RCMOS – Multidisciplinary Scientific Journal of Knowledge.
ISSN: 2675-9128. São Paulo-SP.
Year IV, v.1, n.2, Aug./Dec. 2024. | submission: 2024-11-09 | accepted: 2024-11-11 | publication: 2024-11-13

EFFECTS OF STRESS AND MATERNAL MENTAL HEALTH ON PREGNANCY: A Literature Review

EFFECTS OF STRESS AND MATERNAL MENTAL HEALTH ON PREGNANCY: A Literature Review

Lavinia Chixaro de Sousa Ferreira– Aparício Carvalho University Center (FIMCA)
Paula Isabelly Freire Moreira– Aparício Carvalho University Center (FIMCA)
Vanessa Alves– Aparício Carvalho University Center (FIMCA) Thais Camila Alves Lessa Duran –Aparício Carvalho University Center (FIMCA) Ernesto Duran Neto – Aparício Carvalho University Center (FIMCA) Marco Aurelio da Silva Reis –Aparício Carvalho University Center (FIMCA)

SUMMARY
High levels of stress during pregnancy have been associated with lasting negative impacts on the physical and mental health of mothers, which also have repercussions on the development of their children. Studies suggest that the intrauterine environment, influenced by the mother's emotional state, can affect the future health of the child. This study aims to investigate the factors associated with increased stress in pregnant women and its consequences on maternal mental health and child development. The results indicate that the mental health of pregnant women is strongly influenced by a variety of factors, including family relationships, socioeconomic conditions, and dietary patterns. Food insecurity and psychosocial stress are associated with high rates of depression and anxiety, negatively impacting the mother's quality of life. Furthermore, family support emerges as a crucial element for maternal psychological well-being, highlighting the need for active partner involvement in promoting mental health during pregnancy. These findings reinforce the importance of targeted interventions that consider both the individual and relational dimensions of the pregnancy experience.

Keywords: Stress. Mental health. Gestational. Consequences.

ABSTRACT
High levels of stress during pregnancy have been associated with lasting negative impacts on the physical and mental health of mothers, which also have repercussions on the development of their children. Studies suggest that the intrauterine environment, influenced by the mother's emotional state, can affect the future health of the child. This study aims to investigate the factors associated with increased stress in pregnant women and its consequences on maternal mental health and child development. The results indicate that the mental health of pregnant women is strongly influenced by a variety of factors, including family relationships, socioeconomic conditions, and dietary patterns. Food insecurity and psychosocial stress are associated with high rates of depression and anxiety, negatively impacting the mother's quality of life. Furthermore, family support emerges as a crucial element for maternal psychological well-being, highlighting the need for active partner involvement in promoting mental health during pregnancy. These findings reinforce the importance of targeted interventions that consider both the individual and relational dimensions of the pregnancy experience. **Keywords:**Stress. Mental health. Gestational. Consequences.

1. INTRODUCTION

High levels of stress during pregnancy are associated with a negative impact on the mental and physical health of mothers, which can have long-term repercussions on the health and development of their children. The pandemic The COVID-19 pandemic has intensified these stressors for pregnant women, increasing social isolation, financial pressure, difficulties in accessing prenatal care, and the risk of contamination. During this period, many pregnant women reported high levels of stress both related to pregnancy (such as concerns about childcare and the physical challenges of pregnancy and childbirth) and associated with the pandemic (such as fear of infection and the feeling of unpreparedness for childbirth) (BARBOSA-LEIKER*et al*, 2021).

Elevated rates of prenatal depression and anxiety have been reported, although rates vary widely across studies. Furthermore, the effects of stress on maternal mental health outcomes have been shown to be heterogeneous. One possible explanation for this variation is that individual differences in how

each woman deals with stress can influence the response to the stressful pandemic environment, affecting mental health outcomes (LEVINSON*et al*, 2023).

