Factors associated with physical violence against pregnant women from São Luís, Maranhão State, Brazil: an approach using structural equation modeling

Fatores associados à agressão física contra gestantes em São Luís, Maranhão, Brasil: uma abordagem com modelagem de equações estruturais

Factores asociados a la agresión física contra embarazadas en São Luís, Maranhão, Brasil: un enfoque con modelos de ecuaciones estructurales

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Abstract

The factors associated with physical violence against pregnant women were analyzed in a cross-sectional study of 1,446 pregnant women from a prenatal cohort who were interviewed in 2010 and 2011 in São Luís, Brazil. In the initial model, socioeconomic status occupied the most distal position, determining sociodemographic factors, social support and the behavioral factors that ultimately determined physical violence, which was investigated as a latent variable. Structural equation modeling was used in the analysis. Pregnant women who were from more disadvantaged backgrounds (p = 0.027), did not reside with intimate partners (p = 0.005), had low social support (p < 0.001) and had a high number of lifetime intimate partners (p = 0.001) reported more episodes of physical violence. Low social support was the primary mediator of the effect of socioeconomic status on physical violence. The effect of marital status was mainly mediated by a high number of lifetime intimate partners.

Pregnant Women; Prenatal Care; Violence Against Women

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Introduction

The expression violence against women expresses gender violence associated with unequal power relations that reflect the dominance of the male over the female [1].

Considered as a violation of human rights and a public health problem [1,2,3], gender violence is conceived as any threat or act of violence based on gender that was found to or that appeared to cause injuries or physical, sexual or psychological suffering to women, such as coercion or arbitrary deprivation of freedom, occurring either in a public or private place [2,3].

Violence perpetrated against pregnant women has been highlighted as being more frequent than the complications that are routinely investigated before birth, such as pre-eclampsia and diabetes [4]. Its prevalence varies from 0.9% to 57.1%, depending on the methods used to measure it and on sociocultural characteristics [4,5,6,7]. In Brazil, researchers of the *WHO Multi-Country Study on Women's Health and Domestic Violence Against Women* found an 8% prevalence of abuse of pregnant women in the municipality of São Paulo and an 11.1% prevalence in Zona da Mata of Pernambuco State [1]. The prevalences of physical violence against pregnant women, the most investigated type of violence, varied from 1.2% to 40% [4,5,6,7].

Violence during pregnancy has been associated with socioeconomic, demographic and behavioral factors. The results regarding the associations between age, minority status, education, employment status, income level and parity with physical violence against pregnant women have been inconclusive. In addition, most studies have only used bivariate analyses and were performed in health services with homogeneous samples, which are prone to selection bias [4].

In a multi-centre study performed in sixteen states of the United States, physical abuse was more frequent among pregnant women who were young, unmarried, had less than 12 years of education, were non-white, received Medicaid benefits, and had an unintended pregnancy and in women with stressful experiences during pregnancy. In that study, only bivariate analysis results were reported [8].

A study in China, which used multiple logistic regression and the *Abuse Assessment Screen* to assess violence, showed a greater risk of physical maltreatment in women who had less than 9 years of education, had unemployed partners and were in a patriarchal family situation and those who smoked cigarettes and used alcohol and non-prescription drugs [9].

In Brazil, in São Paulo, no association was found between schooling and social class of pregnant women and physical abuse by an intimate partner [10]. Another study conducted in Rio de Janeiro revealed that physical violence was more frequent against adolescent pregnant women who had a low educational level, did not work outside the home, had fewer prenatal appointments, had low levels of social support, were from low-income families, had three or more children aged less than five and who reported use of alcohol [11]. In Campinas (São Paulo), pregnant women with low schooling and women who were heads of their household were more exposed to physical and sexual violence [12]. In another study in Rio de Janeiro, physical violence was more frequent among pregnant adolescents who reported use of alcohol [13].

Most studies have used bivariate or multivariable analyses by means of logistic regression [4,5,11,12,13]. There are criticisms of this type of analysis because it only investigates direct relationships between explanatory variables and an outcome, not allowing for the evaluation of intermediate paths, i.e., indirect or mediation effects [14,15].

From this perspective, investigations that view violence as a phenomenon with multiple causes are still required, and statistical analyses that consider the factors associated with the causes as a complex interconnected structure should be conducted [1,16].

This article had the objective of analyzing the factors associated with physical violence perpetrated against pregnant women who used prenatal services in the municipality of São Luís (Maranhão State). For this purpose, we used structural equation modeling, which allowed for simultaneous evaluation of direct and indirect effects of several variables on physical violence against pregnant women [14,15].

Methods

This cross-sectional study used data collected from the BRISA prenatal cohort, which investigated new etiologic factors for preterm birth in São Luís from 2010 to 2011.

