence of CMD (10.1%). In contrast, the highest prevalence was observed among Black women in a stressful situation (a group simultaneously exposed to the three factors considered), reaching 33.1%, approximately three times that found in the reference group **(Table 4)**.

Table 4 Prevalence, prevalence ratios, and 95% confidence intervals for common mental disorders (CMD) according to intersectional categories of gender, race, and occupational stress. Health workers, Bahia, Brazil, 2012 (n = 3,012)*

Exposure	CMD				
	Crude analysis			Adjusted analysis**	
	P(%)	PR	95% CI	PR**	95% CI**
Reference					
Gender= 0, Race= 0, ERI= 0 (White men in E-R balance situation)	10.1	1.00	-	-	-
Intersectional categories					
Gender= 1, Race= 0, ERI= 0 (White women in E-R balance situation)	11.7	1.15	0.56 ; 2.36	0.93	0.43 ; 2.02
Gender= 0, Race= 1, ERI= 0 (Black men in E-R balance situation)	13.5	1.33	0.67 ; 2.61	1.14	0.55 ; 2.34
Gender= 0, Race= 0, ERI= 1 (White men in E-R imbalance situation)	23.3	2.30	1.01 ; 5.24	1.65	0.62 ; 4.37
Combined intersectional categories					
Gender= 1, Race= 1, ERI= 0 (Black women in E-R balance situation)	17.5	1.73	0.92 ; 3.26	1.26	0.64 ; 2.49
Gender= 0, Race= 1, ERI= 1 (Black men in E-R imbalance situation)	29.3	2.90	1.49 ; 5.59	2.16	1.05 ; 4.44
Gender= 1, Race= 0, ERI= 1 (White women in E-R imbalance situation)	32.4	3.20	1.65 ; 6.21	2.26	1.12 ; 4.69
Gender= 1, Race= 1, ERI= 1 (Black women in E-R imbalance situation)	33.1	3.27	1.74 ; 6.12	2.28	1.14 ; 4.45

* Response rates varied depending on the loss of information for the variables analyzed. **Measures adjusted for education, having children, employment status, weekly working hours, occupation, income, and domestic overload. P: prevalence; PR: prevalence ratio; 95%CI= 95% of Confidence Interval; ERI: effort-reward imbalance; 0 = Not exposed; 1= Exposed.

The analysis showed that white women in the E-R balance situation had a higher prevalence of CMD (11.7%) than white men in the same situation (10.1%). Black men, also in the E-R balance situation, had a higher prevalence of CMD (13.5%) than white women. There was a higher prevalence of CMD among white workers experiencing occupational stress (23.3%). However, no statistical significance was observed for the association measures between these intersectional categories and the occurrence of CMD after adjusting the model for the covariates of interest **(Table 4)**. However, among the exposures investigated separately, exposure to occupational stressors was noted as the one with the highest prevalence of CMD.

The combination of exposures showed a trend of increasing prevalence of CMD, as well as crude and adjusted prevalence ratios, compared to the reference group. The prevalence of CMD at the intersection of gender and race (17.5%) was higher than those exposed to these factors separately, although the level of statistical significance was not significant. The combination of race-occupational stressors, gender-occupational stressors, and gender-race-occupational stressors increased the prevalence of CMD to 29.3%, 32.4%, and 33.1%, respectively, at statistically significant levels **(Table 4)**. Additionally, the excess prevalence observed for the combined factors exceeded expected values, demonstrating an interaction between exposure factors **(Table 5)**.

