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Physical intimate partner violence and dietary patterns in pregnancy: a Brazilian cohort

Violência física por parceiro íntimo e padrão de alimentação na gestação: uma coorte brasileira

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Abstract *Little is known about the repercussions of intimate partner violence (IPV) on nutritional outcomes in pregnancy, especially regarding diet. The aim was to investigate whether the occurrence of physical IPV at any time during pregnancy is associated with gestational dietary patterns. 161 adult pregnant women were enrolled in a prospective cohort study in Rio de Janeiro, Brazil. Overall and severe physical IPV were measured to evaluate IPV at any time during pregnancy. Three gestational dietary patterns ("Healthy", "Common-Brazilian", and "Processed") were established by principal component analysis. The effect of physical IPV was tested in relation to the score of adherence to each of the dietary patterns. The occurrence of overall and severe physical IPV at any time during pregnancy was 20.4% and 6.8%, respectively. Women living in intimate relationships in which overall and severe physical IPV occurred had an average increase of 0.604 units (95%CI 0.149-1.058) and 1.347 units (95%CI 0.670-2.024), respectively, in the Processed dietary pattern adherence score. No association with "Healthy" and "Common-Brazilian" dietary patterns was observed. Physical IPV was associated with greater adherence to a dietary pattern of lower nutritional quality.*

Key words *Nutrition, Intimate partner violence, Pregnancy, Cohort studies*

Resumo *Pouco se sabe sobre as repercussões da violência por parceiro íntimo (VPI) nos desfechos nutricionais da gravidez, principalmente no que diz respeito à dieta. O objetivo foi investigar se a ocorrência de VPI física na gestação está associada aos padrões alimentares gestacionais. 161 gestantes adultas participaram de um estudo prospectivo no Rio de Janeiro, Brasil. A VPI física geral e grave foi medida para avaliar a VPI a qualquer momento durante a gravidez. Três padrões alimentares gestacionais ("Saudável", "Brasileiro Comum" e "Processado") foram estabelecidos pela análise de componentes principais. O efeito da VPI física foi testado em relação ao escore de adesão a cada um dos padrões alimentares. A ocorrência de VPI física geral e grave em qualquer momento da gestação foi de 20,4% e 6,8%, respectivamente. Mulheres que viviam em relacionamentos íntimos em que ocorreu VPI física geral e grave tiveram um aumento médio de 0,604 unidades (IC95% 0,149-1,058) e 1,347 unidades (IC95% 0,670-2,024), respectivamente, no escore de adesão ao padrão alimentar processado. Não foi observada associação com os padrões alimentares "Saudável" e "Brasileiro Comum". A VPI física foi associada à maior adesão a um padrão alimentar de menor qualidade nutricional na gestação.*

Palavras-chave *Nutrição, Violência por parceiro íntimo, Gravidez, Estudos de coorte*

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Introduction

Pregnancy is characterized by psychological and social behavioral changes in the entire family. Stressful situations, such as exposure to violent environments, during this stage may influence pregnant women's dietary behavior and health in the prenatal and postnatal periods, potentially leading to low birth weight in newborns[1] and perinatal death[2-4]. Violence in the domestic environment can be perpetrated by a family member, the pregnant woman's intimate partner, or the pregnant woman against her partner[5]. Intimate partner violence (IPV) is defined as the intentional use of physical force or power, threatened or actual, against an intimate partner, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation[6].

The prevalence of IPV during pregnancy varies widely in the literature. An international study with data from 19 United Nations member countries estimated that physical and/or sexual IPV during pregnancy varied from 2.0% in Australia to 13.5% in Uganda[7]. Regional methodological and cultural differences are indicated as the main explanations for these variations[7]. In Brazil, a representative national survey of 6,774 non-pregnant women living in 15 state capitals and the Federal District estimated that the prevalence of physical IPV ranged between 13.2% and 34.8% in the cities surveyed[8].

