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ORIGINAL ARTICLE

Affective and interaction social support early in pregnancy are associated with a healthy dietary pattern among pregnant Brazilian women

Apoio social afetivo e de interação no início da gestação está associado a padrão alimentar saudável em gestantes brasileiras

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Abstract

Introduction: Social support is an essential factor for health-related behavior, including eating habits. Little is known about whether social support could promote healthier eating habits during pregnancy. **Objective:** The aim of the study was to test the association between social support early in pregnancy and gestational dietary patterns. **Methods:** This is a secondary analysis of a prospective cohort study with data from 185 healthy adult pregnant women from Rio de Janeiro, Brazil. Social support was assessed at 5–13 weeks of gestation using the Medical Outcomes Study Social Scale, and five dimensions (material, affective, emotional, information, and interaction) were evaluated. Diet was investigated using a food frequency questionnaire applied at 30–36 weeks of gestation. Three gestational dietary patterns were identified ("Healthy," "Common-Brazilian," and "Processed") using principal component analyses. **Results:** Women's age was 26.8±5.5 years, and the highest mean social support scores were for the affective (91.2±17.0) and the interaction dimensions (83.5±17.4). In adjusted linear regression models, the affective (β 0.011; 95% confidence interval [95%CI] 0.001;0.021) and the interaction (β 0.011; 95%CI 0.002–0.020) domains of social support were positively associated with the "Healthy" dietary pattern. No association was observed with the "Common-Brazilian" and "Processed" dietary patterns. **Conclusion:** Affective and interactional social support in the early stage of pregnancy can promote healthier eating habits during pregnancy.

Keywords: cohort studies; dietary patterns; food consumption; pregnancy; social support.

Resumo

Introdução: O apoio social é fator essencial para o comportamento relacionado à saúde, incluindo os hábitos alimentares. Pouco se sabe sobre o apoio social na promoção de hábitos alimentares saudáveis na gestação. **Objetivo:** Testar a associação entre o apoio social no início da gestação e padrões alimentares gestacionais. Métodos: Análise secundária de um estudo de coorte prospectivo de 185 gestantes adultas do Rio de Janeiro, Brasil. O apoio social foi avaliado em 5–13 semanas de gestação por meio da Escala Social do Estudo de Resultados Médicos (MOS-SSS), e foram avaliadas cinco dimensões (material, afetiva,

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emocional, de informação e de interação). A alimentação foi avaliada por questionário de frequência alimentar aplicado entre 30 e 36 semanas de gestação. Foram identificados três padrões alimentares gestacionais (Saudável, Comum-Brasileiro, Processado) por análise de componentes principais. **Resultados:** A idade média foi 26,8±5,5 anos, e as dimensões sociais de maiores médias foram a afetiva (91,2±17,0) e de interação (83,5±17,4). Nos modelos de regressão linear ajustada, os domínios de apoio social afetivo (β 0,011; intervalo de confiança de 95% — IC95% 0,001–0,021) e de interação (β 0,011; IC95% 0,002–0,020) foram positivamente associados ao padrão alimentar Saudável. Nenhuma associação foi observada com os padrões Comum-Brasileiro e Processado. Conclusão: O apoio social afetivo e de interação ao início da gestação pode promover hábitos alimentares mais saudáveis na gestação.

Palavras-chave: estudos de coorte; consumo alimentar; nutrição; gravidez; apoio social.

INTRODUCTION

Pregnancy is a period of hormonal and physical changes, as well as social changes in the lives of mothers and those around them, which can generate a stressful process for everyone involved[1]. Stressors are known to be alleviated by social support[2]. Social support comprises interpersonal relationships between friends, relatives, and/or society in different situations of life. The Medical Outcomes Study Social Scale (MOS-SSS) is among the widely used instruments to investigate social support perception[3]. This instrument presents the individual's needs that can be achieved in five different domains (material, affective, emotional, information, and interaction) that represent the presence of people to help in adverse situations of life and to offer love, care, and understanding, as well as the presence of people who make the individual feel socially important and included in society[3,4]. Several adverse events in the health of the offspring and mothers, such as pre-and postpartum depression[5], premature/low birth weight[6], and pain during childbirth[7], are associated with a lack of social support.