Table 5 Excess prevalence, prevalence ratios, and relative differences for common mental disorders (CMD) according to intersectional categories of gender, race, and occupational stress. Health workers, Bahia, Brazil, 2012 (n = 3.083)

| Exposure | P(%) | Excess prevalence[a] | Excess Prevalence Ratio (EPR = PR − 1) | | Relative Difference[d] ((A/B) − 1) (%) |
			Observed (EPRO) (A)[b]	Expected based on separate exposures (B)[c]	
Reference					
Gender = 0, Race = 0, ERI = 0 (White men in E-R balance situation)	10.1	-	-	-	-
Intersectional categories					
Gender = 1, Race = 0, ERI = 0 (White women in E-R balance situation)	11.7	1.6	0.15	-	
Gender = 0, Race = 1, ERI = 0 (Black men in E-R balance situation)	13.5	3.4	0.33	-	
Gender = 0, Race = 0, ERI = 1 (White men in E-R imbalance situation)	23.3	13.2	1.30	-	
Combined intersectional categories					
Gender = 1, Race = 1, ERI = 0 (Black women in E-R balance situation)	17.5	7.4	0.73	0.48	52
Gender = 0, Race = 1, ERI = 1 (Black men in E-R imbalance situation)	29.3	19.2	1.90	1.63	16
Gender = 1, Race = 0, ERI = 1 (White women in E-R imbalance situation)	32.4	22.3	2.20	1.45	51
Gender = 1, Race = 1, ERI = 1 (Black women in E-R imbalance situation)	33.1	23.0	2.27	1.78	27

[a] $(P_{exposure} - P_{no\ exposure})$.

[b] Observed excess prevalence ratio (EPR = PR − 1).

[c] Expected excess prevalence ratio based on separate exposures = $EPRO^{01} + EPRO^{10}$.

[d] Relative difference $(R_{11} - 1/(EPR_{01} + EPR_{10}) - 1)$.

P: prevalence; ERI: effort-reward imbalance.

0 = Not exposed; 1 = Exposed.

The calculations were adapted to evaluate the interaction between three exposures[33].

The relative difference between the combined prevalence estimates (including simultaneous exposures of gender, race, and ERI) indicated a departure from the expected behavior for the independent action of the factors, according to additive models, with values of 52% for Black women in E-R balance situation; 16% for Black men experiencing occupational stress; 51% for white women in a situation of occupational stress and 27% for Black women in a situation of occupational stress. The additivity interaction was noted to be more significant when exposure to gender was present and combined with race **(Table 5)**.

Discussion

The prevalence of CMD was higher among women, Black people, and people experiencing work stress. The three exposure factors, when combined, resulted in a higher prevalence of CMD, being almost three times higher among Black women in ERI compared with white men in a balanced situation.

Our results support the literature highlighting the greater participation of women in the health sector and the predominance of the Black/brown population in the region where the study was conducted. There is a reproduction of tasks that occur in the domestic sphere, with professions focused on care, resulting from the female stereotype socially constructed and reproduced in the world of work[34], especially health work, where female participation is significant in professions linked to direct assistance to users (e.g., nursing, nursing technicians, and community health agents). The Black and brown race/color, in turn, represented 80.9% of the sample compatible with the population investigated. Official data from the state of Bahia highlights that Black and brown people correspond to 81.1% of the state's population, responsible for 81.6% of the workforce in 2019[35].

Despite the predominance of women and Black people in the sample studied, the sexual and racial division of work contributes to asymmetries in the distribution of power, access to professional qualifications, and opportunities for career advancement[17,36]. White workers, in general, are in more valued work positions involving higher salaries, less exposure to stressors, and broader possibilities for managing stressful situations—factors that can contribute to the quality of life and mental health[2]. The results found in this study support this condition: white workers had a higher level of education and higher income. In addition, they more frequently occupied professions with greater social prominence, recognition, and remuneration, such as higher education occupations and higher valorization (such as medicine), compared with other groups. These characteristics may represent advantageous conditions capable of protecting mental health at work. Our results strengthen this hypothesis since the lowest prevalence of CMD was observed in this group (taken as a reference).