IPV during pregnancy can give rise to diverse negative reactions in pregnant women, such as anxiety symptoms and postnatal depression[9,10], vaginal infection, and spontaneous preterm labor[11], as well as giving rise to dietary disorders[12]. There is still a paucity of studies in the literature concerning the association between IPV and nutritional outcomes, in particularly with regard to diet. The existing literature shows a positive association between the occurrence of IPV during pregnancy and insufficient weight gain at the end of pregnancy[2,13,14]. This evidence indicates that malnutrition resulting from the occurrence of IPV impacts maternal health directly and indirectly on the child's health[15], which may lead to intrauterine growth restriction[16], delayed psychomotor development[17], and immune system deficiency[18]. To the best of our knowledge, there is no study in the literature that has investigated the repercussions of IPV on dietary patterns, especially during pregnancy.

In the present study, we aimed to investigate whether the occurrence of physical IPV at any time during pregnancy is associated with gestational dietary patterns among adult pregnant women attending a public health center in Rio de Janeiro, Brazil. We hypothesized that the occurrence of physical IPV results in higher adherence to a pattern of lower nutritional quality.

Methods

Design and participants

This was a prospective cohort study with low-risk adult pregnant women attending an antenatal clinic at a municipal health center in Rio de Janeiro, Brazil. Pregnant women were recruited between November 2009 and October 2011, when they accessed the antenatal service for the first time or during the immune-positive pregnancy test. The study protocol comprised three visits during pregnancy, 5th-13th (baseline), 24th-26th and 34th-36th weeks, and one between 30 and 45 days after childbirth. All interviews were conducted at the primary care facility, in a room designated for the study. Interviews were scheduled beforehand (except the recruitment interview) and were carried out face to face in a standardized manner by trained interviewers.

All pregnant women attending the health center were approached, and those who met the following inclusion criteria were invited to take part in the study: i) being between 5 and 13 weeks of gestational; ii) being between 20 and 40 years of age; iii) not having chronic diseases (except obesity) or infectious diseases; iv) present a singleton pregnancy; v) living in the health center's catchment area, and vi) having antenatal follow-up at the study center.

A total of 299 pregnant women agreed to participate. After the first trimester clinical evaluation, 45 women were excluded due to a confirmed prepregnancy diagnosis of chronic (n=12) and infectious disease (n=9), gestational age >13 weeks at the baseline visit (n=15), declined prenatal care or were transferred to other units (n=5), or twin pregnancy (n=4). Thus, the first trimester sample comprised 254 eligible pregnant women. Over the study period, 25 miscarriages and five stillbirths were recorded, resulting in an initial sample of 224 pregnant women. There were 33 losses on the second trimester visit, four of whom were recovered at the third trimester appointment. Finally, data on dietary intake were incomplete in six cases, and the interview on IPV was missing an additional 28

cases. The final cohort with complete data in the third trimester comprised of 161 pregnant women (63.4% of the eligible participants) (Figure 1).

Ethical approval

This study was conducted according to the guidelines laid down in the Declaration of Helsinki, and all procedures involving research study participants were approved by the Research Ethics Committee of the Institute of Psychiatry of the Federal University of Rio de Janeiro (Certification of Submission for Ethical Appraisal - CAAE No. 0012.0.249.000-09; dated on 04/08/2009) and the Ethics Committee of the Municipal Secretary of Health of the city of Rio de Janeiro (CAAE No. 0139.0.314.000-09; dated on 13/08/2009). Written informed consent was obtained from all participants before the study.

Intimate partner violence

The Portuguese version of the Conflict Tactics Scales (CTS-1)[19] was administered at the 34th-36th gestational weeks to retrospectively evaluate physical IPV occurrence at any time during pregnancy. CTS-1 evaluates strategies used by couples to solve possible disagreements and, indirectly, capture situations of IPV. The scale comprised of 18 items covering three tactics for dealing with conflicts: i) negotiation, consisting of the use of discussion, using moderate and reasonable language (items a-c); ii) verbal aggression, characterized by use of insults and threats with the intention of symbolically hurting and attacking the other person (items d-f, h-j); iii) "physical violence", use of physical force to deal with conflicts. Physical violence has two subscales, minor physical violence (characterized by the use of physical force on objects or on the victim, such as seizing/pushing/slapping; items k-m), and severe physical violence (characterized by use of physical force on the victim with the possibility of resulting in physical harm or which leaving the victim unable to carry out mechanical tasks, such as beating/burning/strangling; items n-s). All the questions on tactics used to deal with the couple's conflicts were answered by the pregnant women,

