Violence and depressive symptoms during pregnancy in BRISA cohort: using structural equation modeling approach

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Abstract

Objectives: to analyze associations among violence against pregnant women, depressive symptoms during pregnancy and maternal depression symptoms.

Methods: a sample of 1,139 mothers was conducted on a prenatal cohort study in the municipality of São Luís in Brazil. Psychological and physical violence against pregnant women were measured by the World Health Organization Violence Against Woman. Depressive symptoms during pregnancy were measured by the Escala de Depressão do Centro de Estudos Epidemiológicos (CES-D) (Depression Scale for Epidemiological Studies Center) and maternal depression symptoms were measured by the Edinburgh Postnatal Depression Scale (EPDS). The conceptual model of the structural equation modeling contained socioeconomic situation, social support, psychological and physical violence and depression during pregnancy as determinants of the maternal depression symptoms.

Results: maternal depression symptoms were more frequently reported by pregnant women who suffered psychological violence (Standardized Coefficient, SC=0.256; p-value, p<0.001), physical violence (SC=0.221 p<0.001) and those who presented depressive symptoms during pregnancy SC=0.322, p<0.001). Depressive symptoms during pregnancy mediated the effects on physical and psychological violence on maternal depression.

Conclusions: pregnant women who were submitted to psychological and physical violence and presented depressive symptoms during pregnancy frequently reported more of having maternal depression symptoms.

Key words *Violence against women, Pregnancy, Depression*

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Introduction

Depression is the most common mental disorder during pregnancy and the main risk factor for perinatal depression. Some studies have suggested that depression during pregnancy tends to persist during the postpartum period in about half the cases.[1]

Approximately 10% of the pregnant women and 13% of the women during the first year of postpartum experience some type of mental disorder, especially depression and anxiety in high income countries.[2] A meta-analysis systematic review showed a 5.9% rate of mental disorders during pregnancy and a 19.8% rate in the immediate postpartum period in middle and low income countries, but when the symptoms were self-reported, the percentages were lower (13.4%) compared to the diagnostic evaluation (21.7%).

Low socioeconomic level, low schooling level and a previous history of mental disorders were associated with mental disorders during the first year of postpartum.[2]

Violence against pregnant women can affect their physical and mental health, social and working life, as well as their ability to take care of themselves and their children.[3] A meta-analysis systematic review of 67 publications, 12 of which were longitudinal studies showed that violence during pregnancy is associated to higher scores for depressive symptoms during pregnancy and postpartum period.[4]

Standardized questionnaires in identifying depression are useful to monitor mental health both at individual and populational level. The Edinburgh Postnatal Depression Scale (EPDS), a 10 item scale developed by Cox *et al*.[5] to measure depression in women during the postnatal period and has proved to be useful in evaluating women.[6] The use of the EPDS is in favor of its easy and rapid application. The high clinical value and the epidemiological scale have been confirmed by several studies and its validation has been performed in different countries, especially by applying on postpartum women.[7-9]

Although the associations between violence and depression during pregnancy are acknowledged, no studies reporting how these entities interact in order to determine postpartum depression were detected. In order to respond this question, the present study proposed a conceptual model using structural equation modeling in order to analyze the influence of physical and psychological violence against pregnant women and depressive symptoms during pregnancy on postpartum depression symptoms (Figure 1).

Methods

Study design

This is a cohort study using the cohort data entitled as "*Fatores Etiológicos do Nascimento Pré-Termo e consequências dos Fatores Perinatais na Saúde da Criança: Coortes de Nascimentos em Duas Cidades Brasileiras - BRISA*" Etiological Factors on Preterm Birth and Consequences on Perinatal Factors in Child Health: Birth Cohorts in Two Brazilian Cities – BRISA"). The data were collected in two stages: during the prenatal period (stage 1) to measure violence and during the child's second year of life (stage 2) to investigate the outcome of maternal depression symptoms.