Thus, greater female vulnerability to CMD has been described in the literature[2,5,37]. As evidenced in the results, women, regardless of race, face more precarious working conditions, which are characterized by occupations with low social value, lower pay, few chances of career promotion, and low control over their work. These unfavorable situations are associated with double working hours due to domestic overload, in which activities such as cleaning the house, washing, cooking, and caring for children and older people are culturally imposed on them. Simultaneous exposure to paid and domestic work increases the total working day, maintains exposure to stressful factors for a more extended period, and compromises wear-recovering activities (rest time, leisure, and self-care)[32]. The data found in this study of higher percentages of high domestic overload among women, especially among Black women, show that entering paid work did not reduce responsibilities for domestic activities and family care. Thus, the length of the working day (indicated as a gender difference) may contribute to the maintenance of inequalities in the observed health indicators.

The greater exposure to high domestic overload among Black women may be due to lower income and worse living and housing conditions, elements that contribute to increasing the time allocated to domestic work, as they restrict potential resources to assist in carrying out these activities. For these women, the total working hours increase significantly[32]. Therefore, it is necessary, especially for Black workers, to reduce the free time available to take care of themselves and to practice leisure activities that can alleviate the negative impacts of work on physical and mental health[2]. This fact is evidenced by the more significant domestic burden and higher prevalence of CMD among them.

In work situations with less exposure to occupational stressors, race alone resulted in more significant harm to mental health than gender. In this study, there was a clear gap between white people and Black people concerning mental

illness. The higher prevalence of CMD among Black people may be associated with the structural racism characteristic of our society and health institutions, relegating the Black population to the most precarious jobs, with exhausting and less rewarding demands[1,2]. A lower income, lower education, and greater participation in more exhausting occupations were observed among Black workers. In this way, these workers may have less access to social resources, which could promote improvements in living conditions, health, and professional advancement, feeding back into a vicious cycle of racial and social inequality.

Exposure to ERI alone increased the prevalence of CMD among white workers. The recurring experience that effort is not adequately rewarded deteriorates the worker's self-esteem, generates a feeling of humiliation, and negatively impacts mental health[38].

Although white workers, historically, occupy more balanced work positions, it is worth drawing attention to the general context of precarious work, which, in the current economic development model, is characterized by situations of solid competition, loss of social rights and labor, and constant fear of unemployment that subject this group of workers to accept experiences of high effort and low reward to keep their jobs and chances of career advancement. To gain experience and progress in their career, some workers agree to submit to unfair working conditions. While this has been called "strategic choice"[9], the general precariousness of work has limited the success of this strategy since the progression and stabilization of favorable conditions always becomes something to be achieved in the future—a future that never arrives. The high prevalence of CMD for white men in a situation of ERI may be pointing to the failure of this strategy.

Despite a strong association between situations of ERI and CMD, the joint analysis of exposures demonstrated that the accumulation of social disadvantages resulted in greater vulnerability to stress and mental illness. The results reinforce the gender-race intersection as a structure of health inequities. Therefore, their effects must be analyzed together[1,14].

Unlike what was observed among workers in the E-R balance situation, there was a higher occurrence of CMD among women in a stressful situation, regardless of race, than among Black men in the same category. More studies are needed to understand better the differences in exposure to occupational stress between white women and Black men and its impacts on mental health. One of the aspects that can be explored to understand better these results is related to the analysis of new factors, which may play an essential role in determining inequalities and disadvantages in the world of work and which were not included in this study, such as social class, for example. The inclusion of this dimension is particularly relevant considering that workers with a more significant accumulation of social disadvantages are more susceptible to unfair contractual transactions, as the risks of rejecting them are low due to having no choice and depending on work for their subsistence, characterizing an experience of 'dependency,' in which the failure in the reciprocity of labor relations is clearly noticeable. On the other hand, workers in a better social position enjoy the possibility of 'choosing,' strategically, to submit to a condition of high effort in exchange for a low reward for a certain period, aiming to progress in their career and, in the future, enjoy a situation more favorable employment[9].