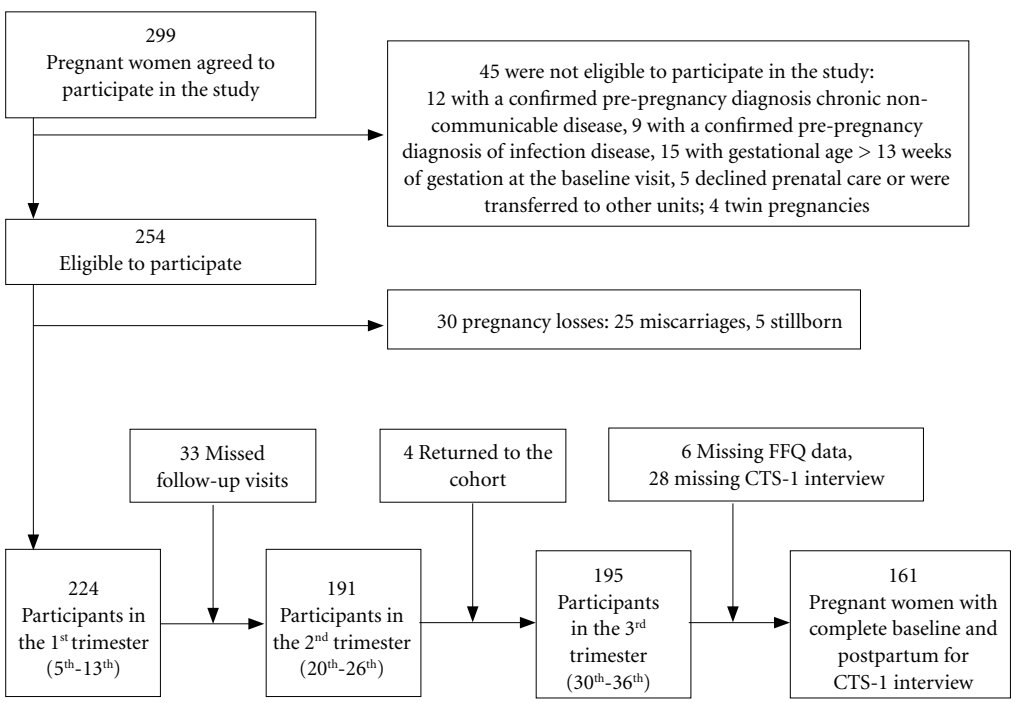

Figure 1. Flow chart of exclusion criteria of the study.

Note: FFQ, food frequency questionnaire; CTS-1: Conflict Tactics Scales.

Source: Authors.

replying first about the reactions of their intimate partners in conflict situations, and then replying about their own reactions in these situations. All the questions had the following response options: sometimes reacted like that; often reacted like that; reacted like that in the past, but not in recent months; never reacted like that. The first two options were considered "yes" regarding the occurrence of IPV.

The evaluated outcomes were i) overall physical IPV, which consists of practicing at least one act of IPV (minor or severe) on the physical violence scale, and ii) severe physical IPV. IPV was considered present when there was a positive reply to at least one of the questions, whether the woman was the victim or the perpetrator.

Dietary patterns

Gestational dietary habits were assessed using a semi-quantitative food frequency questionnaire (FFQ) administered at the 34th-36th weeks of gestation covering the last 6 months of pregnancy. This instrument consisted of 82 food items with eight frequency options: >3 times/day, 2-3 times/day, 1 time/day, 5-6 times/week, 2-4 times/week, 1-3 times/week, never or hardly ever[20]. Three dietary patterns were previously derived using principal component analysis[21]: "Healthy" characterized by milk, dairy products, fruit, fruit juice, green vegetables and pulses (chickpeas and lentils), fresh fish, cakes and biscuits, and "mate" tea; "Common-Brazilian" characterized by rice, beans, onion, garlic, sweet pepper, eggs, bread, butter, and margarine; and "Processed" characterized by chicken and pork meats, sweets, pasta, root and tuber vegetables, snacks (pizzas and savory snacks), processed meats and sodas, and lower consumption of coffee and red meat. Each pregnant woman was given a score for her adherence to each of the three dietary patterns identified. Negative scores indicate less adherence while positive scores indicate more adherence.

For descriptive analysis, the women were classified in a specific pattern only. High adherence to each dietary pattern was classified according to the score's quintiles. When women were classified in the fifth quintile of a specific dietary pattern, they were considered to have high adherence for that pattern. In cases when a pregnant woman was classified in the fifth quintile of two patterns, she was kept in the pattern with the highest score[22].