Participants and sample

Pregnant women who used prenatal services in the municipality of São Luís were enrolled in the study from 2010 onwards to be interviewed from the 22nd to the 25th weeks of their pregnancy. Having their first ultrasound performed at less than 20 weeks of pregnancy and intending to give birth at one of the maternity hospitals in the municipality were criteria for inclusion. Women with multiple pregnancies were excluded.

To analyze the factors associated with physical violence, a minimum number of 948 women would be necessary based on a type I error of 5%, a power of 80% and a prevalence of violence against pregnant women of 11.1% [1] (estimate of the WHO Multi-Country Study in the Zona da Mata region of Pernambuco for violence during pregnancy).

From February 2010 to June 2011, 1,447 pregnant women participated in the study, which was conducted at the Clinical Research Centre (CEPEC) of the Federal University of Maranhão (UFMA). One interviewed woman was not included in this study because she failed to complete the questions on violence during pregnancy; thus, there was a total of 1,446 observations.

A convenience sample was used because it was not feasible to obtain a random sample representative of the population of pregnant women of São Luís.

Data collection and storage

Two questionnaires were used to collect data in the BRISA prenatal cohort. The *Prenatal Interview Questionnaire*, applied by interviewers, obtained information on the socioeconomic status, sociodemographic characteristics and behavioral factors of the pregnant women. From the *Self-Applied Prenatal Questionnaire*, which was answered individually by the pregnant women, data were extracted on physical violence during pregnancy and social support. Questions about perpetrators and episodes were asked.

Constructs and indicator variables

All variables were declared categorical in Mplus version 7.31 (Muthén & Muthén, Los Angeles, U.S.A.). Socioeconomic status, social support, and physical violence were treated as latent variables. Sociodemographic characteristics and pregnant women's behavioral factors were considered observed variables. The latent variable physical violence against pregnant women was a first-order construct that was considered the outcome.

Physical violence against pregnant women was obtained from the Brazilian version of the WHO Multi-Country Study questionnaire through six questions used to identify physical violence during pregnancy perpetrated by different subjects, not only by the women's intimate partners. The pregnant women replied to the following situations: since you became pregnant has someone (V5) slapped you or thrown something at you that could hurt you?; (V6) pushed or shoved you, hit you with a fist or something else that could hurt?; (V7) hit you with his/her fist or with some other object that could have hurt you?; (V8) kicked, dragged or beaten you up?; (V9) choked or burnt you on purpose?; and (V10) threatened you with, or actually used, a gun, knife or other weapon against you? Each of these questions on physical violence had the following possible response options: (a) never, (b) once, (c) rarely and (d) frequently [17].

The instrument *Scale of Social Support* from the *Medical Outcomes Study* (MOS) was used to investigate the tangible (four questions), positive social interaction (four questions), affectionate (three questions) and emotional/informational (eight questions, of which four were on emotional support and another four on informational support) dimensions of social support. The interviewed women replied with the frequency with which they could rely on someone in the following scenarios: (A9) to help you if you were confined to bed; (A10) you can count on to listen to you when you need to talk; (A11) to give you good advice about a crisis; (A12) to take you to the doctor if you needed it; (A13) who shows you love and affection; (A14) to have a good time with; (A15) to give you information to help you understand a situation; (A16) to confide in or talk to about yourself or your problems; (A17) who hugs you; (A18) to get together with for relaxation; (A19) to prepare your meals if you were unable to

do it yourself; (A20) whose advice you really want; (A21) to do things with to help you get your mind off things; (A22) to help with daily chores if you were sick; (A23) to share your most private worries and fears with; (A24) to turn to for suggestions about how to deal with a personal problem; (A25) to do something enjoyable with; (A26) who understands your problems; and (A27) to love and make you feel wanted. The social support questions had the following response options: (a) never, (b) rarely, (c) sometimes, (d) almost always and (e) always [18]. Social support was analyzed as a second-order latent construct consisting of the tangible, positive social interaction, affectionate and emotional/informational dimensions.

The instruments used to investigate physical violence [17] and social support [19] were validated in Brazil. The *World Health Organization Violence Against Women* (WHO VAW) instrument was validated for this cohort of pregnant women [20].

Socioeconomic status, a more distal latent variable, was investigated as a first-order construct and consisted of the following observed variables: (a) occupation of the head of family (unskilled manual laborer, semi-specialized manual laborer, specialized manual laborer, office worker, higher level professional and administrator/manager/director/owner); (b) years of study of the pregnant woman (0 to 4, 5 to 8, 9 to 11, 12 or more); (c) family income in multiples of the monthly Brazilian minimum wage (less than 1, 1 to less than 3, 3 to less than 5 and 5 or more); and (d) Brazilian economic class (D/E, C and A/B). The instrument used to measure economic class was designed by the Brazilian Association of Research Companies (ABEP) [21]. The monthly minimum wage in 2010 was BRL 510.00.

