Maternal depressive symptomatology during pregnancy is a risk factor affecting newborn's health: a longitudinal study

Journal:	*Journal of Reproductive and Infant Psychology*
Manuscript ID	CJRI-2018-0008.R2
Manuscript Type:	Original Article
Keywords:	Maternal depression, Prenatal attachment, Delivery experience, Newborn health, Longitudinal study

Maternal depressive symptomatology during pregnancy is a relevant risk factor affecting newborn's health: a longitudinal study

Abstract

Background: Depression symptomatology in pregnant women is a condition that represents an important risk factor for the health of both women and children.

Objectives: The aim of this study was to investigate the influence of women's depression symptomatology on the clinical aspects of their delivery, assessed through the delivery length in hours and the amount of epidural analgesia and oxytocin, both directly and indirectly, through mothers' prenatal attachment to their unborn children. Moreover, we analyzed if these aspects affect the well-being of the newborn, assessed through the Apgar score.

Methods: A longitudinal design at two different time points was carried out on a total of 203 pregnant women (M = 32.12, SD = 4.71). At week 31-32 of gestation, women filled out the Beck Depression Inventory and the Prenatal Attachment Inventory. The day of childbirth, hospital healthcare staff registered the clinical data of childbirth (duration of labor, duration of eventual administration of epidural analgesia or oxytocin, and the child's Apgar score).

Results: A woman's depressive symptomatology negatively affects prenatal attachment to her unborn child and positively affects the clinical aspects of the delivery, both directly and mediated by the quality of prenatal attachment. Moreover, the Apgar score was significantly and negatively influenced by the clinical aspects of the delivery and, indirectly, by the depressive symptomatology.

Conclusion: Depressive symptomatology during pregnancy is a relevant risk factor and has important and negative outcomes, affecting the delivery experience of women, the first emotional bond with the child, and the well-being of the newborn.

Introduction

Depression during pregnancy represents an important risk factor for a multitude of negative outcomes, both for women and their children, in the short, medium and long term (Chung, Lau, Yip, Chiu, & Lee, 2001; Grigoriadis et al., 2014; Plant, Pawlby, Sharp, Zunszain, Pariante, 2016). A large amount of consistent literature has found that depression during pregnancy may be associated with obstetric complications and puerperal pathologies, as well as fetal health. Concerning the first aspect, it has been shown that depressive symptoms during gestation were related to spontaneous abortion, increased uterine artery resistance, gestational hypertension and subsequent preeclampsia, spontaneous early labor, preterm or operative deliveries such as cesarean section or vaginal instrumental deliveries and, finally, more painful labor, which implies a stronger need for analgesia, such as epidural analgesia and / or stimulant mediations for contractile activity, such as oxytocin (Bonari et al., 2004; Pereira, Lovisi, Pilowsky, Lima, & Legay, 2009).

Mother's depression during pregnancy also has significant physiological consequences on the fetus' and child's health, such as preterm birth, neonatal growth retardation, perinatal and birth complications, low birth weight, low Apgar scores, more frequent admission to a neonatal care unit and, in severe cases, fetal death (Bonari et al., 2004; Chung et al., 2001; Grote et al., 2010).

These obstetric and perinatal complications may represent not only stressful but also traumatic experiences that, in turn, enhance the risk for maternal post-natal anxiety, depression, and post-traumatic stress disorder (Vismara, 2017). Thus, antenatal maternal depression, enhancing the risk for obstetric and perinatal complications, in turn, increases the risk for adverse psychological consequences during the post-partum period.