Socioeconomic, demographic and behavioral variables

Socioeconomic, demographic, obstetric and behavioral information were collected using a standardized questionnaire applied at the baseline interview. The following information was included in the analysis: age (years), schooling (years of formal completed education), total per capita family income (in US$), alcohol consumption (yes, no), and current smoking habit (yes, no).

Psychiatric assessment

Psychiatric interviews were conducted using the Mini International Neuropsychiatric Interview (MINI) (DSM-IV; version 5.0.0)[23], an instrument with a standard model of a brief (15-30 min) structured interview for the evaluation of the presence of Axis I psychiatric disorders according to the Diagnostic and Statistical Manual of Mental Disorders[24]. This instrument is divided into modules (A-P), each containing questions that represent different psychiatric disorders. The participants must answer yes or no to each of the questions. All women were interviewed at the study baseline. The interviews were performed by a psychiatry resident and graduate students in mental health (Master's and PhD students) who were trained for this purpose. In the present study, we used the data relating to major depression (yes, no) and generalized anxiety (yes, no).

Statistical analyses

The baseline characteristics of the study cohort were described using means and standard deviations or medians and 95% confidence intervals. The categorical variables were described by absolute numbers and frequencies. These variables were stratified according to the established dietary patterns identified on the basis of the greater adherence to each dietary pattern. ANOVA was used to test for differences between mean values of the variables, while the Chi-square or Fisher's test ($n<5$) was used to compare the frequencies of the categorical variables.

Crude and adjusted linear regression models were performed to test for the association between the occurrence of overall and severe physical IPV during pregnancy and the scores of adherence to each of the dietary patterns. For these analyses, all pregnant women were considered in each dietary pattern. ß coefficients, 95% confi-

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dence intervals (95%CI) and Wald heterogeneity test *p* values were calculated using a <5% statistical significance level.

To identify confounding factors for the complete adjusted model, we created a Directed Acyclic Graph (DAG) – a technique that represents hypothetical causal relationships between variables, allowing the identification of the minimum but sufficient set of covariates to remove confounding factors from the statistical analysis and help avoid inappropriate adjustments[25]. In the present investigation, the following variables were included in the adjusted models according to the DAG results: age, per capita family income, schooling, first trimester current alcohol consumption, first trimester tobacco smoking, major depression, and generalized anxiety (Figure 2).

Furthermore, we performed analyses of women included in the current analyses and those excluded to assess the effects of losses of follow-up using Student's t-test or Kruskal Wallis and chi-square test of proportions for selected sociodemographic variables (age, per capita family income, schooling, first trimester current alcohol consumption, first trimester tobacco smoking, major depression, and generalized anxiety) with the aim of ruling out possible selection bias. All statistical analyses were performed using Stata 15.0® (Stata Corp., College Station, Texas, USA).

Results

The mean age of the 161 pregnant women included in the study was 26.7 (SD=5.4) years, schooling was 8.6 years (SD=2.9), and the median total per capita family income was US$ 263.9 (95%CI 137.5-687.8). Alcohol consumption was reported by 15.5% and current smoking habits were reported by 5.0%. Major depression was