Theories of disease development and models of fetal programming suggest that the intrauterine environment influences fetal development and may have lasting effects on the health of offspring throughout life. Increasing evidence also suggests that maternal experiences before conception may affect the development and future health of offspring. One possible mechanism for this intergenerational transmission of stress and mental health is dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis (MAHRER*et al*, 2021).

The present study aims to investigate the relationship between maternal mental health and perceived stress before conception and diurnal cortisol patterns in preschool-aged children, using this noninvasive measure as an indicator of HPA axis activity. Life course models and evidence in maternal and child health suggest that parental health and experiences before conception affect both pregnancy outcomes and child development. Maternal stress before conception, even when controlling for stress during pregnancy, increases the risk of adverse birth outcomes (SPRY*et al*, 2020).

Research in animal models that increased exposure to maternal stress before conception, while controlling for additional stress during pregnancy, identified adverse effects on offspring neurodevelopment. In humans, maternal stress and mental health symptoms before conception have been associated with negative childhood outcomes, such as sleep disturbances, emotional reactivity, increased negative affectivity, behavioral problems, and increased risk of attention deficit/hyperactivity disorder in boys (GUARDINO*et al*, 2022).

Thus, the aim of this study is to detail the factors related to increased stress in pregnant women, in order to characterize the negative influences that maternal mental health absorbs in the face of this form of psychological involvement. This will enable a greater understanding of the components that conceptualize this obstacle that is increasingly present in the current obstetric community.

2. THEORETICAL FRAMEWORK

According to Lima et al (2024), the successful adaptation of pregnant women to the transition process to motherhood is closely associated with the strengthening of the emotional bond with the fetus, that is, their mental perception and feeling of connection with it. This maternal-filial relationship begins in the prenatal phase and is known as maternal-fetal attachment (MFA), involving the intensity of the bond and the behaviors of interaction with the fetus. During pregnancy, women tend to develop an emotional bond with the baby and have expectations regarding the child to come, which intensify throughout the pregnancy.

Depression and anxiety are common mood disorders that affect about one in seven pregnant women, and during the pandemic, pregnancy and the postpartum period, particularly for first-time mothers, bring significant changes in the social, psychological, and physiological spheres. After COVID-19, uncertainty about the effects of the disease on maternal and neonatal health has further intensified anxiety among pregnant women. Impaired mental health can have immediate and lasting consequences for both mothers and their babies, highlighting the importance of specific care and interventions for this population (JEONG et al, 2024).

Pregnancy and the early years of life are crucial and especially sensitive phases for child development. Psychosocial stress during this period can negatively influence the course of the child's development, increasing the risk of adverse outcomes in both the fetus and childhood. Maternal stress and depression during pregnancy have been associated with fetal problems, such as low birth weight and premature birth, in addition to negative impacts on child development (GOKOEL et al, 2021).

Prenatal stress has previously been linked to neurodevelopmental disorders in children, including increased risk of attention deficit hyperactivity disorder (ADHD), autism spectrum disorder (ASD), cognitive delays, and even schizophrenia. Depression during pregnancy has also been associated with changes in the integrity of the brain's white matter, which can impact children's emotional and behavioral function, cognitive development, language, and motor skills (RAKERS et al, 2020).

In the first year of life, interactions between mother and baby are fundamental to the child's cognitive and behavioral development. Maternal postpartum stress or depression has been associated with behavioral difficulties (such as anger and withdrawal) and delays in infants' cognitive development.

Furthermore, infants may manifest altered attachment patterns in response to emotional separation from the mother (ABRISHAMCAR et al, 2024).

3. MATERIAL AND METHOD

This work is characterized by a bibliographic review of articles published between 2020 and 2022, that is, in the last 5 years, with the aim of establishing a good bibliographical base while promoting knowledge in the most complete way possible. Incomplete studies, which do not offer the necessary information to address the topic proposed in the work, will be excluded. The repetition of studies in different databases will also be an exclusion criterion.