Given the clinical relevance of maternal prenatal depression on mother and infant outcomes, previous research has tried to define mechanisms that could explain these findings. To this aim, several potential direct and indirect causal pathways have been proposed from an overall biological perspective. A first hypothesis was that depression during pregnancy acts through the dysregulation of the hypothalamic-pituitary-adrenocortical axis, stimulating the release of stress hormones, such as cortisol and catecholamines. These biological changes may negatively affect fetal activity, fetal growth restriction leading to low birth weight or low Apgar scores, and birth complications via placental hypofusion and consequent restriction of oxygen and nutrients to the fetus (Räisänen et al., 2014). These alterations in turn predispose offspring to health problems such as chronic illness (Dunkel Schetter & Tanner 2012). Moreover, other studies revealed that babies born from depressed mothers had lower motor tone, were less active and more irritable; they also had fewer facial expressions in response to happy faces, disrupted sleep patterns, and there was increased negative reactivity in 2- to 4-month-olds (Bergner, Monk, & Werner 2008). A recent review showed substantial evidence for a relationship between prenatal maternal stress and decreases in immune function in the offspring (Veru, Laplante, Luheshi, & King, 2014). Another proposed hypothesis is that antenatal depression might compromise immune system functioning, which in turn may lead to a reproductive tract infection triggering pre-term birth (Federenko & Wadhwa, 2004; Grote et al., 2010).

Until now, however, less attention has been paid to the other environmental and affective conditions that could produce effects on the maternal–fetal–placental systems, especially during a sensitive period in the woman's life, such as pregnancy. Starting from these considerations, the main aim of this paper was to study one of most relevant of these aspects, analyzing the role that maternal prenatal attachment to child plays in direct and indirect causal pathways linking maternal depression to both the clinical aspect of delivery and child health.

Consistent literature has overall verified that the quality of maternal prenatal attachment to child is strictly linked to the woman's ability to assume an adequate maternal role after childbirth, and for this reason it could be considered an important variable on the quality of the subsequent mother-child relationship and on the child's development (Tani, Castagna & Ponti, 2017a; Walsh, Hepper, & Marshall, 2014).

Prenatal attachment could also be a protective factor for the delivery experience. In effect, given that prenatal attachment refers to the bond between mother and child during pregnancy and to maternal sensitiveness to the fetus' signals and movements, it is reasonable to suppose that this sensitivity and interconnection would also be useful during labor and delivery. It has been verified that the increase of uterine contractility during labor is regulated by a complex interplay of signals between fetus and mother (Mendelson, 2009 for a review). In this regard, Tani and colleagues reported that a low maternal attachment to child during pregnancy results to be negatively linked to the woman's delivery experience in terms of labor duration, oxytocin use, and higher analgesia use (Tani et al., 2017a).

Moreover, research showed that depression can affect a mother's emotional ability and hinder the development of her prenatal attachment to child (Ohoka et al., 2014).

Starting from these considerations, the main aim of this study was to analyze the complex

influences, both direct and indirect, that a woman's depression symptomatology and her prenatal attachment to her unborn child have on the clinical aspects of the delivery and, in turn, on the well-being of the newborn. Specifically, our purpose was to test the theoretical model reported in figure 1. We hypothesized that depression symptomatology during pregnancy could negatively affect the clinical aspects of the delivery, assessed through the delivery length in hours and the amount of epidural analgesia and oxytocin, both directly and indirectly, by impeding the development of prenatal attachment to child. Moreover, we expected that a better delivery experience could have a protective influence on the well-being of the new-born, assessed through the Apgar score.

Method

Procedure and participants

A cohort longitudinal study was carried out. Data were collected at two different time points: T1) week 31-32 of gestation; T2) the day of childbirth. At T1, all participants were asked to fill out a questionnaire with their own socio-registry and clinical data: age, educational level, work status, number of years in their couple relationship. They were also requested to complete a questionnaire to assess their depression symptomatology and their prenatal attachment to child. At T2, clinical data on childbirth were registered. Specifically, hospital healthcare staff registered the duration of labor, duration of eventual administration of epidural analgesia and oxytocin, natural vs. caesarean delivery, Apgar score at birth, and admission to the neonatal care unit.