Black women presented the worst social indicators concerning the other strata: lower level of education, lower income, occupying more exhausting jobs with less social recognition, in addition to being exposed to more significant domestic overload. These variables are closely related and reflect class and power relations. Educational level influences personal aspirations, self-esteem, and the search for new knowledge, which can result in healthier attitudes and behavior. A better education level increases the possibility of choices in life, and for these reasons, it is directly related to mental health. Furthermore, the level of education reflects the qualifications of individuals to carry out certain occupations and, in this way, influences socioeconomic conditions and insertion in the job market. Income, in turn, provides access to better living and housing conditions, which can reduce household burdens. On the other hand, insecurity and stress generated by the lack of money are factors associated with mental illness[39]. Our findings support results found in a population-based study, which indicated a higher prevalence of CMD among women, black people, individuals with a low educational level, and lower income[13].

Gender-race intersectionality revealed how Black women are more strongly positioned in spaces of social vulnerability, which will make them more susceptible to occupational stress and mental illness. The overlapping of oppressions intertwines a complex web of inequality that is socially reproduced and maintained, making their bodies more frequently ill[40].

This study presents contributions whose originality can be identified in the approach to multiple situations that determine disadvantages and inequalities in mental health conditions, allowing deepened knowledge about social vulnerability, occupational stressors, and mental illness. However, it is also necessary to consider its limitations. The first refers to the types of biases characteristic of cross-sectional studies, such as memory bias, healthy worker bias, and reverse causality. This study design does not allow us to follow the life trajectory and consider the role of each exposure factor over time. Another limitation refers to the small number of male workers, mainly white men, a fact that made more robust and precise analyses impossible. However, the sample size previously established for each stratum was exceeded, considering the percentage distribution of groups by sex, occupation, and level of complexity of services. Concerning possible selection biases due to the inclusion of a more significant number of workers than the established minimum sample size, it is noteworthy that the inclusion considered the percentage of workers in the target population strata. The methodological procedures adopted in the selection process and the limitation of the replacement list to a maximum of 20% of the total were measures intended to guarantee this representativeness.

Despite the limitations, this study made it possible to advance the intersectional analysis of exposure factors, especially gender and race, since studies of health inequalities rarely consider joint assessment of vulnerabilities. The relevance of considering intersectionality in analyzing inequities in workers' health is highlighted, which makes it possible to highlight the effect of the accumulation of disadvantages on mental health.

Final remarks

This study showed a higher prevalence of CMD among women, Black people, and workers in situations of occupational stress. The combination of factors increased the prevalence of CMD concerning isolated exposures, confirming the existence of an interaction between exposures. Black women in situations of occupational stress were more socially vulnerable as they accumulated social disadvantages, which culminate in greater exposure to mental illness.

The pertinence and relevance of analyzing gender and race together are confirmed. Intersectionality, in this sense, allows us to access health inequities in more detail concerning the relationship between occupational stress and mental health, in addition to how these inequities can increase or be reduced through the intersection.

Finally, it is necessary to expand discussions on factors associated with mental illness, incorporating the social class dimension into the analyses together with gender and race. Studies from this perspective can explain the differences perceived between white women and black men when exposed, or not, to occupational stressors and deepen knowledge about the interaction between gender, race, and social class in the production and reproduction of social inequalities in health.

References

1. Smolen JR, Araújo EM, Oliveira NF, Araújo TM. Intersectionality of Race, Gender, and Common Mental Disorders in Northeastern Brazil. Ethn Dis. 2018;28(3):207-14.

2. Campos FM, Araújo TM, Viola DN, Oliveira PCS, Sousa CC. Estresse ocupacional e saúde mental no trabalho em saúde: desigualdades de gênero e raça. Cad Saude Colet. 2020;28(4):579-89.

3. Organização Mundial da Saúde. Relatório Mundial da Saúde. Saúde mental: nova concepção, nova esperança [Internet]. Lisboa, 2002. [Cited 2023 Nov 21]. Available from: https://apps.who.int/iris/bitstream/handle/10665/42390/WHR_2001_por.pdf?sequence=4

4. Carmo MBB, Santos LM, Feitosa CA, Fiaccone RL, Silva NB, Santos DN, et al. Screening for common mental disorders using the SRQ-20 in Brazil: what are the alternative strategies for analysis? Rev Bras Psiquiatr. 2018;40(2):115-22.