Social support is also an essential factor for health-related behavior[8,9], as well as the adherence to healthier eating habits[10]. A study using baseline data from a randomized controlled trial that included 740 low-income overweight and obese American women after delivery observed that social support favored a reduction in high-calorie foods and increased fruit and vegetable intake[11]. Although studies consider the influence of social support on certain food groups[10,11], there is still insufficient knowledge of its influence on eating patterns, which assumes the individual's overall food habits. Furthermore, the body of evidence on social support and overall dietary quality is weak in lower and middle-income countries, and socioeconomic structures can reinforce the association under study. In the last decades, diet investigation based on the definition of dietary patterns has emerged as an alternative approach to traditional analysis focused on a single or a few nutrients or foods. The dietary pattern analysis considers the complex interactions of nutrients, food compounds, and foods with a better representation of the real scenario of food intake of a population[12]. Research findings provided in terms of dietary patterns better contribute to the formulation and support of public policies and improve the communication of dietary guidelines to the population[12,13]. This type of dietary investigation may be a useful tool for exploring the association between social support and nutritional aspects in pregnancy.

This study aimed to investigate the association between social support and gestational dietary patterns in a sample of apparently healthy pregnant adult women attending a public health center in Rio de Janeiro, Brazil. We hypothesized that social support in the early stage of pregnancy could promote healthier eating habits during pregnancy.

METHODS

Participants

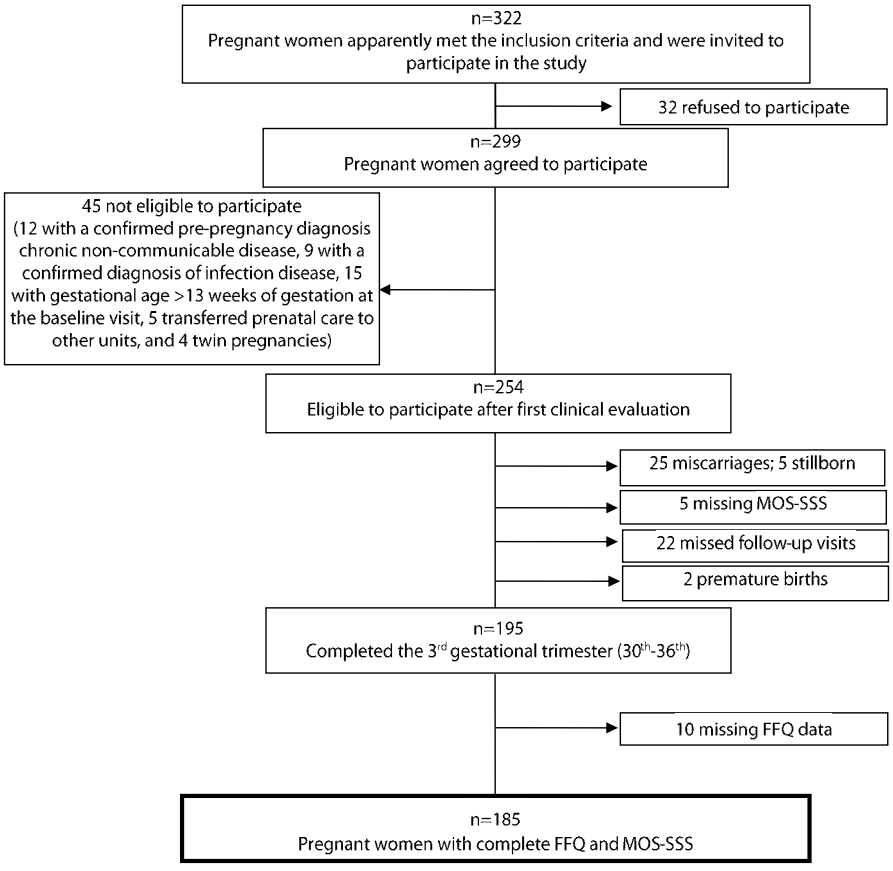
This is a secondary analysis of data from a prospective cohort study of healthy pregnant women and was conducted at a prenatal health care center in Rio de Janeiro, Brazil. The primary

aim of this cohort was to investigate nutritional aspects and mental health during pregnancy. The recruitment was carried out between November 2009 and October 2011. Pregnant women were evaluated between 5th and 13th (baseline), 20th and 26th, and 30th–36th gestational weeks, and 30–45 days postpartum. All protocol interviews were conducted during appointment days at a public prenatal care center of the Brazilian Unified Health System.

During the recruitment phase, all pregnant women who attended the prenatal center were invited to participate if they met the following criteria in the screening:

1. Being 20 and 40 years of age;
2. Being between the 6th and 13th week of pregnancy at enrollment;
3. Free of any infectious or chronic diseases, except obesity;
4. Not having a twin pregnancy,
5. Residing in the area covered by the study.