The following descriptors were used: “stress”, “mental health”, “gestational” and “consequences”. In addition, these terms were searched in English: “stress”, “mental health”, “gestational” and “consequences”, in order to have bibliographical research in English and Portuguese, aiming for a greater breadth of literature and greater detail on the topic.

Through research with descriptors on the main scientific search platforms, namely: PubMed (Public Medical Literature Analysis and Retrieval System Online), SciELO (Scientific Electronic Library Online), Bireme, Google Scholar, Medscape, among others, the articles necessary for the preparation of the bibliographic review article were obtained.

Based on searches using the proposed combinations of topics and descriptors, an exploratory reading of the abstracts of these bibliographic materials will be carried out. Subsequently, the full text of these studies will be read. Therefore, after this procedure, scientific works will be selected to constitute the present review.

Initially, the articles will be classified by date of publication and will undergo an evaluative analysis according to data collection instruments consisting of the following questions: numerical identification of the article; authors; year of publication; objective(s); results; and conclusion of the work. After this stage of survey and content analysis, the content will be analyzed and used for the development of the study.

4. RESULTS AND DISCUSSION

Declining mental health is correlated with somatized manifestations, causing systemic symptoms in mothers with psychological disorders. Several factors influence the mental state of a pregnant woman, including family relationships, acceptance by society and concerns about goals during pregnancy.

1.1 CAUSAL FACTORS OF STRESS AND DECLINE IN MENTAL HEALTH DURING PREGNANCY

During pregnancy, women undergo several psychological and social transformations, influenced by factors such as genetic predisposition, previous history of mental disorders, pregnancy-specific stress and anxiety, experience of traumatic events and lack of social and family support. These conditions can contribute to the emergence of mental health problems during this period. In addition, low income and home food insecurity (HFI) are considered psychosocial stressors that are associated with worsening mental health in pregnant women (BIETE et al, 2024a).

Women of childbearing age are highly vulnerable to developing depression. Studies have shown a strong correlation between stressful situations, such as food insecurity,

tar (IF - food insecurity in English), and the emergence of depressive symptoms during pregnancy, in addition to a reduction in quality of life. In the United States, a cross-sectional analysis of 1,158 pregnant women from the National Health and Nutrition Examination Survey (NHANES) revealed that 19% of women with a family income ≤ 300% of the Federal Poverty Level (FPL) faced FI (LARAIA et al, 2022).

In low-income countries such as Nigeria, a national survey of 3,519 adolescents and pregnant women found a 75% prevalence of FI. In Brazil, the prevalence of FI among pregnant women is estimated to range from 34.8% to 71.5%. There is ample evidence linking FI with depressive symptoms during pregnancy. A combined prevalence of depression during pregnancy of 16% was identified in nine countries, with almost 20% in the first year after delivery in 17 low- and middle-income countries. It is suggested that depression in pregnancy may

predict postpartum depression (BIETE et al, 2024b).

Access to health services and prenatal care is restricted for many pregnant women, especially those in vulnerable situations, such as women from ethnic minorities, those living in poverty, those who are homeless, migrants and refugees, sex workers, victims of domestic violence, people with mental health disorders and substance abusers, among other groups. These inequalities in access to health care are reflected in maternal mortality rates, which are higher among black women, those with low socioeconomic and educational levels, these being some of the several factors that influence the decline in maternal mental health during pregnancy (BARBOSA et al, 2024).

Research indicates that pregnant women who are older and more educated tend to adopt a more conscious diet, characterized as a healthy eating pattern (with consumption of vegetables, legumes, and fruits) and the traditional Brazilian pattern (with foods such as rice, beans, meat, vegetables, and legumes). Adherence to a diet rich in snacks and ultra-processed foods has been shown to be more closely related to overweight, obesity, and symptoms of depression. There is a possibility that women at risk of depression have less motivation to eat properly, more frequently adhering to unhealthy eating patterns (COSMO, 2021).

Thus, Cosmo (2021) provides a table that explains dietary patterns when correlated with excess weight, hypertension, diabetes mellitus and depression during pregnancy, prepared through a literary review covering 14 articles, of which 6 articles were used specifically to assemble Table 1.