5. Sousa CC, Araújo TM, Lua I, Gomes MR, Freitas KS. Insatisfação com o trabalho, aspectos psicossociais, satisfação pessoal e saúde mental de trabalhadores e trabalhadoras da saúde. Cad Saude Publica. 2021;37(7):e00246320.

6. Oliveira AMN; Araújo TM. Situações de desequilíbrio entre esforço-recompensa e transtornos mentais comuns em trabalhadores da atenção básica de saúde. Trab Educ Saude. 2018;16(1):243-62.

7. Araújo TM, Siegrist J, Moreno AB, Fonseca MJM, Barreto SM, Chor D, et al. Effort-Reward Imbalance, Over-Commitment and Depressive

Episodes at Work: Evidence from the ELSA-Brasil Cohort Study. Int J Environ Res Public Health. 2019;16(17):3025.

8. Siegrist, J. Adverse health effects of high- effort – low reward conditions at work. J Occup Health Psychol. 1996;1(1):27-41.

9. Siegrist J, Wahrendorf M. Work stress and health in a globalized economy: The model of 'effort'-'reward' imbalance. Cham: Springer; 2016.

10. International Labour Office. World Employment and Social Outlook: Trends 2017. Geneva; 2017.

11. Pinhatti EDG, Ribeiro RP, Soares MH, Martins JT, Lacerda MR, Galdino MJQ. Aspectos psicossociais do trabalho e distúrbios psíquicos menores na enfermagem: uso de modelos combinados. Rev. Latino-Am. Enfermagem. 2018;26:e3068.

12. Mattos AIS, Araujo TM, Almeida MMG. Interação entre demanda-controle e apoio social na ocorrência de transtornos mentais comuns. Rev Saude Publica. 2017;51(0);48.

13. Moraes RSM, Silva DAS, Oliveira WF, Peres MA. Social inequalities in the prevalence of common mental disorders in adults: a population-based study in Southern Brazil. Rev bras epidemiol. 2017;20(01):43-56.

14. Warner DF, Brown TH. Understanding how race/ethnicity and gender define age-trajectories of disability: an intersectionality approach. Soc Sci Med. 2011;72(8):1236-48.

15. Sousa CC, Araújo TM, Lua I, Gomes MR. Occupational stress and job dissatisfaction with health work. Psicol Reflex Crit. 2019;32(1):18.

16. Scott J. Gender: a useful category of historical analyses. Gender and the politics of history. Nova York: Columbia University Press; 1989.

17. Hirata H. Gênero, patriarcado, trabalho e classe. TN. 2018;16(29):14-27.

18. Kergoat D. Da divisão do trabalho entre os sexos. Tempo Social. 1989;1(2):73-103.

19. Brasil. Ministério da Saúde. Política Nacional de Saúde Integral da População Negra: uma política para o SUS. 3a ed. Brasília, DF: Editora do Ministério da Saúde; 2017.

20. Osório RG. O Sistema Classificatório de Cor ou Raça do IBGE. Instituto de Pesquisa Econômica Aplicada. Brasília, DF: IPEA; 2003.

21. Maio MC, Monteiro S, Chor D, Faerstein E, Lopes CS. Cor/raça no Estudo Pró- Saúde: resultados comparativos de dois métodos de autoclassificação no Rio de Janeiro, Brasil. Cad Saude Publica. 2005;21(1):171-80.

22. Araújo TM, Sousa CC, Siegrist J. Stressful work in primary health care and mental health: the role of gender inequities in Brazil. Am J Ind Med. 2022;65(7):604-12.

23. Leineweber C, Wege N, Westerlund H, Theorell T, Wahrendorf M, Siegrist J. How valid is a short measure of effort-reward imbalance at work? A replication study from Sweden. Occup Environ Med. 2010 Aug;67(8):526-31.