All of the observed variables were categorized in increasing order: age group of the pregnant woman and of the resident intimate partner within the household (up to 19, 20-24, 25-29 and 30 years or over); number of resident children of the pregnant woman (no children, 1 child, 2 children and 3 or more children); years of study of the resident intimate partner (0 to 4, 5 to 8, 9 to 11, 12 or more); and number of male intimate partners with whom the pregnant woman has had a sexual relationship in her life (1 partner, 2 or 3 partners, 4 or 5 partners and 6 or more). The marital status of the pregnant woman was categorized as married, consensual union, unmarried/widow or divorcee/separated. Abuse of alcohol by the pregnant woman, considered as consumption of four or more alcohol units on a single occasion, was categorized as "no alcohol consumption", "no abuse" or "abuse" .

The interviewers or field coordinators reviewed the responses of the pregnant women before the data were entered. Inconsistencies were corrected whenever possible. The data were recorded in an Access 2007 (Microsoft Corp.) spreadsheet through double independent entry. Errors and inconsistencies were verified. After final correction, the data were transferred to Stata version 12.0 (StataCorp LP, College Station, U.S.A.), and subsequently to Mplus, version 7.31, to perform the statistical analyses.

Descriptive analysis and structural equation modeling

In the descriptive analysis, physical violence was considered to have occurred when the interviewee answered yes to at least one of the six questions. Frequencies and percentages were calculated in Stata.

In the proposed initial theoretical model (Figure 1), socioeconomic status occupied the most distal position, determining sociodemographic characteristics, social support and women's behavioural factors, which ultimately determined the outcome of physical violence.

Structural equation modeling, a multivariate statistical analysis technique, allows the researcher to analyze patterns of correlations between observed variables (or indicators) and latent variables and to test hypotheses in addition to proposing alternative models to the initial one [14] was used. The analysis was conducted using Mplus software. Because all variables were categorical, the mean and variance adjusted weighted least squares estimator (WLSMV) were used. Theta parameterization was used to control for residual differences in variances.

To determine whether the models had a good fit, the following indices were considered: (a) a p-value (p) greater than 0.05 for the chi squared test (χ^2) [14]; (b) a p-value less than 0.05 and an upper limit of the 90% confidence interval (90%CI) lower than 0.08 for the Root Mean Square Error of Approximation (RMSEA); (c) values greater than 0.95 for the Comparative Fit Index and the Tucker Lewis Index (CFI/TLI); and (d) a Weighted Root Mean Square Residual (WRMR) value lower than 115.

Figure 1

Initial hypothesized structural equation model of direct and indirect effects of social support, sociodemographic and behavioral factors on physical violence against pregnant women. São Luís, Maranhão State, Brazil, 2010-2011.
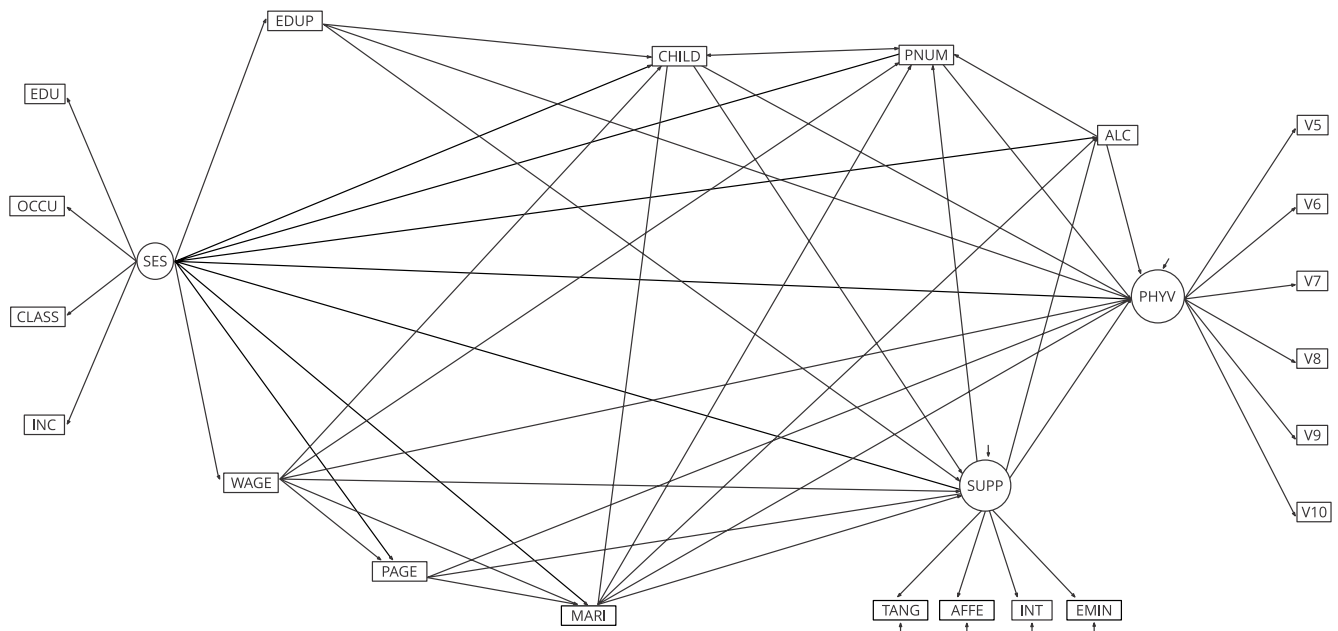
AFFE: affectionate support; ALC: abuse of alcohol by the pregnant woman; CHILD: number of resident children of the pregnant woman; CLASS: economic class Brazil; EDU: years of study of the pregnant woman; EDUP: years of study of the resident intimate partner; EMIN: emotional/informational support; INC: family income; INT: positive social interaction support; MARI: marital status of the pregnant woman; OCCU: occupation of the head of family; PAGE: age group of the resident intimate partner; PHYV: physical violence against pregnant woman; PNUM: number of intimate partners in the woman's life; SES: socioeconomic status; SUPP: social support; TANG: tangible support; V5: question number 5 of physical violence; V6: question number 6 of physical violence; V7: question number 7 of physical violence; V8: question number 8 of physical violence; V9: question number 9 of physical violence; V10: question number 10 of physical violence; WAGE: age group of the pregnant woman.