The study was conducted in accordance with the guidelines for the ethical treatment of human participants of the Italian Psychological Association. Women were recruited when they attended delivery preparation courses, organized for pregnant women (>30 weeks of gestation),

after the Ethical Committee of the Local Health Authorities had approved the study. Data were collected in the maternity ward of a public hospital of the metropolitan area of Florence, Italy. A trained psychologist assumed the task of data collection. Inclusion criteria were to be nulliparous women, without diagnosis of depression or anxiety during the present pregnancy, not in pharmacological treatment for depression during the present pregnancy, with singleton pregnancies, no risk pregnancy, and no previous pregnancies or abortions.

All the women included were informed about the aims of the study and signed a written informed consent form. They could withdraw from participation at any time. Ninety-nine per cent of the women accepted to take part in the survey and completed the entire follow-up.

A total of 203 pregnant Italian women, aged from 18 to 42 (M = 32.12, SD = 4.71) were recruited for the present study. All participants come from central Italy and have a middle or high socioeconomic level, with 89.1 % having a high school diploma or university degree and 64% having a job. The duration of their couple relationships ranged from 1 to 17 years, with an average of 6.84 years (*SD* = 3.72).

Measures

The Beck Depression Inventory (Beck, Steer, & Brown, 1996; Ghisi, Flebus, Montano, Sanavio, & Sica, 2006) was used to detect the level of women's depression symptomatology. The BDI is a self-report measure that consists of 21 items ranging from 0 to 3. Each item is represented by four sentences indicating different levels of depression. The Italian version of the BDI presented a good factorial structure and optimal psychometric properties, both in normal and clinical samples. Specifically, the test-retest reliability (.76) and the Alpha coefficients (.80; .87) are similar to the results founded by Beck et al. (1996) in the original version. Moreover, the

concurrent validity with other measures of depression was good, ranging from .60 to .73. (Ghisi et al., 2006). In the present sample, Cronbach's value was .84.

The Prenatal Attachment Inventory (PAI) (Della Vedova, Dabrassi, & Imbasciati, 2008; Muller & Mercer, 1993) was employed to assess the mother's attachment bond to her child during pregnancy. The PAI is a self-report measure consisting of 21 items ranging from 1 (*Almost never*) to 4 (*Almost always*). For the present sample, the Cronbach's alpha was .93.

Statistical analyses

Frequency, means, standard deviation and bivariate correlation were calculated for all variables using package SPSS version 23. In order to test the hypothesized model, a Structural Equation Modeling (SEM) using package MPLUS version 5.12 (Muthén & Muthén, 1998-2007) was undertaken. The model was tested using the Maximum Likelihood estimator (ML, Muthén & Muthén, 1998), because no serious problems with skewness or kurtosis were found (see Table 1), suggesting that the data were close to a normal univariate distribution (Curran, West, & Finch, 1996; Kline, 2010; Muthen & Kaplan, 1985). The goodness of fit of the model was assessed using the χ^2 test, the Comparative Fit Index (CFI) (Bentler, 1990), the Tucker-Levis index (TLI) (Tucker & Lewis, 1973) , the Standardized Root Mean Square Residual (SRMR) (Bentler, 1995) and the Root Mean Square Error of Approximation (RMSEA) (Steiger, 1990). The CFI and the TLI indices ranged from 0 to 1. Higher values indicate a better model fit with satisfactory values of .90 or higher (Hu & Bentler, 1998). The SRMR and the RMSEA indices also ranged from 0 to 1, with lower values indicating a better model fit. Values of less than .08 were considered adequate and satisfactory (Browne & Cudek, 1993; Hu & Benxtler, 1999).

Results

Within the sample, women reported depressive symptomatology scores in the average of women in the general population. The mean score of the BDI, in fact, is close to the average score found in women in the general population of the Italian BDI adaptation (Ghisi et al., 2006). Moreover, only 5 women had a caesarean delivery. Given the low number of caesareans, that variable is not used in subsequent analyses. Regarding epidural and oxytocin use, 61 women (30%) had epidural analgesia and 74 (36.5%) oxytocin. None of the women in our sample reported a child's admission to the neonatal care unit; thus, that variable is not used in subsequent analyses.