A total of 322 women apparently met the inclusion criteria and were invited to participate. Twenty-three of these women (7%) chose not to participate; thus, 299 were initially enrolled in the study. After the clinical evaluation of the first trimester, 45 women did not meet the eligibility criteria and were excluded (12 with a confirmed pre-pregnancy diagnosis of a chronic non-communicable disease, 9 with a confirmed diagnosis of an infectious disease, 15 with a gestational age of >13 weeks on the first visit, 5 changed prenatal care assistance, and 4 presented twin pregnancy). Of the 254 eligible and enrolled women in the cohort, 30 women reported pregnancy losses (25 miscarriages and 5 stillborn), 5 presented missing data regarding social support, 22 missed interviews, and 2 losses occurred due to premature birth. In the third trimester of follow-up, 195 participants remained in the study, of whom dietary intake data were incomplete in ten cases. Therefore, the final sample comprised 185 pregnant women (Figure 1).



FFQ: food frequency questionnaire; MOS-SSS: Medical Outcomes Study Social Support Scale.

Figure 1. Flow chart of participant recruitment and follow-up. Rio de Janeiro, Brazil 2009–2012[3].

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Assessment of social support

Social support was evaluated using the adapted and validated Brazilian version[14,15] of the MOS-SSS[3], which was applied at the 5th–13th gestational week.

The nineteen items of the scale evaluate the individual perceptions of social support in five dimensions:

1. Material (the presence of people to help in special situations of life that require concrete actions of support and care; four questions),
2. Affective (it reflect the presence of people who make the individual feel socially significant, such as physical demonstrations of love and affection; three questions),
3. Emotional (the presence of a social network that satisfies emotional needs and provides encouragement during difficult moments in life; four questions),
4. Information (the presence of people who can help in problem-solving, four questions), and
5. Social and affective interaction (the presence of people with whom one can establish pleasant social relationships, and feeling included in the society; four questions).

Women answered a five-point scale from "never" (1 point) to "always" (5 points). The MOS-SSS allows us to obtain the score for each dimension through the ratio between the sum of the values obtained in the set of items and the maximum possible score, multiplied by 100, and ranges from 20 to 100. As such, a higher score indicates greater social support.

Dietary assessment

Dietary habits were collected using a food frequency questionnaire (FFQ), which had been previously validated[16] and used four 24-h dietary recalls as a reference. The coefficients for energy, carbohydrates, protein, and fats were 0.44, 0.34, 0.44, and 0.41, respectively. The coefficients for the micronutrients ranged from 0.18 (vitamin A) to 0.55 (calcium). The FFQ consisted of 82 food items, and eight frequency options were given, which ranged from "more than three times a day" to "never or hardly ever"[16]. Thins instrument was applied in the third trimester of gestation and covered the last 6 months of pregnancy. To identify the dietary patterns, 77 of the 82 items listed in the FFQ were grouped into 21 food groups based on their nutritional characteristics. Foods that were not regularly consumed by participants (e.g., consumed by <20% of the participants) were excluded since these foods were not part of the regular diet of the subjects and had lower correlations with other defined food groups (lard, alcoholic beverages, and dried meat/cod. Items that were consumed by 80% or more of the subjects or had a different nutritional composition were kept separate, even if they had a nutritional composition similar to other items (e.g., rice, beans, bread, and sugar).

The Kaiser-Meyer-Olkin (KMO) test and the Bartlett sphericity test were used to verify whether the assumptions of the principal component analysis were met[17,18]. Then, the varimax rotation was applied to obtain orthogonal factors. Food groups with factor loadings >0.20 and communalities >0.20 were considered to be strongly associated with this factor or pattern and these values have been previously used in other studies[19,20]. Eigenvalues >1.5 and Scree test plots were used as a reference to extract the number of factors[17]. Each pregnant woman received a score for each identified dietary pattern to indicate to what degree the women adhered to all identified dietary patterns[12]. We labeled each dietary pattern based on the food items with a higher factor loading of foods in the dietary patterns, and the nutritional significance of them[21]. The three dietary patterns identified were "Healthy," "Common-Brazilian," and "Processed"[22]. The "Healthy" pattern explained 11.9% of total variance, and was characterized by consumption of tea, cakes and biscuits, fresh fish, pulses (chickpeas and lentils), green vegetables, fruit juice, fruit, dairy products, and milk. The second dietary pattern explained 9.8% of the total variance and was denominated as "Common-Brazilian" pattern. This was characterized by margarine, butter, bread, eggs, sweet pepper, garlic, onion, beans, and rice. The "Processed" pattern explained 8.5% of the total variance, and included sodas, processed meats, snacks (pizzas and savory snacks), root and tuber vegetables, pasta, sweets, chicken and pork meat, and lower coffee and red meat consumption. The variance explained by the three dietary patterns was 30%. More details on the principal component analysis are described elsewhere[22].