Study Location

São Luís is the capital in the State of Maranhão, a city whose population was 1,014,837 inhabitants in 2010. The city is located in one of the poorest regions in the country, and its Human Development Index (HDI) in the year 2010 was 0.768, occupying the 249th position among the Brazilian municipalities.[10]

Participants and Sample

A convenience sample was obtained during the prenatal period due to the impossibility of obtaining a representative random sample of pregnant women in the population of São Luís.

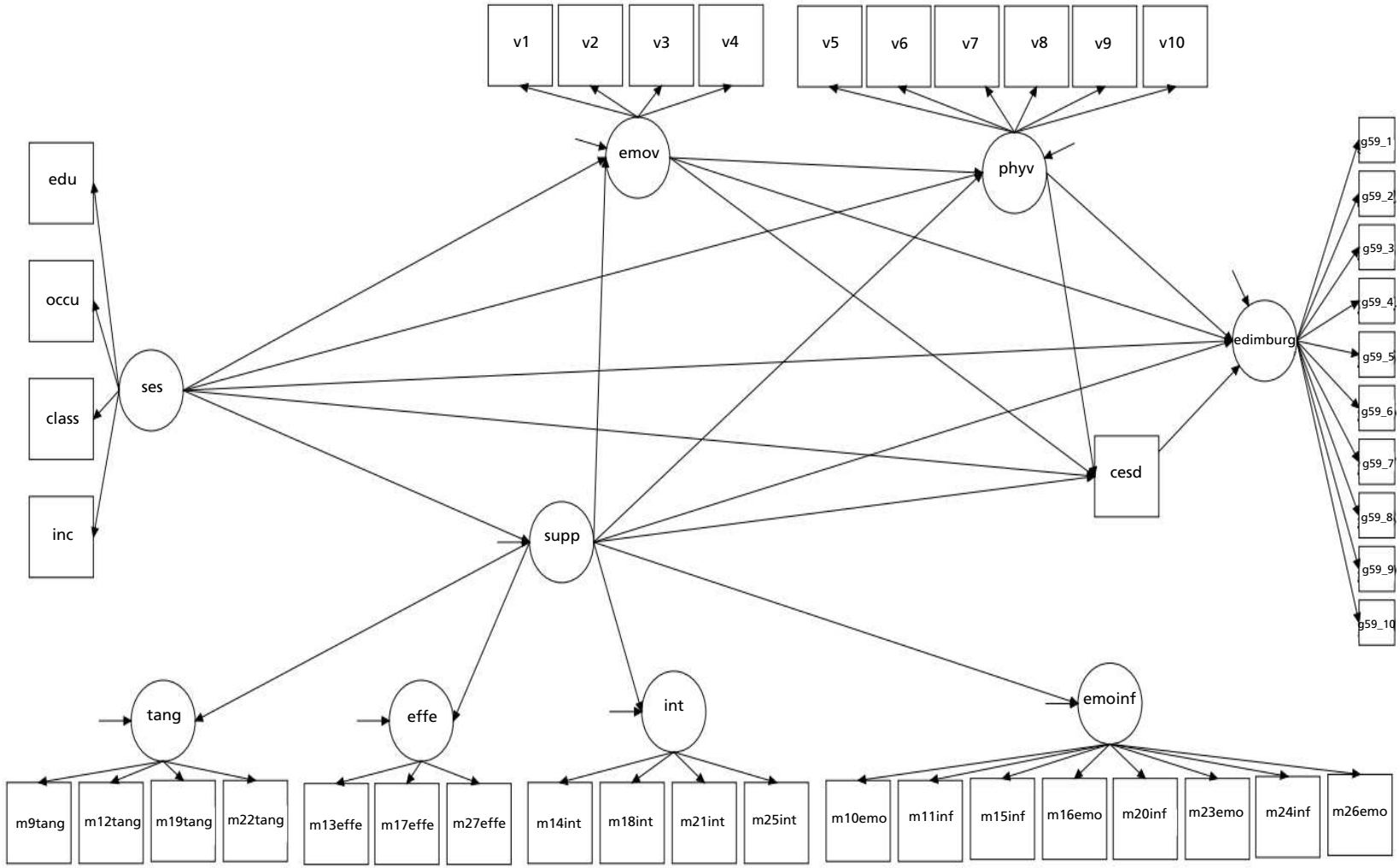
Pregnant women who were assisted in the prenatal and public service and planned their childbirth in the municipality of São Luís were invited to participate in the prenatal BRISA Cohort by following the criteria: a) have undergone an obstetrical ultrasound examination before the 20th week of pregnancy, b) gestational age of 22 to 25 weeks at the moment of data collecting, and c) have a singleton fetus.