Since both the age range of women and the duration of the close relationships are large, we have analyzed the correlation between age, duration of relationship, and severity of symptoms of depression. As expected, there is a positive correlation between age and duration of the couple relationship (r = .45). However, no significant correlation emerges between the severity of depression symptoms and the age and duration of couple relationships.

Descriptive statistics and bivariate correlations for women's depressive symptomatology, prenatal attachment, and the clinical aspects of delivery are presented in Table 1.

INSERT TABLE 1 ABOUT HERE

High levels of women's depressive symptomatology were significantly and positively associated with delivery length, epidural analgesia and oxytocin, and significantly and negatively linked to prenatal attachment to child and Apgar score. Moreover, high levels of women's

prenatal attachment to child were significantly and negatively associated to delivery length, epidural analgesia and oxytocin, and positively with the newborn's Apgar score. Delivery length, epidural analgesia and oxytocin were all significantly and positively associated with each other and negatively with Apgar score.

SEM analyses showed that the model tested has a good fit to the data ($\chi^2 = 587.313$, df = 15, $p < .000$, CFI = .97, TLI = .94, RMSEA = .07, SRMR = .04). The delivery experience was influenced negatively by women's prenatal attachment and positively by women's depressive symptomatology. Moreover, analyses revealed a significant effect of depressive symptomatology on the clinical aspects of delivery, mediated by the level of prenatal attachment (Indirect effect: β = .17, $p <.000$; CI 95%: .024, .105). Finally, the Apgar score was significantly and negatively affected both directly by the clinical aspects of the delivery, and indirectly by the depressive symptomatology (Indirect effect: β = -.27, $p <.000$; CI 95%: -.075, -.025) (Figure 1).

INSERT FIGURE 1 ABOUT HERE

Discussion

Overall, our results show that women's depression symptomatology during pregnancy promotes a worse prenatal attachment to child, and both affect the delivery experience in terms of labor length and the amount of epidural analgesia and oxytocin. These clinical aspects of delivery influence a lower Apgar score. These data are consistent with findings indicating that a depressive symptomatology during pregnancy is a relevant risk factor, affecting women's delivery experience and the well-being of the newborn (Räisänen et al., 2014). Moreover, our results also showed the relevant role played by prenatal attachment to child. A positive

interaction and warm emotional bond with the unborn child can improve the delivery experience (Tani et al., 2017a) during labor. As previous suggested, the ability of the mother to recognize the fetus' signals and to respond appropriately may be positively linked to the labor and delivery experience, where the complex interplay of signals between fetus and mother coexist (Mendelson, 2009). Our data confirmed that gestational depression has important consequences, not only for the delivery experience and for the well-being of the newborn, but also for the attachment bond between mother and child. This first emotional bond is closely linked to mother-child interaction after the birth (Tani, Castagna, & Ponti, 2017b).

These findings are highly relevant for clinical practice, suggesting that prenatal assistance is not limited to maternal physical care, but must jointly address and support affective and relational difficulties of pregnant women, which have significant consequences for the health and well-being of both the mother and child. The promotion of physical and mental health during pregnancy constitutes a target in the new millennium.

Despite the undeniable relevance of these aspects, there are some limitations to the present study. First, the test model cannot be considered exhaustive, and other variables could play a significant role in affecting the delivery experience and newborn's well-being. Moreover, it cannot be excluded that a two-way correlation could exist between prenatal attachment and maternal depression. In fact, in line with previous studies (Goetzke et al., 2012), a closer prenatal attachment of the mother to her unborn child could reduce her reported symptoms of depression during the perinatal period.