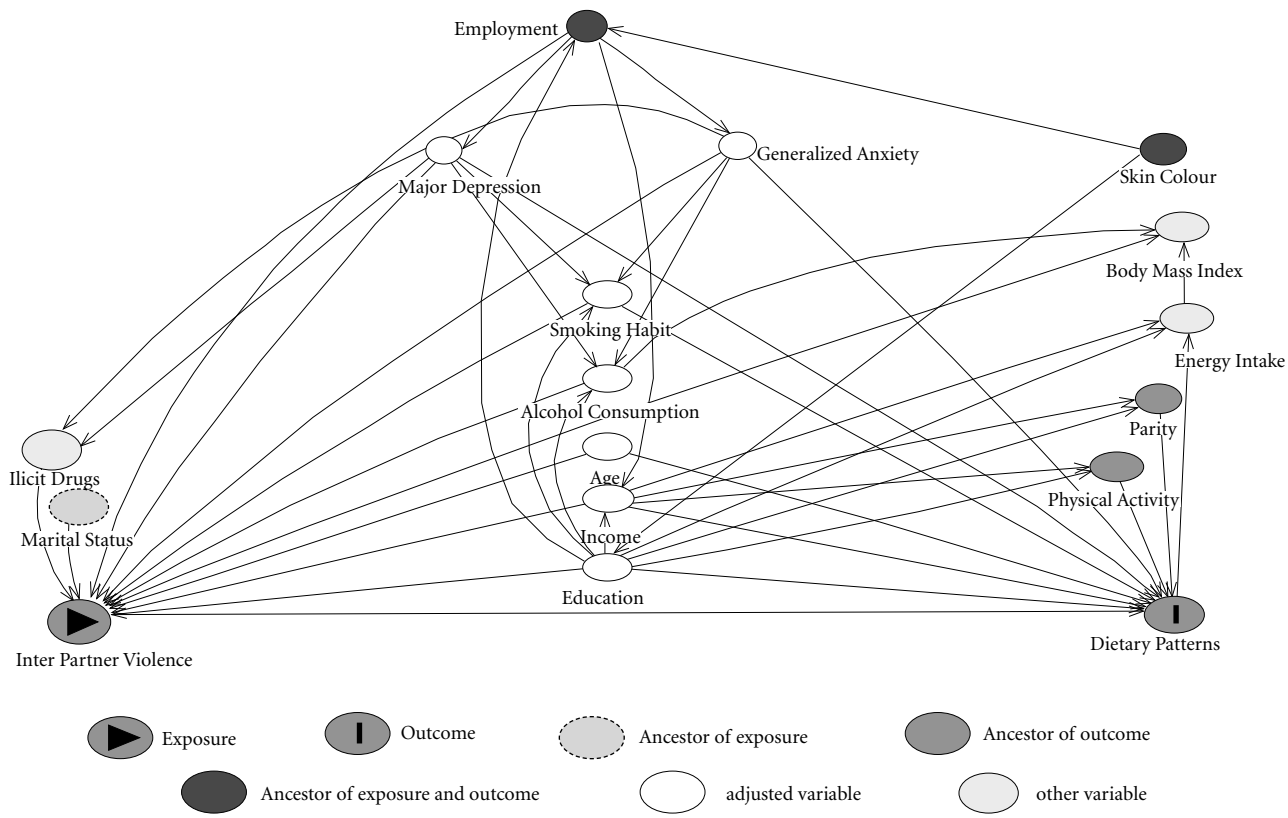

Figure 2. Directed Acyclic Graph showing the relationships between intimate partner violence, dietary patterns and covariates.

Source: Authors.

observed in 14.3% and generalized anxiety in 8.7% of pregnant women (Table 1). Women not included in the present analysis due to losses of follow-up at the third trimester presented a higher proportion of major depression (28.9%) compared to those women who completed the cohort follow-up (14.3%) (Table 2).

The occurrence of overall and severe physical IPV at any time during pregnancy was 20.4% and 6.8%, respectively. Pregnant women with higher adherence to the "Healthy" dietary pattern had higher per capita family income (US$ 355.30, 95%CI 146.1-791.7) than those with higher adherence to the "Common-Brazilian" (US$ 251.3, 95%CI 136.1-527.8) and "Processed" (US$ 266.7, 95%CI 138.9-588.9) dietary patterns (p=0,041). Women who had higher adherence to the "Healthy" dietary pattern less frequently reported gestational overall physical IPV (7.1%) compared to the "Common-Brazilian" (23.9%) and the "Processed" (26.5%) dietary patterns (p=0.036) (Table 1).

In crude and adjusted linear regression models, a significant association between physical IPV at some point during pregnancy and "Processed" dietary pattern was observed. The pregnant women exposed to overall physical IPV during pregnancy had a mean increase of 0.604 units (95%CI 0.149; 1.058) in their score for adherence to the "Processed" dietary pattern**.** Similarly, those exposed to severe physical IPV during pregnancy had a mean increase of 1.347 units (95%CI 0.670; 2.024) of adherence to this pattern. There was no significant crude or adjusted association between overall and severe IPV at some point during pregnancy with the "Healthy" and "Common-Brazilian" dietary patterns (Table 3).