A total of 1,447 pregnant women in the prenatal phase were interviewed from February 2010 to June 2011. According to the objective of the present investigation, one pregnant woman was excluded because she did not answer the questions about violence and maternal depression, with a final sample consisting of 1,446 women.

At the end of prenatal data collection, the women received a participation card containing information about other schedules for data collection (at birth and on the child's second year of life) and they were instructed to communicate to the investigators that they belonged to the cohort study as soon as they arrived at the hospital for the childbirth. In this study, the data collected at birth were not used.

Figure 1

Theoretical association model on violence during pregnancy and maternal depression symptoms in BRISA cohort. São Luís – MA, 2010-2013.



For the data collection on the children's second year of life, the mothers were invited by telephone contact to arrive at the *Hospital Universitário Materno Infantil* (HUMI) (Mother-Child University Hospital) for a new interview held from Monday to Saturday, when the children were in the age range of 15 to 36 months old. If they did not arrive on the scheduled day, they were invited again and a new date was rescheduled. If they refused to participate, their decision was respected. When the telephone contact was not possible, a motorcycle messenger properly identified wearing a shirt with the logotype of the project, actively searching for these mothers on the basis of their home address. Even after the telephone contact and a scheduled appointment, some mothers did not appear at the hospital (HUMI). As a last approach, the interviewers were sent to the mothers' home who had not come for the evaluation and the mothers who had stated that it would be impossible for them to come, could answer the questionnaires.

The questionnaire of stage 2 was standardized and answered, after the consent, by the mother or by a responsible guardian of the child by means of an interview. They also answered a self-applied questionnaire to collect various types of information, such as questions referring to postpartum depression symptoms.

The follow-up period data were collected from March 2011 to March 2013, a total of 1,151 mothers were evaluated and a total of 1,139 mothers responded the EPDS.

Instruments for data collection

Two questionnaires elaborated by the research coordination department were used in stage 1 of this present study: *Prenatal Interview Questionnaire* for the study on socioeconomic and demographic variables (age, marital status, the pregnant woman and the head of the family schooling, the Brazilian Economic Classification, and family income) and *Self-Applied Prenatal Questionnaire* from which information on violence, depression and social support during pregnancy were extracted.

The *Self-Applied Maternal Mental Health Questionnaire* was used in stage 2 (second year follow-up) in order to obtain information about postpartum depression symptoms. This questionnaire was also prepared by the research coordination department.

Theoretical model and variables

In the conceptual model (Figure 1), the socioeconomic situation occupied the most distal position, followed by the variables on social support, psychological violence, physical violence and depressive symptoms during pregnancy, which determined the outcome regarding the postpartum depression symptoms.

The socioeconomic situation, social support, psychological and physical violence against pregnant women were considered to be latent variables. Socioeconomic situation, psychological violence and physical violence were investigated as first-order factorial structure. Social support was investigated as second-order factorial structure. Depressive symptoms during pregnancy were investigated as an ordinal quantitative variable and postpartum depression symptoms as a dichotomous variable.

The latent variable, socioeconomic situation, was elaborated from four indicator variables: a) maternal schooling, categorized as 4, 5 to 8, 9 to 11 and 12 or more years of schooling; b) the head of the family occupation, categorized as unqualified, semi-qualified, qualified, office function, higher education professional level, and administrator/ manager/ director/ property owner; c) monthly family income, categorized as less than one national minimum wage (which in 2010 was R$ 510.00 equivalent to US$ 846,00), 1 to 3, 3 to 5, and 5 or more minimum wages; and d) economic class, categorized as D/E, C and A/B based on material ownership and the head of the family schooling level, with categories A and B having greater power of consumption.