To obtain suggestions of modifications to the initial hypotheses, the *modindices* command was used to calculate the modification indices. When the proposed modifications were considered acceptable from a theoretical viewpoint, a new model was elaborated and analyzed.

Ethical aspects

The research that led to this article was compliant with the requirements of *Resolution n. 196/96* of the Brazilian National Health Council and its supplementary regulations and was approved by the Ethics Research Committee of the University Hospital of the UFMA (Opinion n. 4771/2008-30). All women signed an Informed Consent Form. The researchers declare that there were no conflicts of interest.

Results

The results of the descriptive analysis are shown in Table 1. Approximately 12% of the interviewees were less than or equal to 19 years of age, 75% had 9-11 years of study, 3% lived with three or more children, 22% were married and 57% lived in a consensual union. Approximately 88% of the resident

Table 1

Characteristics of pregnant women, intimate partners and head of family. São Luís, Maranhão State, Brazil, 2010-2011.

Variables	n	%
Age group of the pregnant woman (years)	1,446	
Up to 19	178	12.3
20-24	476	32.9
25-29	442	30.6
30 or more	350	24.2
Years of study of the pregnant woman	1,445	
0-4	21	1.5
5-8	162	11.2
9-11	1,090	75.4
12 or more	172	11.9
Marital status of the pregnant woman	1,446	
Married	329	22.7
Consensual union	831	57.5
Unmarried/Widow	263	18.2
Divorced/Separated	23	1.6
Number of resident children of the pregnant woman	1,446	
No children	830	57.4
1	446	30.8
2	126	8.7
3 or more	44	3.1
Number of male intimate partners	1,446	
1	405	28.0
2 or 3	532	36.8
4 or 5	323	22.3
6 or more	186	12.9
Abuse of alcohol by the pregnant woman	1,446	
No alcohol consumption	1,065	73.6
No abuse	237	16.4
Abuse	144	10.0
Age group of the resident intimate partner (years)	1,151	
Up to 19	22	1.9
20-24	107	9.3
25-29	87	7.6
30 or more	935	81.2
Years of study of the resident intimate partner	1,122	
0-4	45	4.0
5-8	166	14.8
9-11	827	73.7
12 or more	84	7.5
Occupation of the head of family	1,364	
Unskilled manual laborer	396	29.0
Semi-specialized manual laborer	564	41.4
Specialized manual laborer	66	4.8
Office worker	218	16.0
Higher level professional	77	5.7
Administrator/Manager/Director/Owner	43	3.1

(continues)

Table 1 (continued)

Variables	n	%
Brazilian economic class	1,379	
D/E	225	16.3
C	933	67.7
A/B	221	16.0
Monthly minimum wage	1,403	
Less than 1	70	5.0
1 to less than 3	787	56.1
3 to less than 5	333	23.7
5 or more	213	15.2
Physical violence during pregnancy	1,443	
No violence	1,264	87.6
Once	96	6.6
Few times	34	2.4
Often	49	3.4

intimate partners were 25 years or older, and 73% of them had 9-11 years of study. The percentage of pregnant women who were part of families in economy class C was 67.7%; of those, the proportion of women who survived on less than one minimum wage was 5%. Approximately 75% of the heads of households had manual occupations. The percentage of pregnant women who abused alcohol was 10%. Approximately 3% of the pregnant women had six or more lifetime intimate partners.

The prevalence of physical violence against pregnant women was 12.4%, and 66% suffered abuse on a single occasion. Physical intimate partner violence was involved in 66% of these cases.