Other variables

A structured questionnaire was applied at all follow-ups. The following covariates obtained in the baseline interview were considered in the analysis: age (years), education (years), marital status (without a partner or with a partner), household monthly income per capita (USD$), parity (0–1, ≥2), current alcohol consumption (no or yes), current smoking habit (no or yes), unplanned pregnancy (no or yes).

The Mini International Neuropsychiatric Interview — MINI (Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV); version 5.0.0)[23] was applied to all women in the first visit to obtain a baseline psychiatric assessment. The MINI consists of a brief (15–30 min) structured interview to evaluate the existence of Axis I psychiatric disorders, as defined by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition[24]. Each module (A-P) of this instrument has questions about different psychiatric disorders. This instrument was applied by medical doctors and trained graduate students. Participants answered "no" or "yes" to each of the questions. In the current study, we used the data collected on major depression and generalized anxiety, each of them summarized as dichotomic (no or yes).

Statistical analysis

We first conducted a descriptive analysis which consisted of a summary of the absolute and relative frequencies for categorical variables and mean and standard deviation (SD) or median and interquartile range (P25–P75) for continuous variables. For this first set of analysis, the dietary pattern scores were categorized into tertiles, and women were classified into the lowest (1st and 2nd tertiles) or the highest (3rd) level of adherence to each pattern. Group differences across categories of adherence to dietary pattern were evaluated using Student's t-test, Wilcoxon rank-sum, or the χ^2 test.

In the second set of analysis, crude and adjusted linear regression models were used to test the association between each social support dimension (exposure) and gestational dietary patterns (outcome). Linear regression models were performed considering the dietary patterns as continuous variables. To best define the potential confounder variables to be included in the adjusted models, we draw a directed acyclic graph (Figure 2)[25]. The baseline variables included in the adjusted models were age, education, household monthly income per capita, marital status, parity, alcohol consumption, current smoking habit, unplanned pregnancy, major depression, and generalized anxiety. All statistical analyses were performed using Stata 14.1 (StataCorp., College Station, TX, USA), and a p-value of <0.05 was considered as statistically significant.

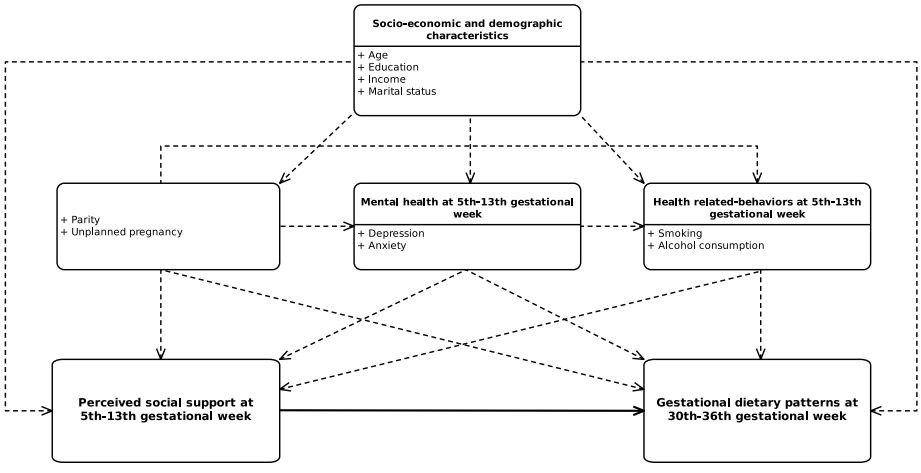

Figure 2. Directed acyclic graph approach illustrating the relationships between social support, gestational dietary patterns, and covariates used in the adjusted linear regression models. (dagitty.net/mMLnwsZ)

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Ethical approval

The study protocol was approved by the Ethics Committees of the Federal University of Rio de Janeiro Maternity Hospital (Protocol number: 0023.0.361.000-08) and the Federal University of Rio de Janeiro Institute of Psychiatry (Protocol number: 0012.0.249.000-09). All participants received oral and written explanation of the study aims, protocol and measurements, and freely and spontaneously signed the consent form.

RESULTS

The mean age and years of education of the women were 26.8±5.5 and 8.7±2.9, respectively. The monthly per capita household income distribution was positively skewed, with a median of USD$ 277.8 (interquartile range [IQR] 175.4–384.2). More than 80.0% of the sample lived with a partner and did not report consumption of alcoholic beverages or being current smokers. Fifty-eight percent of women reported unplanned pregnancies. The occurrence of major depression and generalized anxiety was 15.1 and 10.3%, respectively (Table 1). Comparing the baseline characteristics, the women included in the present analysis had a lower consumption of alcoholic beverages in comparison to those considered losses to follow-up (Data not shown).