Second, we selected only psychologically healthy women, without a psychiatric diagnosis. For this reason, to better generalize our results, it is necessary to explore the complex links among these variables, also in women with a diagnosed depressive state. In this case, it would be

useful to have information about the depression history of pregnant women, their possible pharmacological or psychotherapeutic treatments, and the presence of other mental health problems, such as anxiety. Third, we contacted only nulliparous women with singleton pregnancies, no risk pregnancy, and no previous pregnancies or abortions. It is possible that a depressive symptomatology could have stronger consequences in a situation of complicated pregnancy. Fourth, we analyzed only the depressive symptomatology implicated on the clinical aspects of delivery and on the newborn‘s well-being . However, because there are other aspects involved on these outcomes, our model is not exhaustive. For example, some authors have found that the quality of maternal social support perceived by pregnant women has a significant influence on the quality of the birth experience (Tani & Castagna, 2016; Tani, Castagna, & Ponti, 2017). Another important variable is maternal anxiety during pregnancy. This aspect is linked to complication to the delivery and the well-being of the newborn (Ibanez et al., 2012). Finally, other scholars suggest taking into consideration, in addition to depressive symptomatology, neuroticism and emotional deficits, given that they could enhance vulnerability to depression. In fact, according to these previous studies, non-depressed women with high levels of neuroticism in late pregnancy were at high risk of developing postpartum depressive symptoms up to 6 months after delivery (Iliadis et al., 2015).

Therefore, a more comprehensive model could provide a profound understanding of the complex set of prenatal variables that may play a significant role in prediction of delivery experience and neonatal well-being. Finally, we used the BDI instrument to assess depressive symptomatology in pregnant women. Although we are aware that diagnosing depression in the perinatal period may be particularly challenging due to the overlap of normal perinatal symptoms

(e.g. fatigue, weight changes, sleep disturbance), the BDI, in comparison with other instruments, has proven to be a valid questionnaire for measuring depression during pregnancy (Ji et al. 2011). Despite these limitations, these results have significant implications for clinicians. On the whole, they confirm the risk condition of depressive symptomatology in pregnant women and the need for early detection and treatment of depressive symptoms during pregnancy, to facilitate and improve the well-being of the mother, the child, and the entire family.

References

Beck, A., Steer, R., & Brown, G. (1996). BDI-II, Beck depression inventory-II. *San Antonio*, 78(2), 490-498.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*(2), 238–246.

Bentler, P. M. (1995). *EQS Structural Equations Program Manual*. Multivariate Software.

Bergner, S., Monk, C., & Werner, E. A. (2008). Dyadic Intervention during Pregnancy? Treating Pregnant Women and Possibly Reaching the Future Baby. *Infant Mental Health Journal*,29(5), 399-419.

Bonari, L., Pinto, N., Ahn, E., Einarson, A., Steiner, M., & Koren, G. (2004). Perinatal Risks of Untreated Depression during Pregnancy. *The Canadian Journal of Psychiatry*, *49*(11), 726–735.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. Sociological Methods & Research, 21, 230-258.

Chung, T. K., Lau, T. K., Yip, A. S., Chiu, H. F., & Lee, D. T. (2001). Antepartum depressive symptomatology is associated with adverse obstetric and neonatal outcomes.

Psychosomatic Medicine, *63*(5), 830–834.

Curran, P. J., West, S. G., & Finch, J. F. (1996). The robustness of test statistics to nonnormality and specification error in confirmatory factor analysis. *Psychological Methods*, *1*, 16-29.

Della Vedova, A. M., Dabrassi, F., & Imbasciati, A. (2008). Assessing prenatal attachment in a sample of Italian women. *Journal of Reproductive and Infant Psychology*, *26*(2), 86–98.

Dunkel Schetter, C., & Tanner, L. (2012). Anxiety, depression and stress in pregnancy: implications for mothers, children, research, and practice. *Current Opinion in Psychiatry*, 25(2),141.

Federenko, B. I. S., & Wadhwa, P. D. (2004). Women's Mental Health During Pregnancy Influences Fetal and Infant. *CNS Spectrums*, *9*(3), 198–206.

Ghisi, M., Flebus, G. B., Montano, A., Sanavio, E., & Sica, C. (2006). *Beck Depression Inventory II. Adattamento italiano: Manuale* (Firenze: OS).