The initial model (Model 1), shown in Figure 1, did not show a good fit (CFI = 0.935 and TLI = 0.917; WRMR = 1.310). The modification suggestion with the highest modification index (94.710) for model 1 was to add a path from the abuse of alcohol by the pregnant woman to the number of intimate partners in the woman's life. For model 2, which also did not have a good fit (TLI = 0.942; WRMR = 1.144), the highest modification index (96.436) suggested adding a path from the number of intimate partners in the woman's life to the marital status of the pregnant woman. Model 3 showed a good fit, but the suggestion to include a path from abuse of alcohol by the pregnant woman to the marital status of the pregnant woman (modification index of 17.117) was considered plausible. After adding this last modification, the model fit improved, and no further suggested modifications were considered plausible; thus model 4 was chosen as the final model (Table 2).

In the final model, the construct physical violence and the latent variables socioeconomic status and social support had factor loadings exceeding 0.5, with p-values < 0.001 for all of their components (Table 3).

Low social support (standardized coefficient SC = -0.210 and p < 0.001) and a high number of lifetime intimate partners (SC = 0.166 and p = 0.001) had significant total and direct effects on physical violence (Table 3 and Figure 2).

Low socioeconomic status had a significant total effect (SC = -0.114 and p = 0.027) on physical violence. Its effect on violence was only indirect (SC = -0.159 and p = 0.048), as it was mediated by low social support (SC = -0.050 and p < 0.001) and living with a partner (estimate = -0.039 and p = 0.008) (Table 3).

Not living with a partner had only an indirect effect on physical violence (SC = 0.057 and p = 0.009); it was mediated by a high number of lifetime intimate partners (SC = 0.051 and p = 0.001) and social support (SC = 0.020 and p = 0.024) (Table 3).

Table 2

Fit indices of models 1 to 4. São Luís, Maranhão State, Brazil, 2010-2011.

Indices	Model 1 *	Model 2 **	Model 3 ***	Model 4 #
χ^2 ##	470.879	376.166	291.132	275.233
Degrees of freedom	164	163	162	161
p	< 0.001	< 0.001	< 0.001	< 0.001
RMSEA	0.036	0.030	0.023	0.022
90%CI	0.032-0.040	0.026-0.034	0.019-0.028	0.018-0.027
p-value	0.999	0.999	0.999	0.999
CFI	0.935	0.955	0.973	0.976
TLI	0.917	0.942	0.965	0.968
WRMR	1.310	1.144	0.970	0.934

90%CI: 90% confidence interval; CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation;
TLI: Tucker Lewis Index; WRMR: Weighted Root Mean Square Residual.
* Initial model. Highest modification index to the path from the number of intimate partners in the woman's life to abuse of alcohol by the pregnant woman (94.710);
** Highest modification index to the path from the marital status of the pregnant woman to the number of intimate partners in the woman's life (96.436);
*** Highest modification index to the path from abuse of alcohol by the pregnant woman to marital status of the pregnant woman (17.117);
# Final model. Without further suggestion of modification;
Chi squared test.

Discussion

In the São Luís BRISA prenatal cohort, physical violence was more common among pregnant women who were from more disadvantaged backgrounds, did not reside with their intimate partners, had low social support and had a high number of lifetime resident intimate partners. Physical abuse occurred indiscriminately among pregnant women of different age groups. There was also no association between the number of resident children of the pregnant women, alcohol abuse by the pregnant women, or the age and education of the resident intimate partners and physical violence.

The effect of socioeconomic status was only indirect and was completely mediated by low social support and having a companion. In the BRISA prenatal cohort, current and previous intimate partners were the main perpetrators of physical violence. It is possible to explain the effect of socioeconomic status from male domination standards. From this perspective, social and structural contexts contribute to shaping values and norms in the domestic-family environment, including gender relations. Intimate partners from families with low socioeconomic status could experience high levels of stress because of their lack of financial success, which is valued in the patriarchal culture. They could assert their domination by showing strength and power through violence when they felt challenged by women [22,23]. In this context, low social support would be an aggravating factor for women in unfavorable socioeconomic situations [6]. Low socioeconomic status together with low social support have been related to poorer health [24].

Low socioeconomic status is frequently associated with violence against pregnant women [4,5,6,11,22,25]. Researchers nevertheless use one or more variables representing this condition, and the conclusions are mostly based on bivariate analyses, which is a limitation of those studies [4,11]. With regard to intimate partner violence, it has been suggested that it would be more closely related to gender inequalities than to low socioeconomic status [26].

Low social support, represented by the material, emotional/informational, affective and positive social interaction dimensions, was associated with physical violence during pregnancy in São Luís and mediated the indirect effects of socioeconomic status and marital status on physical violence

Table 3

Factor loadings, standard errors and p-values of direct and indirect effects for indicator variables and constructs.
São Luís, Maranhão State, Brazil, 2010-2011.