Women in the highest tertile of the "Healthy" dietary pattern had a higher household monthly income per capita than those in the lowest tertiles. Women in the highest tertile of the "Healthy" and "Common-Brazilian" dietary patterns were older than those in the lowest tertiles. Women in the highest tertile of the "Processed" diet pattern had a lower probability of living with a partner than those in the lowest tertiles (Table 1).

The social support dimension with the highest mean score was the affective dimension (91.2±17.0), following by the interaction (83.5±17.4), emotional (80.4±20.0), information (79.9±18.8), and material (78.1±20.5) dimensions (Table 2). Table 3 shows consistent results in both crude and adjusted linear regression models when testing the association between social support dimensions and dietary patterns during pregnancy. After adjustment, the score for social support in the affective (β 0.011; 95% confidence interval [95%CI] 0.001–0.021) and interaction (β 0.011; 95%CI 0.002–0.020) dimensions increased the mean of adherence to the "Healthy" dietary pattern. The other social support dimensions were not associated with dietary patterns.

DISCUSSION

Our study reveals a positive association between affective and interaction social support with the "Healthy" dietary pattern of women attending prenatal care in a public health care center in Rio de Janeiro, Brazil. These findings fill an important literature gap, since studies on social support and dietary patterns during pregnancy are scarce, especially in low- and middle-income countries[26,27]. To our knowledge, this is the first study to show how different social support dimensions can affect with women's adherence to dietary patterns during pregnancy. Additionally, the dietary patterns were established using *a posteriori* data-driven approach, that is, without predefining a few key food groups or nutrient intake that is currently recommended as "healthy eating," which allowed us to characterize the dietary patterns without basing them on current diet-disease paradigms.

Two previous studies conducted in the United States have investigated the association between social support and *a priori* dietary patterns among pregnant women. Harley and Eskenazi[28] used data from 568 participants, and most of the sample comprised low-income women of Mexican descent living in an agricultural community in the United States. The overall social support and affective support, which were measured using the adapted version of the Duke-University of North Carolina Functional Social Support Questionnaire[29], were positively associated with the Diet Quality Index for Pregnancy, as well as the instrumental support (evaluated by additional questions)[28]. Using the Prenatal Psychosocial Profile instrument[30,31] to assess social support, Fowles et al.[26] observed that social support from people other than

Table 1. Characteristics of pregnant women followed up a public health center according to tertiles of the dietary patterns between 30–36 weeks of pregnancy. Rio de Janeiro, Brazil, 2009–2012.