Discussion

This study has three main findings. First, women who reported being exposed to physical IPV at any time during pregnancy had higher scores for adherence to the "Processed" dietary pattern, and this adherence was higher for those women who reported severe physical IPV compared to those who were exposed to overall physical IPV.

Table 1. Characteristics of pregnant women followed up a public health center stratified by dietary patterns between 30-36 weeks of pregnancy. Rio de Janeiro, Brazil, 2009-2012.

Continuous variables	All (n=161)§	Gestational Dietary Patterns*†‡		
		Healthy (n=42)	Common-Brazilian (n=70)	Processed (n=49)
	Mean (SD) or Median (95%CI)	Mean (SD) or Median (95%CI)	Mean (SD) or Median (95% CI)	Mean (SD) or Median (95%CI)
Age (years)	26.7 (5.4)	27.1 (4.6)	27.3 (5.9)	25.7 (5.3)
Education (years)	8.6 (2.9)	9.1 (2.9)	8.3 (3.0)	8.4 (3.0)
Per capita total family income (US$)	263.9 (137.5 – 687.8)	355.3‖ (146.1 – 791.7)	251.3‖ (136.1 – 527.8)	266.7‖ (138.9 – 588.9)
Categorical variables	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Alcohol consumption – yes	25 (15.5)	3 (7.1)	13 (18.8)	3 (6.5)
Current smoker – yes	8 (5.0)	2 (4.8)	3 (4.4)	1 (2.2)
Major depression**	23 (14.3)	7 (16.7)	10 (14.5)	6 (13.0)
Generalized anxiety**	14 (8.7)	2 (4.8)	9 (13.0)	3 (6.5)
Gestational overall physical intimate partner violence††	33 (20.4)	3 (7.1)‖	17 (23.9)‖	13 (26.5)‖
Gestational severe physical intimate partner violence††	11 (6.8)	2 (4.8)	4 (5.7)	5 (10.2)

Categories of references: positive cases.*Food frequency questionnaire administered between 30-36 weeks of pregnancy; †Dietary patterns generated by Principal Component Analysis; ‡Women were classified in only one dietary pattern considering the highest factor loading; §A total of 185 pregnant women had dietary intake reported, and 168 women had completed the Conflict Tactics Scales (CTS-1)[18] interview, and 34 out of the 195 had missing report on both dietary intake and CTS-1; ‖p-value ≤0,005: refers to ANOVA's test; ¶p-value refers to chi-square test or Fisher's exact test when n<5; **M.I.N.I. International Neuropsychiatric Interview (DSM-IV; version 5.0.0.)[22]; ††CTS-1 interview referred to 12-months prior pregnancy [18].

Source: Authors.

Table 2. Frequency distribution of first trimester characteristics of initial sample of pregnant women, and those who were included and losses of follow-up at 30-36 weeks of pregnancy. Rio de Janeiro, Brazil, 2009-2012.

Continuous variables	Initial sample (n=225)[1]	Interviewed at 30-36 weeks of pregnancy (n=161)	Loss of follow-up (n=64)	p-value[†]
	Mean (SD) or Median (95%CI)	Mean (SD) or Median (95%CI)	Mean (SD) or Median (95%CI)	
Age (years)	26.6 (5.4)	26.7 (5.4)	25.6 (3.6)	0.360
Education (years)	8.8 (2.8)	8.6 (3.0)	9.7 (2.0)	0.118
Per capita total family income (US$)	267 (167 – 642)	260 (160 – 642)	402 (185 – 642)	0.171
Categorical variables	**n (%)**	**n (%)**	**n (%)**	**p-value[‡]**
Alcohol consumption – yes	45 (20.1)	25 (15.5)	14 (23.7)	0.232
Current smoker – yes	15 (6.7)	8 (5.0)	5 (8.5)	0.431
Major depression	35 (16.2)	23 (14.3)	11 (28.9)	0.024
Generalized anxiety[§]	22 (10.2)	14 (8.7)	5 (13.1)	0.487

Categories of references: positive cases. [1]Of 254 eligible and excluding 25 cases of miscarriage and 5 stillborn. [†]p-value refers to Student t test or Mann-Whitney U tests. [‡]p-value refers to chi-square test. [§]M.I.N.I. International Neuropsychiatric Interview (DSM-IV; version 5.0.0.

Source: Authors.