Grigoriadis, S., VonderPorter E. H., Mamisashvili, L., Tomlinson, G., Dennis, C. L., Koren, G., … Ross, L. E. (2013). The impact of maternal depression during pregnancy on perinatal outcomes: a systematic review and meta-analysis. *Journal of Clinical Psychiatry*, 74(4), 321-341.

Grote, N. K., Bridge, J. A., Gavin, A. R., Melville, J. L., Iyengar, S., & Katon, W. J. (2010). A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. *Archives of General Psychiatry*, *67*(10), 1012–24.

Hu, L., & Bentler, P. M. (1998). Fit indices in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological Methods*, *3*(4), 424–453.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis:

Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55.

Ibanez, G., Charles, M. A., Forhan, A., Magnin, G., Thiebaugeorges, O., Kaminski, M., ... & EDEN Mother–Child Cohort Study Group. (2012). Depression and anxiety in women during pregnancy and neonatal outcome: data from the EDEN mother–child cohort. *Early human development*, *88*(8), 643-649.

Iliadis, S. I., Koulouris, P., Gingnell, M., Sylvén, S. M., Sundström-Poromaa, I., Ekselius, L., … Skalkidou, A. (2015). Personality and risk for postpartum depressive symptoms. *Archives of Womens Mental Health,* 18(3), 539-46.

Mendelson, C. R. (2009). Minireview: Fetal-Maternal Hormonal Signaling in Pregnancy and Labor, *Molecular Endocrinology*, 23(7), 947–954.

Muller, M. E., & Mercer, R. T. (1993). Development of the prenatal attachment inventory. *Western Journal of Nursing Research*, *15*(2), 199-215.

Muthén, B., & Kaplan, D. (1985). A comparison of some methodologies for the factor analysis of non- normal Likert variables. *British Journal of Mathematical and Statistical Psychology*, *38*, 171-189.

Muthén, L. K., & Muthén, B. O. (1998-2007). *Mplus user' s guide.* Fifth edition. Los Angeles, CA: Muthén & Muthén.

Ohoka, H., Koide, T., Goto, S., Murase, S., Kanai, A., Masuda, T., … Ozaki, N. (2014). Effects of maternal depressive symptomatology during pregnancy and the postpartum period on infant-mother attachment. *Psychiatry and Clinical Neurosciences*, *68*(8), 631–639.

Pereira, P. K., Lovisi, G. M., Pilowsky, D. L., Lima, L. A., & Legay, L. F. (2009). Depression during pregnancy: prevalence and risk factors among women attending a public health

clinic in Rio de Janeiro, Brazil. *Cad Saude Publica*, *25*(12), 2725–2736.

Plant, D. T., Pawlby, S., Sharp, D., Zunszain, P, A. & Pariante, C. M. (2016). Prenatal maternal depression is associated with offspring inflammation at 25 years: a prospective longitudinal cohort study, *Translational Psychiatry* 6, 936.

Räisänen, S., Lehto, S. M., Nielsen, H. S., Gissler, M., Kramer, M. R., & Heinonen, S. (2014). Risk factors for and perinatal outcomes of major depression during pregnancy: a population-based analysis during 2002–2010 in Finland. *BMJ Open*, *4*(11), e004883.

Steiger, J. H. (1990). Structural Model Evaluation and Modification: An Interval Estimation Approach. *Multivariate Behavioral Research*, *25*(2), 173–180.

Tani, F., Castagna, V., & Ponti, L. (2017a). Mothers' social perceived support, anxiety and prenatal attachment to child: Which direct and indirect influences on delivery clinical indices? *International Journal of Health Sciences and Research, 7*(4), 346–352.

Tani, F., Castagna, V., & Ponti, L. (2017b). Women who had positive relationships with their own mothers reported good attachments to their first child before and after birth. *Acta Paediatrica,* 1-5.

Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, *38*(1), 1–10.