Paths and estimates	Factor loading	Standard error	p-value
Latent variables			
SES			
ses BY edu	0.576	0.029	< 0.001
ses BY occu	0.564	0.024	< 0.001
ses BY inc	0.692	0.024	< 0.001
ses BY class	0.778	0.023	< 0.001
PHYV			
phyv BY v5	0.915	0.023	< 0.001
phyv BY v6	0.840	0.028	< 0.001
phyv BY v7	0.911	0.028	< 0.001
phyv BY v8	0.924	0.022	< 0.001
phyv BY v9	0.834	0.069	< 0.001
phyv BY v10	0.715	0.062	< 0.001
SUPP			
supp BY tang	0.779	0.016	< 0.001
supp BY affe	0.843	0.014	< 0.001
supp BY int	0.902	0.011	< 0.001
supp BY emin	0.882	0.011	< 0.001
Direct effects			
phyv ON ses	0.045	0.116	0.696
phyv ON supp	-0.210	0.052	< 0.001
phyv ON wage	-0.117	0.090	0.189
phyv ON mari	0.112	0.067	0.093
phyv ON child	0.131	0.071	0.065
phyv ON pnum	0.166	0.049	0.001
phyv ON alc	0.041	0.055	0.458
phyv ON page	-0.146	0.099	0.142
phyv ON edup	-0.128	0.123	0.298
wage ON ses	0.083	0.032	0.009
mari ON ses	-0.277	0.038	< 0.001
child ON ses	-0.269	0.057	< 0.001
pnum ON ses	0.018	0.035	0.599
alc ON ses	0.132	0.044	0.002
page ON ses	-0.269	0.040	< 0.001
edup ON ses	0.633	0.030	< 0.001
supp ON ses	0.263	0.060	< 0.001
supp ON wage	-0.179	0.042	< 0.001
supp ON mari	-0.084	0.035	0.015
supp ON child	0.030	0.041	0.460
supp ON page	0.022	0.054	0.688
supp ON edup	-0.043	0.060	0.475
pnum ON supp	-0.037	0.031	0.235
alc ON supp	-0.037	0.037	0.306
mari ON wage	-0.061	0.042	0.145
mari ON page	-0.212	0.063	0.001
child ON wage	0.446	0.029	< 0.001

(continues)

Table 3 (continued)

Paths and estimates	Factor loading	Standard error	p-value
Direct effects			
child ON mari	-0.149	0.034	< 0.001
child ON pnum	-0.023	0.034	0.494
child ON edup	-0.059	0.058	0.313
pnum ON wage	0.191	0.029	< 0.001
pnum ON mari	0.258	0.030	< 0.001
pnum ON alc	0.309	0.033	< 0.001
alc ON mari	0.166	0.040	< 0.001
page ON wage	0.424	0.040	< 0.001
Indirect effects			
ses → phyv			
Total	-0.114	0.051	0.027
Indirect	-0.159	0.086	0.048
ses to phyv via supp	-0.050	0.014	< 0.001
ses to phyv via mari	-0.039	0.015	0.008
supp → phyv			
Total	-0.219	0.052	< 0.001
Indirect	-0.009	0.006	0.135
wage → phyv			
Total	-0.081	0.051	0.112
Indirect	0.037	0.059	0.536
mari → phyv			
Total	0.169	0.060	0.005
Indirect	0.057	0.022	0.009
mari to phyv via supp	0.020	0.009	0.024
mari to phyv via pnum	0.051	0.016	0.001
child → phyv			
Total	0.124	0.072	0.084
Indirect	-0.007	0.009	0.473
page → phyv			
Total	-0.186	0.098	0.057
Indirect	-0.041	0.019	0.035
edup → phyv			
Total	-0.126	0.123	0.305
Indirect	0.002	0.016	0.891

AFFE: affectionate support; ALC: abuse of alcohol by the pregnant woman; BY: Mplus command to derive latent variables; CHILD: number of resident children of the pregnant woman; CLASS: economic class Brazil; EDU: years of study of the pregnant woman; EDUP: years of study of the resident intimate partner; EMIN: emotional/informational support; INC: family income; INT: positive social interaction support; MARI: marital status of the pregnant woman; OCCU: occupation of the head of family; ON: Mplus command to estimate path coefficients; PAGE: age group of the resident intimate partner; PHYV: physical violence against pregnant woman; PNUM: number of intimate partners in the woman's life; SES: socioeconomic status; SUPP: social support; TANG: tangible support; V5: question number 5 of physical violence; V6: question number 6 of physical violence; V7: question number 7 of physical violence; V8: question number 8 of physical violence; V9: question number 9 of physical violence; V10: question number 10 of physical violence; WAGE: age group of the pregnant woman.

against pregnant women. Low levels of social support may be related to high levels of stress and may thus contribute to increased risk of violence [6]. Social support, evaluated by the MOS instrument, has also been associated with violence in a bivariate analysis of a study conducted in the municipality of Rio de Janeiro [11].