The *Associação Brasileira de Empresas de Pesquisa* (Brazilian Association of Research Companies) instrument was used to measure the economic class based on the head of the family schooling level and on the use of consumer goods (color television, radio, bathroom, automobile, having a maid, washing machine, VCR or DVD, freezer and refrigerator).[11]

Social support was assessed using the social support scale of the Medical Outcomes Study (MOS). Social support was determined on the basis of its material dimensions (four questions), emotional/information (seven questions), affective (three questions), and positive social interaction (four questions).[11] This scale has been translated and adapted to the Brazilian Portuguese language.[12,13]

The Brazilian version of *Questionário de Violência* WHO Violence Questionnaire) was used to investigate the types of psychological and physical violence during pregnancy. This questionnaire contained questions related to psychological (6 questions), physical (6 questions) and sexual (3 questions) violence and the frequency of these events throughout the current pregnancy. The options to respond each of these 10 questions were: never, once, a few times, and many times. This question-

naire was validated for Brazil by using data obtained from São Paulo city (1,172 women) and from 15 municipalities in the "*Zona da Mata*" (forest area) in Pernambuco (1,473 women) in WHO Multi-Country Study on *Saúde da Mulher e Violência Doméstica contra Mulheres* (Woman's Health and Domestic Violence Against Women), and further validated for the population of pregnant women in the present study.[14] Sexual violence was not investigated because all the women who responded positively to one of the questions about this type of abuse had been submitted to physical violence.

To investigate psychological violence, the respondent was asked whether during the current pregnancy did anybody: a) "Insult you or made you feel bad about yourself?", b) "Belittle or humiliate you in front of other people?", c) "Do something to frighten you or scare you on purpose (e.g.: the way he looks at you, yells or breaks things)?", d) "Threaten to hurt you or somebody you like?". To investigate emotional violence, all the pregnant women who had been submitted to physical and sexual violence were excluded.

To measure physical violence, the respondent was asked whether during the current pregnancy did anybody: a) "Slap you or threw something at you that could have hurt you?", b) "Push you or shook you?", c) "Punch you or hit you with an object?", d) "Kick you, drag you or beat you up?", e) "Try to strangle you or burn you on purpose?", f) "Threaten to use or actually use a fire gun, a knife or any other type of weapon against you?".

Psychological and physical violence from any perpetrator and not only from intimate partners were included in the study.

The *Depressão do Centro de Estudos Epidemiológicos* (CES-D) (Epidemiologic Studies Depression Center) was developed to measure depressive symptoms in the general population based on a scale that measures the frequency of depressive symptoms during the week prior the application of the questionnaire. High scores reflect the intensity of discomfort that accompanies depression, but they are not diagnosed for depression.[15]

The instrument consists of 20 items. Each response may involve four grades that increase the intensity (never or rarely, sometimes, frequently, and always) corresponding the scores of 0, 1, 2 and 3). Items 4, 8, 12 and 16 (positive) are scored with inverse grading. The final score ranges from 0 to 60 points and corresponds to the sum of the scores for all the answers. The CES-D items include questions concerning mood (items 3, 4, 6, 8, 9, 10. 12, 16, 17 and 18), psychosomatic symptoms (items 1, 5 and 11), symptoms linked to social interactions (items 14, 15 and 19), and symptoms related to motor initiative (items 2, 7, 13 and 20).[15] The final score ranges from 0 to 60 points and corresponds to the sum of the scores for all the answers, and the cut-off point of 16 is generally used to discriminate subjects with possibility of depression.[16]

The depressive symptoms during pregnancy were categorized as follows: no possibility of depression (CES-D<16), moderate depressive symptoms (CES-D ≥ 16 or ≤ 21) and severe depressive symptoms (CES-D ≥ 22).[16]