Veru, F., Laplante, D. P., Luheshi, G., & King, S. (2014). Prenatal maternal stress exposure and immune function in the offspring, *The International Journal on the Biology of Stress,* 17 (2), 133-148.

Ji, S., Long, Q., Newport, D. J., Na, H., Knight, B., Zach, E. B., ... & Stowe, Z. N. (2011). Validity of depression rating scales during pregnancy and the postpartum period: impact of trimester and parity. *Journal of Psychiatric Research*, *45*(2), 213-219.

Vismara, L. (2017). Perspectives on perinatal stressful and traumatic experiences. *European Journal of Trauma & Dissociation*, *1*(2), 111–120.

Walsh, J., Hepper, E. G., & Marshall, B. J. (2014). Investigating attachment, caregiving, and mental health: A model of maternal-fetal relationships. *BMC Pregnancy and Childbirth*, *14*(1), 383.

Table 1

Descriptive statistics and bivariate correlations for all variables

	Range	M	SD	Skewness	Kurtosis	1	2	3	4	5	6
1. DBI	0-28	9.51	5.38	.619	.152	-					
2. PAI	34-79	61.44	10.28	-.448	-.822	-.50***	-				
3. Delivery length (hours)	0-17	7.06	2.52	.729	.931	.40***	-.34***	-			
4. Epidural analgesia (hours)	0-9	1.69	2.77	1.760	2.728	.46***	-.55***	.66***	-		
5. Oxytocin (hours)	0-8	1.08	1.77	1.215	-.167	.50***	-.64***	.68***	.71***	-	
6. Apgar index	6-10	8.85	1.06	-.844	-.044	-.35***	.22***	-.35***	-.24***	-.37**	-

Note. *** $p < .001$, ** $p < .01$

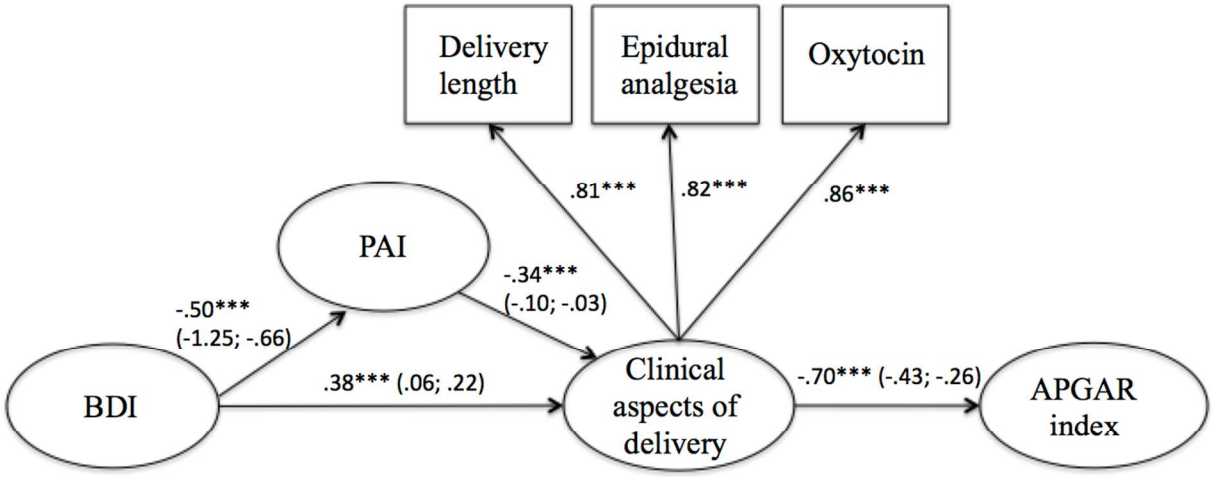

Figure 1. Theoretical tested model and standardized solutions. In parentheses as shown the 95% confidence intervals.
Note. N = 203; BDI = Beck Depression Inventory; PAI = Prenatal Attachment Inventory.