Figure 2

Final structural equation model estimates of direct and indirect effects of social support, sociodemographic and behavioral factors on physical violence against pregnant women. São Luís, Maranhão State, Brazil, 2010-2011.
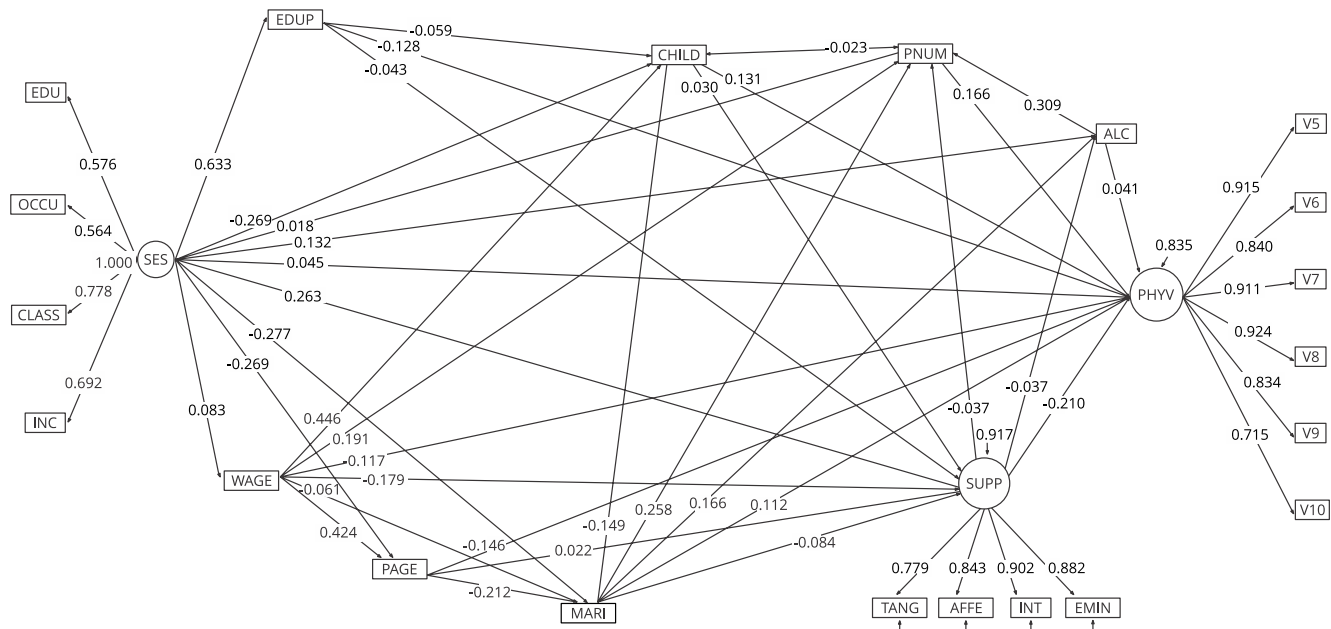
AFFE: affectionate support; CHILD: number of resident children of the pregnant woman; CLASS: economic class Brazil; EDU: years of study of the pregnant woman; EDUP: years of study of the resident intimate partner; EMIN: emotional/informational support; INC: family income; INT: positive social interaction support; MARI: marital status of the pregnant woman; OCCU: occupation of the head of family; PAGE: age group of the resident intimate partner; PHYV: physical violence against pregnant woman; PNUM: number of intimate partners in the woman's life; SES: socioeconomic status; SUPP: social support; TANG: tangible support; V5: question number 5 of physical violence; V6: question number 6 of physical violence; V7: question number 7 of physical violence; V8: question number 8 of physical violence; V9: question number 9 of physical violence; V10: question number 10 of physical violence; WAGE: age group of the pregnant woman.

Having had six or more lifetime intimate male partners was associated with physical abuse against pregnant women in the BRISA cohort. A similar result was found for psychological violence against pregnant women in the same cohort [27]. The effect of the number of intimate male partners on violence was direct and positive, and it was the main mediator of the effect of marital status on physical violence. This is a variable that also reflects gender violence. A possible explanation for this finding could be that when a male partner knows that his wife/companion/girlfriend has had other male partners, he may perceive a lack of control of the woman's body that results in violence [5]. A systematic review revealed a higher risk of violence for pregnant women who had had more than five intimate partners in their lives [6]. Another review of the literature also concluded that pregnant women with 5 or more lifetime intimate partners tended to suffer from a greater number of episodes of violence [7].

With regard to marital status, it was found in this study that not living with a partner had only an indirect effect on physical violence, as it was mediated by a high number of lifetime intimate partners and social support. Women without resident partners (single, widowed, and separated/divorced women) had more lifetime intimate partners and high social support and were more exposed to physical violence during pregnancy. This situation also seems to indicate gender conflicts that result in violence [4]. A study in sixteen states of different countries found a higher frequency of physical violence

during pregnancy in unmarried women through a bivariate analysis [8]. A literature review showed a greater risk of violence for women who are separated or divorced during the gestational period [4].