	Overall sample (n=185)	Gestational Dietary Pattern (score)								
		Healthy			Common-Brazilian			Processed		
		1st–2nd (n=121)	3rd (n=64)		1st–2nd (n=123)	3rd (n=62)		1st–2nd (n=119)	3rd (n=66)	
	Mean (SD) or median (IQR)	Mean (SD) or median (IQR)	Mean (SD) or median (IQR)	p-value	Mean (SD) or median (IQR)	Mean (SD) or median (IQR)	p-value	Mean (SD) or median (IQR)	Mean (SD) or median (IQR)	p-value
Continuous variables										
Age (years)	26.8 (5.5)	26.1 (5.5)	28.0 (5.5)	00.02*	25.8 (5.0)	28.7 (6.0)	<0.01*	26.5 (5.3)	27.2 (6.0)	00.41*
Education (years)	8.7 (2.9)	8.5 (3.1)	9.1 (2.7)	00.14*	8.9 (2.8)	8.3 (3.2)	00.21*	8.7 (2.9)	8.7 (3.0)	00.85*
Per capita monthly household income (US$)[§]	277.8 (175.4–384.2)	253.8 (156.1–370.2)	316.4 (194.7–444.4)	00.04[†]	292.4 (188.6–408.5)	238.6 (152.0–380.1)	00.15[†]	277.8 (176.6–390.1)	278.7 (162.6–389.8)	00.76[†]
Categorical variables	**n (%)**	**n (%)**	**n (%)**	**p-value**	**n (%)**	**n (%)**	**p-value**	**n (%)**	**n (%)**	**p-value**
Marital status										
Without partner	37 (20.0)	22 (59.5)	15 (40.5)	00.40[‡]	28 (75.7)	09 (24.3)	00.19[‡]	18 (48.7)	19 (51.3)	00.03[‡]
With partner	148 (80.0)	99 (66.9)	49 (33.1)		95 (64.2)	53 (35.8)		101 (68.2)	47 (31.8)	
Parity										
0–1	138 (74.6)	90 (65.2)	48 (34.8)	00.93[‡]	95 (68.8)	43 (31.2)	00.25[‡]	88 (63.8)	50 (36.2)	00.79[‡]
≥2	47 (25.4)	31 (66.0)	16 (34.0)		28 (59.6)	19 (40.4)		31 (66.0)	16 (34.0)	
Alcohol consumption										
No	153 (82.7)	97 (63.4)	56 (36.6)	00.21[‡]	102 (66.7)	51 (33.3)	00.91[‡]	97 (63.4)	56 (36.6)	00.57[‡]
Yes	32 (17.3)	24 (75.0)	08 (25.0)		21 (65.6)	11 (34.4)		22 (68.7)	10 (31.3)	
Current smoking habit										
No	175 (94.6)	113 (64.6)	62 (35.4)	00.32[‡]	116 (66.3)	59 (33.7)	00.81[‡]	114 (65.1)	61 (34.9)	00.33[‡]
Yes	10 (5.4)	08 (80.0)	02 (20.0)		07 (70.0)	03 (30.0)		05 (50.0)	05 (50.0)	
Unplanned pregnancy										
No	76 (41.1)	51 (67.1)	25 (32.9)	00.69[‡]	51 (67.1)	25 (32.9)	00.88[‡]	48 (63.2)	28 (36.8)	00.78[‡]
Yes	109 (58.9)	70 (64.2)	39 (35.8)		72 (66.1)	37 (33.9)		71 (65.1)	38 (34.9)	
Major depression[//]										
No	157 (84.9)	101 (64.3)	56 (35.7)	00.47[‡]	102 (65.0)	55 (35.0)	00.30[‡]	99 (63.1)	58 (36.9)	00.39[‡]
Yes	28 (15.1)	20 (71.4)	08 (28.6)		21 (75.0)	07 (25.0)		20 (71.4)	08 (28.6)	
Generalized anxiety[//]										
No	166 (89.7)	109 (65.7)	57 (34.3)	00.83[‡]	114 (68.7)	52 (31.3)	00.06[‡]	108 (65.1)	58 (34.9)	00.54[‡]
Yes	19 (10.3)	12 (63.2)	07 (36.8)		09 (47.4)	10 (52.6)		11 (57.9)	08 (42.1)	

SD: standard deviation; IQR: interquartile range.

*Student's t-test; [†]Wilcoxon rank-sum; or [‡]χ^2 test; [§]Variable with one piece of missing data; [//]M.I.N.I. The International Neuropsychiatric Interview (DSM-IV; version 5.0.0.) referred to the first trimester.

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Table 2. Description of Medical Outcomes Study Social Support Scale (MOS-SSS) domains according to tertiles of the dietary patterns between 30 and 36 weeks of pregnancy. Rio de Janeiro, Brazil, 2009–2012 (n=185).

	Gestational Dietary Pattern (score)*,†									
	Overall sample	Healthy			Common-Brazilian			Processed		
		1st–2nd	3rd		1st–2nd	3rd		1st–2nd	3rd	
	(n=185)	(n=121)	(n=64)		(n=123)	(n=62)		(n=119)	(n=66)	
Social support‡	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**p-value§**	**Mean (SD)**	**Mean (SD)**	**p-value§**	**Mean (SD)**	**Mean (SD)**	**p-value§**
Material	78.1 (19.7)	74.2 (19.8)	76.9 (19.5)	0.38	76.3 (19.5)	72.7 (19.9)	0.25	74.2 (19.5)	76.7 (20.1)	0.40
Affective	91.2 (13.8)	90.0 (15.4)	93.4 (9.8)	0.11	90.4 (14.8)	92.8 (11.6)	0.27	91.0 (13.3)	91.5 (14.8)	0.82
Emotional	80.4 (18.3)	80.0 (18.8)	81.1 (17.6)	0.71	79.6 (18.1)	81.9 (18.8)	0.42	81.1 (17.8)	79.2 (19.3)	0.50
Interaction	83.5 (16.0)	81.9 (16.6)	86.4 (14.6)	0.07	83.2 (16.8)	84.0 (14.4)	0.73	83.3 (15.7)	83.8 (16.8)	0.84
Information	79.9 (18.2)	79.3 (18.8)	80.9 (17.1)	0.57	78.5 (19.4)	82.6 (15.3)	0.15	80.5 (17.5)	78.7 (19.4)	0.51

*Principal Component Analysis; †Each woman received a score of adherences to each dietary pattern and all 185 were entered into each regression model; ‡Medical Outcomes Study Social Support Scale (MOS-SSS)[3]; §p-value refers to Student's t-test.

Table 3. Crude and adjusted associations between social support and the score of adherence to dietary patterns during pregnancy. Rio de Janeiro, Brazil, 2009–2012.