Table 1 – Eating patterns, excess weight, hypertension, diabetes and depression during pregnancy.

Authors	Objective of the study	Results
ZUCCOLOTTO *et al* (2019)	To investigate the relationship between the dietary patterns of pregnant women with excess maternal weight and gestational diabetes mellitus.	Pregnant women with greater adherence to the "healthy" (consumption of vegetables, legumes and fruits) and "traditional Brazilian" (consumption of rice, with maternal excess weight and beans, meats, vegetables and legumes) patterns had a lower chance of obesity. Women classified as having an intermediate level of adherence to the "snacks" pattern (consumption of bread, cold cuts, milk and dairy products, savory snacks, pizzas and sandwiches) had a higher chance of being overweight. Adherence to a healthy pattern is inversely associated with obesity. After adjusting for maternal excess weight, there was no relationship between dietary patterns and gestational diabetes mellitus.
RABBIT *et al* (2015)	To analyze whether food consumption patterns during the third trimester of pregnancy are associated with birth weight.	A high-energy diet is associated with greater gestational weight gain, which in turn is directly related to the baby's birth weight. For pregnant adolescents, the greater the adherence to the 'snack' eating pattern (stuffed cookies, salty biscuits, chocolate and chocolate milk) during pregnancy, the higher the baby's birth weight.

BADANAI*et al*(2019)	To investigate the relationship between dietary patterns and the degree of food processing and feelings of depression during pregnancy.	12% of women reported feelings of depression during pregnancy. Women with greater adherence to "traditional Brazilian" and "healthy" patterns and with greater consumption of minimally processed foods had a lower chance of depression. A higher consumption of ultra-processed foods was associated with depression.
BECKER*et al*(2020)	To evaluate the association between gestational food consumption with different clinical conditions of pregnant women (hypertension, diabetes, smoking) and other associated factors.	No association was found between food consumption and different clinical conditions during pregnancy. The present study showed that there was no difference in dietary consumption of calories, proteins, carbohydrates and lipids between pregnant women with different gestational conditions. On the other hand, the percentage of energy from food ultra processed demonstrated difference between the studied groups. The DM group presented a healthier dietary pattern, as it obtained a greater energy contribution from natural and minimally processed foods (59.5%) compared to the other groups. The caloric intake for the natural and minimally processed food group was 52.5%.
CABRAL*et al*(2018)	To test the association between protein intake and weight gain during pregnancy.	Pregnant women with higher protein intake had lower weight gain from the beginning of pregnancy; the average protein intake observed during pregnancy was 1.67g/kg per day. It was higher than the 1.1g/kg recommended by the IOM from the second trimester onwards.

STRONG *et al* (2015)	To study weight retention in women in the first three months postpartum and its correlation with gestational weight gain and food consumption.	Consumption of saturated fat and processed foods during pregnancy has been shown to significantly increase weight retention after delivery. Weight retention three months postpartum - delivery was shown to be greater the greater the gestational weight gain during pregnancy and parity.

Source: Adapted from Cosmo (2021).

1.2 SYSTEMIC MANIFESTATIONS OF GESTATIONAL AND POSTPARTUM STRESS

After a systematic review carried out by Wang et al (2024), it was found that the prevalence of stress urinary incontinence after childbirth is high, and several studies show that its occurrence can be prevented. Prevention has proven to be the most effective strategy to reduce both the incidence of this problem and the associated adverse effects. This refers to the involuntary loss of urine during activities that involve physical effort, such as exercise, sneezing or coughing, occurring between the period immediately after childbirth or up to one year later. This is one of the factors that is closely linked to gestational development and the birth process.

Poor nutrition influences the care that pregnant women should take regarding the incidence of gestational diabetes. The occurrence of risk factors for diabetes is linked to excess weight and obesity, associated with the widespread adoption of inadequate diets, sedentary lifestyles and high food consumption. The prevalence of gestational diabetes mellitus (GDM) has also increased globally, ranging from 1 to 14%, which increases the risks of negative outcomes for maternal and child health in the short and long term, in addition to generating an increase in health costs (MAURY-MENA et al, 2023).