The lack of associations between physical violence and the age of the pregnant women, the age of the partner, the partner's education and alcohol abuse by the woman, which was found in other publications, could be due to the sociocultural diversity of the samples or because different types of violence (and not only physical violence) were investigated. Furthermore, data were collected in different periods of the women's life (pregnancy, postpartum or other situation), and the methodological choices regarding sample selection, measurement of violence and methods of adjustment for confounding factors also differed between these studies. Some studies only assessed intimate partner physical violence [4,5]. In a review of African studies, most researchers developed their own questionnaire to measure violence [5], making it difficult to perform comparisons. Most studies used logistic regression to analyse data [4,5], which is not the most appropriate statistical method to test associations in complex phenomena such as violence [14,15].

The use of structural equation modeling in this analysis is one of the main strengths of this study. It allowed the construction of latent variables to study violence, social support and socioeconomic status, phenomena that are difficult to measure; improvement of the originally proposed model by adding paths suggested by the modification indices; and assessment of the direct and indirect effects of socioeconomic status, social support and other variables on violence [4,15]. In the literature consulted, no articles were found that had used socioeconomic status, social support and violence as latent constructs or that had used structural equation modeling in its data analyses [4,5,6,7].

A limitation of this study was that it was not representative of the population of pregnant women of the municipality of São Luís, as a convenience sample was used. Additionally, this was a cross-sectional study, thus it was difficult to assess the temporality of the associations, and they were prone to reverse causality. Another limitation is that only data regarding resident partners were collected. Finally, we must consider that the authors investigated physical violence perpetrated by different subjects (intimate partners, other family members or known and unknown persons), not just physical violence by the intimate partner.

Conclusion

Knowledge of the factors associated with physical maltreatment of pregnant women enables prevention and assistance to women in situations of violence during the prenatal period. Healthcare professionals may thus provide more effective guidance to pregnant women who have a greater risk of suffering violent episodes during pregnancy.

Structural equations modeling allowed for more explicit knowledge of how the factors included were related to each other by demonstrating the direct and indirect influences of the factors on physical violence against pregnant women, as well as their intercorrelations. Low social support and a high number of lifetime intimate partners had effects on physical violence during pregnancy. Low socioeconomic status was associated with physical violence against pregnant women; this effect was only indirect and was wholly mediated by low social support and living with a partner. Single mothers, widows and women who were separated/divorced were more battered when they had more lifetime intimate partners and high social support. The effect of not living with a companion on violence was only indirect and was mediated by high social support and having more lifetime intimate partners.

In conclusion, physical violence was a common phenomenon during pregnancy among women interviewed in the BRISA study, and low social support, low socioeconomic status, a high number of lifetime intimate partners and living without a companion increased the risk of physical violence, which was mostly manifested as gender violence.

Contributors

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Resumo

Foram analisados fatores associados à agressão física contra gestantes, em um estudo transversal com uma amostra de 1.446 mulheres de uma coorte pré-natal, entrevistadas em 2010 e 2011 em São Luís, Maranhão, Brasil. No modelo inicial, o nível socioeconômico ocupou a posição mais distal, determinando os fatores sociodemográficos, de apoio social e comportamentais, que por vez determinavam a violência física, investigada enquanto variável latente. A análise usou modelagem de equações estruturais. O relato de mais episódios de violência física esteve associado estatisticamente ao nível socioeconômico mais baixo (p = 0,027), não residir com parceiro (p = 0,005), apoio social baixo (p < 0,001) e alto número de parceiros na vida (p = 0,001). Apoio social baixo apareceu como o principal mediador do efeito do nível socioeconômico sobre a violência física. O efeito do estado conjugal foi mediado principalmente pelo número de parceiros na vida.

Gestantes; Cuidado Pré-Natal; Violência contra a Mulher

Resumen

Se analizaron factores asociados a la agresión física contra embarazadas, en un estudio transversal con una muestra de 1.446 mujeres de una cohorte prenatal, entrevistadas en 2010 y 2011 en São Luís, Maranhão, Brasil. En el modelo inicial, el nivel socioeconómico ocupó la posición más distal, determinando los factores sociodemográficos, de apoyo social y comportamentales, que a su vez determinaban la violencia física, investigada como variable latente. El análisis usó modelos de ecuaciones estructurales. El relato de más episodios de violencia física estuvo asociado estadísticamente al nivel socioeconómico más bajo (p = 0,027), no residir con pareja (p = 0,005), apoyo social bajo (p < 0,001) y alto número de parejas en la vida (p = 0,001). El apoyo social bajo apareció como el principal factor del efecto del nivel socioeconómico sobre la violencia física. El efecto del estado conyugal fue medido principalmente por el número de parejas en la vida.

Mujeres Embarazadas; Atención Prenatal; Violencia contra la Mujer