Social support‡	Gestational Dietary Pattern (score)*,†					
	Healthy		Common-Brazilian		Processed	
	β (95%CI)	p-value	β (95%CI)	p-value	β (95%CI)	p-value
Material						
Crude	0.006 (-0.001–0.013)	0.10	-0.001 (-0.009–0.006)	0.72	0.001 (-0.006–0.009)	0.69
Adjusted§	0.004 (-0.004–0.012)	0.29	-0.0002 (-0.008–0.008)	1.00	0.002 (-0.006–0.010)	0.65
Affective						
Crude	**0.011 (0.001–0.021)**	**0.04**	0.002 (-0.008–0.013)	0.65	-0.001 (-0.011–0.010)	0.91
Adjusted§	**0.011 (0.001–0.021)**	**0.04**	0.003 (-0.008–0.014)	0.63	0.001 (-0.011–0.012)	0.88
Emotional						
Crude	0.003 (-0.005–0.011)	0.42	0.002 (-0.006–0.010)	0.57	-0.002 (-0.010–0.006)	0.62
Adjusted§	0.005 (-0.003–0.013)	0.22	0.005 (-0.003–0.014)	0.20	-0.002 (-0.011–0.007)	0.69
Interaction						
Crude	**0.010 (0.002–0.019)**	**0.02**	0.001 (-0.008–0.010)	0.82	0.001 (-0.009–0.010)	0.91
Adjusted§	**0.011 (0.002–0.020)**	**0.02**	0.003 (-0.007–0.012)	0.59	0.002 (-0.008–0.012)	0.74
Information						
Crude	0.004 (-0.004–0.011)	0.36	0.004 (-0.004–0.012)	0.29	-0.003 (-0.011–0.005)	0.48
Adjusted§	0.004 (-0.004–0.012)	0.32	0.006 (-0.002–0.014)	0.17	-0.002 (-0.011–0.006)	0.61

*Principal component analysis; †Each woman received a score of adherences to each dietary pattern and all 185 were entered into each regression model; ‡Medical Outcomes Study Social Support Scale (MOS-SSS)[3]; §Adjusted for age, education, per capita household monthly income, marital status, parity, alcohol consumption, current smoking habit, unplanned pregnancy, major depression, and generalized anxiety; p-values refer to linear regression model.
Bold values represent statistically significant results.

partners increased the quality of the diet in a sample of 71 low-income pregnant women. Both studies assessed the quality of the diet using the Diet Quality Index for Pregnancy. This index is based on nutritional recommendations for pregnancy and dietary guidelines for Americans[32,33]. The Diet Quality Index for Pregnancy reflects the consumption of some items similar to the "Healthy" dietary pattern found in our analyses, such as fruits and vegetables.

In a qualitative approach, carried out via semi-structured interviews with pregnant and postpartum Latino and African American women, Thornton et al.[33] showed that informational support was the most significant influence on the eating pattern, in which friends and relatives helped women who did not know how to cook with their food choices and food preparation. There was also a positive influence from the partner's emotional, informative, and material support in financing the purchase of healthier foods and encouraging more athletic bodies. However, these incentives were sometimes aggressive and fat-phobic, creating a source of violence, stress, and a negative influence on women's diet.

A previous study conducted with the current sample observed that physical violence caused by the partner increased adherence to the "Processed" dietary pattern[34]. Besides most processed food products being ready-to-eat foods, the industrial food processing enriches the products with hyperpalatable components, and these substances stimulate well-being. These foods do not require time or much attention in their preparation, and the majority are energy-dense that quickly satisfy in a small portion size. Social support is known to improve quality of life and make adverse situations more bearable. In this perspective, higher affective and social/affective interactions can stimulate eating behaviors associated with healthier and more social attitudes, such as cooking at home[35,36] and eating meals in the company of family members[37].

Consistent with our results on social support and the "Healthy" dietary pattern, previous studies have shown that social support can improve health-related behaviors during pregnancy[8,9,28]. A cohort study[9] conducted among pregnant women assisted in public prenatal care units in Rio de Janeiro also applied the Brazilian version of MOS-SSS[14,15] to evaluate social support. In this particular study, the diet was investigated with respect to the weekly frequency of the consumption of fruits and vegetables (<5 times a week was defined as an inadequate diet). The authors observed that women with low social support were more likely to have an inadequate diet. Furthermore, in a cluster analysis, considering the simultaneous smoking, alcohol consumption, and inadequate diet, the increase in the social support scale was inversely associated with the number of health-risk behaviors[9].