Table 3. Crude and adjusted associations between the occurrence of physical intimate partner violence (IPV) at any period during gestation (overall and severe) and the score of adherence to dietary patterns in pregnancy. Rio de Janeiro, Brazil, 2009-2012 (n=161).

Intimate partner violence*	Gestational Dietary Pattern (score)[†‡]		
	Healthy	Common-Brazilian	Processed
	β (95%CI)	β (95%CI)	β (95%CI)
Overall Physical IPV - crude[§]			
Overall Physical IPV - adjusted[§]			
Age (years)	0.023 (-0.005; 0.053)	0.030 (-0.001; 0.061)	0.002 (-0.031; 0.034)
Schooling (years)	-0.002 (-0.056; 0.053)	-0.030 (-0.0870; 0.027)	0.013 (-0.047; 0.073)
Per capita family income (US$)	0.001 (0.0001; 0.001)	-0.0001 (-0.001; 0.0003)	0.0002 (-0.0005; 0.001)
Alcohol intake (yes, no)	-0.105 (-0.551; 0.341)	0.288 (-0.181; 0.756)	0.286 (-0.206; 0.778)
Current smoker (yes, no)	0.243 (-0.546; 1.032)	-0.301 (-1.129; 0.528)	-0.707 (-1.577; 0.163)
Major depression (yes, no)	-0.043 (-0.476; 0.390)	-0.086 (-0.541; 0.368)	0.043 (-0.434; 0.520)
Generalized anxiety (yes, no)	0.417 (-0.132; 0.966)	-0.016 (-0.592; 0.560)	-0.230 (-0.835; 0.374)
Severe Physical IPV - crude[§]	-0.360 (-0.953; 0.234)	0.213 (-0.390; 0.817)	1.134 (0.523; 1.745) [††]
Severe Physical IPV - adjusted[§]	-0.396 (-1.029; 0.237)	0.166 (-0.497; 0.828)	1.347 (0.670; 2.024) [††]
Age (years)	-0.397 (0.0004; 0.058)	0.024 (-0.006; 0.0539)	-0.007 (-0.038; 0.023)
Schooling (years)	0.0004 (-0.054; 0.055)	-0.036 (-0.094; 0.021)	0.010 (-0.049; 0.069)
Per capita family income (US$)	0.001 (0.0002; 0.001)	-0.002 (-0.001; 0.0002)	0.00005 (-0.0004;0.001)
Alcohol intake (yes, no)	-0.120 (-0.570; 0.329)	0.326 (-0.144; 0.796)	0.304 (-.176; 0.784)
Current smoker (yes, no)	0.202 (-0.646; 1.049)	-0.456 (-1.343; 0.431)	-0.657 (-1.564; 0.249)
Major depression (yes, no)	-0.014 (-0.457; 0.428)	-0.142 (-0.605; 0.322)	-0.052 (-0.525; 0.422)
Generalized anxiety (yes, no)	0.404 (-0.159; 0.967)	0.012 (-0.578; 0.602)	-0.389 (-0.992; 0.214)

β refers to linear regression model; CI = Confidence interval; *Conflict Tactics Scales (CTS-1)[19]; [†]Principal Component Analysis[21]; [‡]Each woman received a score of adherences to each dietary pattern and all 161 were entered into each regression model; [§]Reference category: Absence of overall or severe physical violence; **p-value ≤0,01; [††]p-value ≤0,001.

Source: Authors.

The women who reported gestational overall physical IPV tended to have lower scores for adherence to the "Healthy" dietary pattern. Physical IPV at some point during pregnancy was positively associated with the "Processed" dietary pattern, while there were no significant associations between the other two dietary patterns and physical IPV. To our knowledge, this is the first study that examined the association of physical IPV and gestational dietary patterns, and the first to provide evidence that physical IPV at any time in pregnancy may be associated with a higher adherence to a processed dietary pattern.

This study reveals that exposure to physical IPV during pregnancy had negative repercussions on pregnant women's dietary habits regardless of its severity. Such exposures favored greater adherence to the "Processed" dietary pattern, comprised predominantly of processed meat, snacks, sweets, and sodas. These types of food have a high energy density but low nutritional quality, i.e., they are poor in vitamins and minerals while being high in sugar, sodium, trans and saturated fat content. The higher adherence to the "Processed" dietary pattern may indicate that pregnant women with greater exposure to physical IPV (overall and severe) were somehow precluded from choosing a better qualify nutrition.