Although it may seem contradictory, the diagnosis of GDM serves as a timely warning to promote changes in diet, physical activity and psychosocial aspects, as the diagnosis itself affects the mother psychologically and, consequently, the child. To achieve healthy pregnancies, education of pregnant women with diabetes is essential as part of the treatment, and it is essential to encourage them to take an active role in their care to improve metabolic control, reduce risk factors and minimize social costs (CRAIG et al, 2020).

1.3 FAMILY RELATIONSHIP AS AN ATTENUATING OR STRESSFUL FACTOR

Shafiq et al (2024), through the analysis of 8 perinatal couples aged between 20 and 40 years old, developed a framework based on a reflective and phenomenological thematic analysis carried out by mental health professionals, in which 3 main themes and subthemes were found, which are directly related to maternal psychological well-being during the gestational period (Table 2).

Table 2 –Themes and subthemes causing gestational discomfort.

Themes	Evaluation of Psychological Screening	Articulation Cultural	Etiology Cultural
Subthemes	Disorder of generalized anxiety zada	Expression emotional-somatic.	Functions of gender.
	Disorder major depressive	Expression emotional-behavioral-maladaptive mental.	Events are-traumatic stressors waistband.
	Mania/Bipo-larity	Expression religious cognitive and supernatural.	Stigma of mental health.
	Disorders psychotic	–	Illiterate-mo in mental health; Family support liar; Cognitions perinatal; Bond and emotional attachment with fetus and babies.

Source: Adapted from Shafiq et al (2024).

The psychological screening assessment addressed subdiagnoses that mental health professionals established as a classification among couples. Cultural articulation considered emotions, somatization, and maladaptive coping as proximal factors, while religious and supernatural cognitions are classified as distal factors, when we refer to the distance that these findings are from gestational well-being. The interpretation of cultural etiology showed that husbands do not understand what their wives are going through, a fact that directly corroborates the pregnant woman's feeling of displacement in her family relationship and in gestational development.

Family relationships during pregnancy are one of the factors that drastically influence maternal mental health, so that not only the wife, but also the husband, must act together in search of maternal well-being, which results in long-term family well-being.

FINAL CONSIDERATIONS

Maternal mental health is an essential aspect of the well-being of pregnant women and fetal development, and is impacted by a series of socioeconomic, cultural and psychological factors that shape the gestational experience. Situations such as food insecurity, precarious living conditions and difficulty in accessing prenatal care reveal a heightened vulnerability among women at risk, especially ethnic minorities and low-income populations.

These conditions, combined with less healthy eating patterns and the emotional impact of diagnoses such as gestational diabetes, can increase rates of overweight, obesity and depressive symptoms, making the pursuit of a healthy pregnancy even more difficult. Social and family support, in particular, emerges

as a crucial element in maintaining the mental health of pregnant women, offering support and reducing the impacts of environmental and social stressors.

Furthermore, cultural and relational factors play an important role, with marital and family relationships directly influencing the mother's psychological state during pregnancy. A lack of understanding from husbands or the absence of support in the family context can increase feelings of isolation and insecurity for the pregnant woman, aggravating unfavorable emotional conditions. Promoting awareness and involvement of the entire family and social support network, as well as encouraging the active participation of pregnant women in physical and mental health care, are essential actions to reduce risks during pregnancy and to strengthen maternal and child well-being.