24. Montano D, Li J, Siegrist J. The measurement of Effort-Reward Imbalance (ERI) at work. In: Siegrist J, Wahrendorf M, editors. Work Stress and Health in a Globalized Economy: The Model of 'Effort'-'Reward' Imbalance. Basel: Springer; 2016. p. 21-42.

25. Chor D, Werneck GL, Faerstein E, Alves MGM, Rotenberg L. The Brazilian version of the effort-reward imbalance questionnaire to assess job stress. Cad Saude Publica. 2008;24(1):219-24.

26. Silva, LS, Barreto SM. Adaptação transcultural para o português brasileiro da escala effort-reward imbalance: um estudo com trabalhadores de banco. Rev Panam Salud Publica. 2010;27(1) 32-6.

27. Santos KOB, Carvalho FM, Araújo TM. Internal consistency of the Self-Reporting questionnaire-20 in occupational groups. Rev Saude Publica. 2016;50(6):1-10.

28. Abbas RA, Hammam RA, El-Gohary SS, Sabik LM, Hunter MS. Screening for common mental disorders and substance abuse among temporary hired cleaners in Egyptian Governmental Hospitals, Zagazig City, Sharqia Governorate. Int J Occup Environ Med. 2013;4(1):13-26.

29. Santos KOB, Araújo TM, Pinho OS, Silva ACC. Avaliação de um instrumento de mensuração de morbidadepsíquica: estudo de validação do self-reporting questionnaire (SRQ-20). Rev Baiana Saúde Pública. 2010;34(3):544-60.

30. Thierney D, Romito P, Messing, K. She ate not the bread of the idleness: exaustion is related to domestic and salaries working conditions among 539 Québec hospital workers. Women Health. 1990;16(1):21-42.

31. Aquino EML. Gênero, trabalho e hipertensão arterial: um estudo de trabalhadoras de enfermagem em Salvador, Bahia [tese]. Salvador: Universidade Federal da Bahia; 1996.

32. Pinho OS, Araújo TM. Associação entre sobrecarga doméstica e transtornos mentais comuns em mulheres. Rev Bras Epidemiol. 2012;15(3):560-72.

33. Ferrite S, Santana V. Joint effects of smoking, noise exposure and age on hearing loss. Occup Med. 2005;55(1):48-53.

34. Barbosa RHS, Menezes CAF, David HMSL, Bornstein VJ. Gender and healthcare work: a critical view of community health agents' work. Interface. 2012;16(42):751-65.

35. Bahia. Panorama socioeconômico da população negra da Bahia. Textos para discussão, nº 17 [Internet]. Salvador; 2020 [Cited 2022 Sep 30]. Available from: http://www.sei.ba.gov.br/images/publicacoes/download/textos_discussao/texto_discussao_17.pdf.

36. Miguel LF. Voltando à discussão sobre capitalismo e patriarcado. Rev. Estud. Fem. 2019;25(3):1219-37.

37. Quinn MM, Smith PM. Gender, Work, and Health. Ann Work Expo Health. 2018;62(4):389-92.

38. Rugulies R, Aust B, Madsen IEH. Effort-reward imbalance at work and risk of depressive disorders. A systematic review and meta-analysis of prospective cohort studies. Scand J Work Environ Health 2017;43(4):294-306.

39. Ludermir AB, Melo Filho DA. Condições de vida e estrutura ocupacional associadas a transtornos mentais comuns. Rev Saude Publica. 2002;36(2):213-21.

40. Akotirene C. Interseccionalidade. São Paulo: Jandaíra; 2020.

Authors' contributions

Sousa CC and Araújo TM participated in the design of the project, collection, and analysis of data until the writing and final approval of the text for publication and assume responsibility for all aspects of the study, ensuring that those related to the accuracy or integrity of any part of the study were appropriately investigated and resolved.

Data availability

The entire dataset supporting the results of this study is available upon request from the corresponding author.