The Edinburgh Depression Postpartum Scale (EPDS), a validated instrument for Brazil,[7] was used to assess postpartum depression symptoms after three months of childbirth. This is a self-recorded 10-item questionnaire internationally used in the study for postpartum depression, which intends to assess the presence and the intensity of the depressive symptoms in the last 7 days using Likert-type scale from 0 to 3. The validated version for Brazil considers a score ≥12 for "depressive symptoms" this may be the most appropriate cut-off point for this context in the country with 72% sensitivity, 89% specificity and 78% predictive value. Postpartum depression symptoms were considered to be present when the sum of the scores in the Edinburgh Scale was 12 or more.[7]

Descriptive Analysis and Structural Equation Modeling

Descriptive analysis for the determination of frequencies and percentages was performed by using the Stata software, version 12.0 (College Station, TX, USA). The association between violence against pregnant women and the outcome on postpartum depressive symptoms was investigated by using the Structural Equation Modeling, which is a statistical method that uses confirmatory factorial analysis and simultaneously estimates a series of regression equations, assessing direct and indirect effects on the outcome of the variables.[18]

Structural Equation Modeling was carried out using the Mplus software, version 7 (Los Angeles, CA, USA). Weighted Least Square Mean and Adjusted Variance were used for the continuous and categorical variables.

The following adjusted indices were used to determine if the model presented a good adjustment: a) p-value more than 0.05 for the chi-square test (χ^2); b) $p<0.05$ and an upper limit of the 95% of confidence interval lower than 0.08 for the Root Mean Square Error of Approximation (RMSEA); c) values higher than 0.95 for the Comparative Fit Index and the Tucker Lewis Index (CFI/TLI); and d) Weighted Root Mean Residual (WRMR) values lower than

1.[17]

The direct and indirect effects between variables were considered to be present when the *p* value was less than 0.05.

The *modindexes* command was used to obtain suggestions for the modification of the initial hypotheses and a new model was elaborated and analyzed if changes were considered to be theoretically acceptable.

Ethical Aspects

This study fulfilled the Resolution 196/96 criteria of the National Health Council and its complementary rules. The women were invited to participate in the study and when they agreed, they signed the written informed consent. The subject had the option to drop out of the study at any time without suffering any consequences for herself or her family during any stage of investigation. The project was approved by the Research Ethics Committee at the University Hospital – UFMA (document number 223/2009, protocol n. 4771/2008-30).

Results

Of the 1,139 pregnant women who answered the Edinburgh Questionnaire, 12.8% were up to 19 years of age and 12.1% had up to 8 years of schooling. The percentage of pregnant women belonging to D/A economic class families and receiving less than one minimum wage was 15.5% and 4.6%, respectively (Table 1).

Depressive symptoms were reported by 19.7% of the mothers 2 years after childbirth. The rates on psychological and physical violence were 47.3% and 12.1%, respectively. About 20% of the women interviewed reported moderate depressive symptoms during pregnancy and 27% reported severe symptoms (Table 2).

The conceptual model showed good adjustment with no plausible suggestion of modification (Table 3). Except for the variable on the pregnant woman's schooling in the construction of the latent variable socioeconomic situation (SES), all the other factorial loads of the components on latent variables were higher than 0.5 (Table 4).

Women who suffered psychological violence during pregnancy frequently reported more postpartum depression symptoms (Standardized Coefficient, SC=0.256; $p<0.001$). This positive association occurred through a direct (SC=0.131; $p=0.016$) or an indirect (SC=0.124; $p<0.001$) route, the latter being mediated by depressive symptoms during pregnancy (SC=0.131; $p<0.001$) (Table 5).

Women submitted to physical violence during pregnancy frequently reported more postpartum depression symptoms (SC=0.221; $p<0.001$). This positive association only occurred by an indirect route (SC=0.126; $p<0.001$), with mediation of depressive symptoms during pregnancy (SC=0.126; $p<0.001$).