Physical violence is a type of stressor exposure that produces higher levels of cortisol, which, in turn, acts on the brain's reward system and may trigger excessive consumption or preference for hyperpalatable food[26]. High palatability foods, such as those belonging to the "Processed" dietary pattern, have positive effects that are both neurochemical (they stimulate serotonin and dopamine) and psychological (through affective memory) on mood and well-being[27]. Therefore, this may be one of the pathways that explain why women who experience physical violence in their intimate relationships display greater adherence to a diet composed mainly of foods rich in sodium, sugar, saturated and hydrogenated fats, additives and preservatives, and poor essential micronutrients.

Although psychological outcomes owing to IPV were not evaluated (i. e., stress), it is possible that pregnant women who have experienced IPV may have greater emotional impairment[10], thus hindering the process of dietary awareness to plan/make a nutritionally balanced meal. In turn, the main characteristic of processed food is that it is quick and practical to prepare, thus encouraging its consumption by people unable to pay more attention to what they eat[28].

Women exposed to severe physical IPV had higher scores for adherence to the "Processed" dietary pattern when compared to those who were exposed to overall physical IPV. Despite the adjusted analysis taking depressive/anxiety disorders into consideration, pregnant women who perpetrated and/or suffered severe physical IPV may have other forms of psychological suffering because of the severity and, possibly, the chronicity of this form of violence. Given that the severity of IPV increases with time of exposure, the impact of severe physical IPV may have been greater on women's adherence to the "Processed" dietary pattern. Taken together, depending on the severity of the body injury, urgent/emergency medical care may need to be sought out. However, by turning the violence suffered in the intimate sphere public, the prejudice and stigma many women face in healthcare services can bring additional psychological suffering[29].

Dietary patterns were also associated with family income in both the crude and adjusted analyses. According to the results, the higher the family income, the greater the adherence to the healthy diet pattern, regardless of having experienced IPV during pregnancy. The healthy pattern is characterized by fresher products, such as dairy products, fruit, green vegetables, fresh fish and, consequently, more expensive. It is expected that those with greater purchasing power have greater adherence to a healthier diet. Furthermore, although schooling has not been associated, it is possible that pregnant women with greater family income are more aware of adequate nutrition and have economic structure to access this pattern of diet[30].

The strength of the current study lies in its investigation of an association not yet established by the literature and the highlighting of the adversity that IPV brings to health, with particular emphasis on diet. Another aspect was the collection of prospective data on the period during pregnancy, which enabled the identification of the temporality of the occurrence of the events. Even though the reporting of the exposure and the outcome was retrospective in relation to events occurring throughout pregnancy, both instruments used have been validated and were administered by a trained team, thus ensuring the reliability of the information collected. Although the quality of the study protocol ensured the internal validity of the results, these were limited to a single public health center and their extrapolation should be done with caution.

Another limitation relates to the loss to follow-up over the monitoring period, which is a

commonly observed disadvantage of prospective studies[31], especially with parturient women[32]. Despite active tracing of the pregnant women by telephone to confirm appointments and make new ones, approximately 10% of the sample was lost to follow-up. The small sample size may have prevented us from detecting other associations between physical violence and dietary patterns due to lack of power. In addition, our analytical sample presented a lower proportion of women with major depression when compared to the initial cohort, which could underestimate our results.

Finally, our findings reveal that the occurrence of physical IPV among adult pregnant women exists and was associated with greater adherence to the "Processed" dietary pattern. The data reinforce that physical IPV is a problem that has repercussions in various areas of the lives of those who experience it, including shifting away from a healthy diet. Health services, including antenatal care programs, need to consider social incidents experienced by pregnant women as health determinants and provide appropriate care following their identification. Together with the legal sector, health services can act as a detection, support, and follow-up mechanism for IPV cases.

Collaborations

JS Vaz and G Kac worked on conceptualization, methodology, funding acquisition. MEMC Souza and IO Bierhals worked on statistical analysis and first draft preparation. MT Silva worked on statistical support and graphic/visual preparation. ID Valério and JS Vaz worked on edited and wrote the final version. AA Freitas-Vilela and MH Hasselmann worked on editing and critical review. All authors reviewed and commented on subsequent drafts and approved the final manuscript.

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