Social support has an inverse association with the risk of mental disorders, such as anxiety[38] and depression[5]. Therefore, the strong relationship between social support and mental health may explain why the role of social support as a dependent variable has been neglected. Usually, it is considered as a confounder or mediator variable to explain the effect of mental health[39]. At the same time, a vast body of evidence indicates that mental disorders are associated with poor diet[40]. Previous studies in the current cohort have shown that adherence to the healthy diet pattern before pregnancy was inversely associated with symptoms of depression[41] and anxiety[42] during pregnancy. It must be noted that our results were adjusted for depression and anxiety, but residual confusion through other psychological outcomes that were not evaluated cannot be ruled out, for example, stress. However, the slight alteration in the coefficients in the adjusted analysis suggests that the possibility of residual confusion is minimal.

In this sense, a common link between affective and interactional social support and a healthier dietary pattern during pregnancy could be the mechanism to explain our results, since modifiable individual factors, such as the belief that asking for help would be a sign of weakness or social anxiety that prevents the presence of peers and possible help in preparing a healthier diet. Furthermore, there is a diversity in the factorial structure of the MOS-SSS scale in the literature, and this includes studies conducted with different sample groups within Brazilian populations[15,43]. One of these studies used three dimensions: positive social interaction/affective support; emotional/information support; and material support[15], and indicated a high correlation between the dimensions of affective and interaction social support in the Brazilian population. Another way to explain our findings is that there may be a minimum limit of exposure to achieve the effects on healthier dietary patterns during pregnancy, because both the affective and interactional dimensions had the highest mean in our study population, over 80 points. Although there is no pre-established cut-off point for the MOS-SSS, which would allow the identification of levels of perceived social support, several studies have defined it arbitrarily; some authors consider a "good social support" score to be over 80 points[44].

Finally, another aspect that needs to be elucidated is that lack of social support can predict food insecurity, since support can directly help improve food access and consumption and encourage and indicate opportunities for food purchase[45]. In this sense, food insecurity can contribute both to a decrease in the quality of the diet and to an increase in the risk of developing mental disorders[46]. Therefore, food insecurity could be considered a possible factor in explaining the observed association between social support and diet.

Our study has some limitations. The first refers to the losses of follow-up, which are an important challenge in cohort studies due to the longitudinal design, especially those initiated in the prenatal period[47]. Although there was no significant loss during the study period, our final sample presented lower alcohol consumption than non-included participants, which was the only differential variable between groups. The lower reported alcohol consumption could indicate that our sample shows greater social support and concern for diet habits than nonincluded women, thus overestimating our findings. However, no significant association was observed between alcohol consumption and gestational dietary patterns, suggesting a minimal possibility that this difference biases our results. Another limitation refers to the FFQ that relies on memory and, therefore, may be subject to under- or over-reporting, despite being the most widely used dietary instrument applied in epidemiological investigations[48]. The dietary patterns driven by principal component analysis identify foods correlated in the study sample, and the results are unlikely to be generalizable to other samples. Furthermore, the small sample size may have prevented us from detecting other associations between social support and dietary patterns due to lack of power, and by not exploring subgroup analysis in the main covariates. The magnitude of the association was relatively small, and we cannot rule out a possible bias due to residual confounding. Finally, the study sample included women who attended a single public health center and data collection was carried out about 10 years ago; therefore, extrapolating our findings should be done with caution.

Despite these limitations, our study has important strengths. Our study protocol was based on standard questionnaires, qualified and trained teamwork, and high commitment to reduce follow-up losses, resulting in a high response rate. All these qualifications ensured the internal validity of this study. Social support and food consumption were investigated using previously validated instruments that increase the reliability and reproducibility of our findings. In addition, five dimensions of social support were studied and the evaluation of food consumption using the dietary pattern approach allowed us to consider the combination and interaction of foods rather than nutrients or specific foods[12,13].

CONCLUSION

This cohort study showed that affective and interaction social support increased adherence to healthy eating patterns, regardless of the socioeconomic, demographic, and psychological characteristics of pregnant women, which is why social support should be considered in the design of interventions for pregnant women, especially those that promote healthier eating habits.

AUTHORS' CONTRIBUTIONS

FSS: Formal analysis, Investigation, Visualization, Writing – original draft. IDV: Formal analysis, Investigation, Writing – original draft. AAFV: Data curation, Investigation, Methodology, Supervision, Writing – review & editing. GK: Funding acquisition, Methodology, Resources, Supervision, Writing – review & editing. JSV: Conceptualization, Data curation, Investigation, Methodology, Supervision, Writing – review & editing.

DATA AVAILABILITY STATEMENT

The datasets generated and/or analyzed during the study are available from the corresponding author upon request.

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