Women with depressive symptoms during pregnancy frequently presented more postpartum depression symptoms (SC=0.322; $p<0.001$) and reported episodes of psychological and physical violence (Table 5).

Discussion

The study of the prenatal São Luis BRISA cohort revealed that pregnant women submitted to psychological and physical violence reported depressive symptoms during pregnancy frequently reported more postpartum depression symptoms. The psychological violence association with postpartum depression symptoms occurred through direct and indirect routes, the latter was mitigated by the presence of the depression during pregnancy.

It is known that violence against pregnant women, especially if recurrent and in its severe forms, may affect the pregnant women's mental health and the women's life. It is a public health problem and a complex phenomenon whose consequences may be quite negative for the mother, fetus and child's health.[18]

A longitudinal study conducted with 272 pregnant women to identify the frequency of depressive symptoms during pregnancy and to determine its association with sociodemographic, obstetric and health variables revealed that psychological violence was a risk factor for the presence of depressive symptoms during pregnancy and for postpartum depression symptoms when the main aggressors were the partner and family members.[19]

However, it is important to point out that psychological violence is often unnoticed at the health services, therefore it is the less considered than the other types of violent acts. Thus, the high prevalence detected is important to sensitize health professionals, managers and researchers, as well as the victims themselves, for this type of violence and its negative repercussions on women's health, specifically regarding their mental health.[20]

Women submitted to physical violence during pregnancy frequently reported more postpartum depression symptoms. This positive association occurred only in an indirect manner mediated by symptoms of depression during pregnancy.

Table 1

Maternal socioeconomic and demographic characteristics of the prenatal BRISA cohort. São Luís – MA, 2010-2013.

Variables	N	%
Age (years)		
Up to 19 years	145	12.7
20 to 24 years	360	31.6
25 years or more	634	55.6
TOTAL	1,139	100
Marital status		
Married	249	21.8
Consensual union	658	57.7
Single / widow	213	18.7
Divorced	19	1.7
TOTAL	1,139	100
Schooling (years)*		
0 to 4 years	13	1.14
5 to 8 years	125	10.9
9 to 11 years	867	76.1
12 or more years	133	11.6
TOTAL	1,138	100
Income (minimum wages)*		
Less than 1	51	4.61
1 to 3	615	55.5
3 to 5	281	25.3
5 or more	160	14.4
TOTAL	1,107	100
Pregnant woman's occupation		
None	787	51.5
Unqualified	304	28.2
Semi-qualified	459	42.6
Qualified	51	4.74
Office functions	166	15.4
Higher education professional level	59	5.48
Administrators/Managers/Directors/Property Owners	38	3.53
TOTAL	1,077	100
CCEB[a]*		
D/E	168	15.4
C	747	68.7
A/B	172	15.8
TOTAL	1,087	100.0

[a] CCBE= Brazilian Economic Class Classification; *The total for each variable differed due to unknown values.

Table 2

Maternal characteristics of BRISA prenatal cohort. São Luís – MA, 2010-2013.

Variables	N	%
Violence against women	1,115	100.0
No	608	54.3
Yes	507	45.47
Depressive symptoms (during pregnancy)*	1,133	100.0
No possibility of depression	596	52.6
Moderate symptoms	228	20.1
Severe symptoms	309	27.2
Depressive symptoms during postpartum period	1,139	100.0
With depressive symptoms	224	19.7
Without depressive symptoms	915	80.3

*The total for each variable differed due to unknown values.

Table 3

Indicators of the adjusted model. São Luís -MA, 2010-2013.

Indicators	Model[a]
Chi-square (χ^2)	1.507,028
Degrees of freedom	884
p	<0.001
Root Mean Square Error of Approximation	0.025
(RMSEA)	0.023 - 0.027
90% Confidence Interval	0.990
Comparative fit index (CFI)	0.989

[a] Initial and final model, there was no plausible suggestion of modification.

Table 4

Standardized coefficient, standard error and p-values of the latent variables and the direct effects for the indicator variables. São Luís – MA, 2010-2013.

Routes and Estimates	Standardized Coefficient	Standard error	*P*
Latent Variable			
SES			
Ses BY Edu	0.463	0.051	<0.001
Ses BY Occu	0.548	0.045	<0.001
Ses BY Inc	0.684	0.043	<0.001
Ses BY Class	0.826	0.048	<0.001
EMOV			
Emov BY v1	0.863	0.040	<0.001
Emov BY v2	0.886	0.038	<0.001
Emov BY v3	0.661	0.045	<0.001
Emov BY v4	0.655	0.064	<0.001
PHYV			
Phyv BY v5	0.941	0.033	<0.001
Phyv BY v6	0.845	0.038	<0.001
Phyv BY v7	0.907	0.035	<0.001
Phyv BY v8	0.910	0.030	<0.001
Phyv BY v9	0.797	0.108	<0.001
Phyv BY v10	0.728	0.072	<0.001
EDINBURGH			
EDINBURGH BY g59_1	0.578	0.028	<0.001
EDINBURGH BY g59_2	0.644	0.032	<0.001
EDINBURGH BY g59_3	0.651	0.023	<0.001
EDINBURGH BY g59_4	0.555	0.028	<0.001
EDINBURGH BY g59_5	0.704	0.023	<0.001
EDINBURGH BY g59_6	0.580	0.024	<0.001
EDINBURGH BY g59_7	0.868	0.013	<0.001
EDINBURGH BY g59_8	0.909	0.010	<0.001
EDINBURGH BY g59_9	0.829	0.014	<0.001
EDINBURGH BY g59_10	0.755	0.029	<0.001
SUPP			
Supp BY Int	0.983	0.005	<0.001
Supp BY Emoinf	0.950	0.006	<0.001
Supp BY Effe	0.952	0.008	<0.001
Supp BY Tang	0.833	0.014	<0.001
Direct Effects			
EDINBURGH ON Ses	-0.125	0.043	0.003
EDINBURGH ON Supp	-0.055	0.036	0.127
EDINBURGH ON Emov	0.131	0.054	0.016
EDINBURGH ON Phyv	0.095	0.068	0.163
Supp ON Ses	0.238	0.036	<0.001
Emov ON Ses	0.114	0.056	0.041
Emov ON Supp	-0.182	0.047	<0.001
Phyv ON Ses	-0.025	0.070	0.721
Phyv ON Supp	-0.214	0.067	0.001
Phyv ON Emov	-0.031	0.017	0.068

continue

Ses= Socioeconomic situation, BY= Mplus command for obtaining the latent variable; edu= the pregnant woman's schooling level; occu= the head of the family occupation; inc= family income; class= economic class; emov= psychological violence against women during pregnancy; v1 to v4= questions number 1 to 4 about psychological violence; phyv= physical violence against women during pregnancy; v5 to v10= questions number 5 to 10 about physical violence; EDINBURGH= postpartum depression symptoms; g59_1 to g59_10= questions from EDINBURGH questionnaire; supp= social support; int= positive social interaction support; emoinf= emotional support/information; effe= affective support; tang= material support; Cesd= depressive symptoms during pregnancy; ON= Mplus command to estimate coefficient routes. The direct and indirect effects among the variables were considered present if the *p* was less than 0.05.

Table 4 **concluded**

Standardized coefficient, standard error and p-values of the latent variables and the direct effects for the indicator variables. São Luís – MA, 2010-2013.

Routes and Estimates	Standardized Coefficient	Standard error	*P*
Direct Effects			
EDINBURGH ON Cesd	0.322	0.059	<0.001
Cesd ON Ses	-0.161	0.047	0.001
Cesd ON Supp	-0.140	0.044	0.001
Cesd ON Emov	0.408	0.046	<0.001
Cesd ON Phyv	0.390	0.053	<0.001

Ses= Socioeconomic situation, BY= Mplus command for obtaining the latent variable; edu= the pregnant woman's schooling level; occu= the head of the family occupation; inc= family income; class= economic class; emov= psychological violence against women during pregnancy; v1 to v4= questions number 1 to 4 about psychological violence; phyv= physical violence against women during pregnancy; v5 to v10= questions number 5 to 10 about physical violence; EDINBURGH= postpartum depression symptoms; g59_1 to g59_10= questions from EDINBURGH questionnaire; supp= social support; int= positive social interaction support; emoinf= emotional support/information; effe= affective support; tang= material support; Cesd= depressive symptoms during pregnancy; ON= Mplus command to estimate coefficient routes. The direct and indirect effects among the variables were considered present if the *p* was less than 0.05.

Table 5

Standardized Coefficient, Standard error and p-value of the indirect effects for the indicator variables. São Luís – MA, 2010-2013.

Routes and Estimates	Standardized Coefficient	Standard error	*P*
Indirect Effects			
Ses → EDINBURGH			
Total	-0.199	0.039	<0.001
Indirect	-0.074	0.023	0.001
Emov → EDINBURGH			
Total	0.256	0.044	<0.001
Indirect	0.124	0.028	<0.001
Via Cesd	0.131	0.028	<0.001
Phyv → EDINBURGH			
Total	0.221	0.056	<0.001
Indirect	0.125	0.029	<0.001

Ses=socioeconomic situation; EDINBURGH= postpartum depression symptoms; emov= psychological violence against women during pregnancy; cesd= depressive symptoms during pregnancy; phyv= physical violence against women during pregnancy. The direct and indirect effects among the variables were considered present if the *p* was less than 0.05.

According to this result, a cross-sectional study conducted with 426 women from Bangladesh demonstrated a particularly strong association with postpartum depression symptoms in women submitted to physical violence before, during and after pregnancy.[21]

In this present study, the depressive symptoms during pregnancy showed a direct effect on postpartum depression symptoms. In addition, the women who suffered psychological and physical violence demonstrated that those who showed depressive symptoms during pregnancy were more vulnerable to postpartum depression symptoms.

Showing the magnitude of this association, a longitudinal study on pregnant women (n=8,323) conducted in England in order to study the association between depression during pregnancy and the postpartum period revealed that depression during pregnancy was the strongest risk factor for postpartum depression.[22]

A systematic review confirmed this finding, showing that 41.5% of the cases of maternal depression had occurred during the gestational period, and suggested that interventions for depression should start since the prenatal period.[4]

The limitations in this study were the fact that the data collection on maternal mental health was performed using instruments for mental disorders screening and not for diagnostic methods and the external validation on the findings was limited due to the use of convenience rather than a probabilistic sample. In addition, the questionnaires about violence and depression during pregnancy were applied at the same time. However, the violence instrument referred to abuse during pregnancy and the depression instrument referred to the last 7 days.

The strong points of the investigation are that this was a cohort study using international acknowledged instruments validated for Brazil and using structural equation modeling, a method that estimates a series of multiple separated regression equations and depends on one another, establishing direct and indirect linear relations among the variables. This permitted the concomitant study to interact between violence and depressive symptoms during pregnancy and postpartum depression symptoms. Most of the previous studies used bivariate or multivariable analyses by means of logistic regression,[22,23] a type of analysis that is criticized because it investigates only direct relations between explanatory variables and one result, without permitting the evaluation of intermediate routes, i.e., indirect or mediation factors.[17,24]

The main and most important finding in this present research supports the evidence that depressive symptoms during pregnancy were intimately associated to psychological and physical violence during pregnancy, contributing to the onset of postpartum depression symptoms.

These findings reinforce the importance of improving women's health at reproductive age by including them in family planning programs by monitoring and educating their emotional health which may contribute in reducing possible losses in their lives.

Authors' contributions

Ribeiro SVO and Batista RFL - Design and planning of the study. Ribeiro SVO, Batista RFL and Ribeiro MRC - Analysis, interpretation of the data and writing of the manuscript. Pessoa KC, Simões VMF, Figueiredo FP and Bettiol H - Critical review. All authors approved the final version of the manuscript.

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