REFERENCES

1. Abrishamcar S, Zhuang B, Thomas M, Gladish N, MacIsaac J, Jones M, Simons E, Moraes T, Mandhane P, Brook J, Subbarao P, Turvey S, Chen E, Miller G, Kobor M, Huels A. Association between Maternal Perinatal Stress and Depression on Infant DNA Methylation in the First Year of Life. Res Sq [Preprint]. 2024 Mar 21:rs.3.rs-3962429. doi: 10.21203/rs.3.rs-3962429/v1. Update in: Transl Psychiatry. 2024 Oct 22;14(1):445. doi: 10.1038/s41398-024-03148-8. PMID: 38562779; PMCID: PMC10984027.***Translational psychiatry***vol. 14,1 445. 22 Oct. 2024, doi:10.1038/s41398-024-03148-8. Available at:https://pubmed.ncbi.nlm.nih.gov/39438450/ . Accessed November 4, 2024.
2. Barbosa NG, Netto KC, Mendes LMC, Gozzo TO, Jorge HMF, Paiva ADCPC, Amorim TV, Gomes-Sponholz FA. Accessibility to prenatal care at the Street Outreach Office: nurse perceptions in northern Brazil. Rev Bras Enferm. 2024 Aug 30;77Suppl 2(Suppl 2):e20240090. doi: 10.1590/0034-7167-2024-0090. PMID: 39230097; PMCID: PMC11370769. Available at:https://pesquisa.bvsalud.org/portal/resource/pt/mdl-39230097 . Accessed November 5, 2024.
3. Barbosa-Leiker C, Smith CL, Crespi EJ, Brooks O, Burduli E, Ranjo S, Carty CL, Hebert LE, Waters SF, Gartstein MA. Stressors, coping, and resources needed during the COVID-19 pandemic in a sample of perinatal women. BMC Pregnancy Childbirth. 2021 Mar 1;21(1):171. doi: 10.1186/s12884-021-03665-0. PMID: 33648450; PMCID: PMC7920400. Available at:https://pmc.ncbi.nlm.nih.gov/articles/PMC7920400/ . Accessed November 4, 2024.
4. Biete C, Biete A, Patriota ESO, Gonçalves VSS, Buccini G, Pizato N. Household food insecurity and symptoms of anxiety and depression during pregnancy: Systematic review and meta-analysis. Matern Child Nutr. 2024a Sep 12:e13714. doi: 10.1111/mcn.13714. Epub ahead of print. PMID: 39263941. Available at: https://pesquisa.bvsalud.org/portal/resource/pt/mdl-39263941 . Accessed November 5, 2024.
5. Biete C, Gonçalves VSS, Carmo AS, Pizato N. The Happy Child Program's Intersectionality: Prenatal Home Visit Frequency, Food Insecurity Risk, Symptoms of Depression, and Parental Practices in Brazilian Women Assisted During Pregnancy. Nutrients. 2024b Sep 4;16(17):2990. doi: 10.3390/nu16172990. PMID: 39275305; PMCID: PMC11396776. Available at:https://pesquisa.bvsalud.org/portal/resource/pt/mdl-39275305 . Accessed November 5, 2024.
6. Cosmo, TV. Factors that positively and/or negatively influence the diet of pregnant women: a review. Work presented to the Pontifical Catholic University of Goiás as a Final Course Work II in the Nutrition course. School of Social and Health Sciences. Pontifical Catholic University of Goiás, Goiânia (GO). 2021. Available at:https://repositorio.pucgoias.edu.br/jspui/handle/123456789/1776 . Accessed November 5, 2024.
7. Craig L, Sims R, Glasziou P, Thomas R. Women's experiences of a diagnosis of gestational diabetes tes mellitus: a systematic review. BMC Pregnancy Childbirth. 2020 Feb 7;20(1):76. doi: 10.1186/s12884- 020-2745-1. PMID: 32028931; PMCID: PMC7006162. Available at:https://pubmed.ncbi.nlm.nih.gov/32028931/ . Accessed November 5, 2024.
8. 8.Gokoel AR, Abdoel Wahid F, Zijlmans WCWR, Shankar A, Hindori-Mohangoo AD, Covert HH, MacDonald-Ottevanger MS, Lichtveld MY, Harville EW. Influence of perceived stress on prenatal depression in Surinamese women enrolled in the CCREOH study. Reprod Health. 2021 Jun 30;18(1):136. doi: 10.1186/s12978-021-01184-x. PMID: 34193196; PMCID: PMC8243817. Available at:https://pubmed.ncbi.nlm.nih.gov/34193196/ . Accessed November 4, 2024.
9. Guardino CM, Rahal D, Rinne GR, Mahrer NE, Davis EP, Adam EK, Shalowitz MU, Ramey SL, Schetter CD. Maternal stress and mental health before pregnancy and offspring diurnal cortisol in early childhood. Dev Psychobiol. 2022 Nov;64(7):e22314. doi: 10.1002/dev.22314. PMID: 36282760; PMCID:

PMC10111814. Available at:https://pubmed.ncbi.nlm.nih.gov/36282760/ . Accessed November 4, 2024.
10. Jeong W, Kim B, Hong SH, Cho E, Kim SY, Moon JY. Factors associated with COVID-19 infection in pregnant women: Focusing on maternal anxiety. PLoS One. 2024 Oct 24;19(10):e0312300. doi: 10.1371/journal.pone.0312300. PMID: 39446762; PMCID: PMC11500910.***PloS one***vol. 19,10 e0312300. 24 Oct. 2024, doi:10.1371/journal.pone.0312300. Available at:https://pubmed.ncbi.nlm.nih.gov/39446762/ . Accessed November 4, 2024.
11. Laraia BA, Gamba R, Saraiva C, Dove MS, Marchi K, Braveman P. Severe maternal hardships are associated with food insecurity among low-income/lower-income women during pregnancy: results from the 2012-2014 California maternal infant health assessment. BMC Pregnancy Childbirth. 2022 Feb 19;22(1):138. doi: 10.1186/s12884-022-04464-x. PMID: 35183141; PMCID: PMC8858559.***BMC pregnancy and childbirth***vol. 22,1 138. 19 Feb. 2022, doi:10.1186/s12884-022-04464-x. Available at:https://pubmed.ncbi.nlm. nih.gov/35183141/ . Accessed November 5, 2024.
12. Levinson A, Lobel M, Preis H, Mahaffey B. Coping with subjective and objective stress during a pandemic pregnancy: implications for maternal mental health. Arch Womens Mental Health. 2023 Dec;26(6):819- 829. doi: 10.1007/s00737-023-01357-6. Epub 2023 Aug 9. PMID: 37555873; PMCID: PMC10842317. Available at:https://pmc.ncbi.nlm.nih.gov/articles/PMC10842317/ . Accessed November 4, 2024.
13. Lima CA, Brito MFSF, Pinho L, Ruas SJS, Messias RB, Silveira MF. Maternal-fetal attachment and interrelated factors in pregnant women assisted in Primary Health Care. Rev Lat Am Enfermagem. 2024 Oct 25;32:e4404. doi: 10.1590/1518-8345.7104.4404. PMID: 39476144; PMCID: PMC11526247. Available from:https://pubmed.ncbi.nlm.nih.gov/39476144/ . Accessed November 4, 2024.
14. Mahrer NE, Guardino CM, Hobel C, Dunkel Schetter C. Maternal Stress Before Conception Is Associated with Shorter Gestation. Ann Behav Med 2021 Mar 20;55(3):242-252. doi: 10.1093/abm/kaaa047. PMID: 32686836; PMCID: PMC7980768. Available at:https://pmc.ncbi.nlm.nih.gov/articles/PMC7980768/ . Accessed November 4, 2024.
15. Mena SCM, Marín-Escobar JC, Maury A, Marín-Benítez AC. Psychosocial factors associated with gestational diabetes mellitus. Systematic scope review. Horizonte Sanitario [Internet]. 2022 Aug 31 [cited 2022 Nov 16];21(3):531–49. Available at:https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1515207 . Accessed November 5, 2024.
16. Rakers F, Rupprecht S, Dreiling M, Bergmeier C, Witte OW, Schwab M. Transfer of maternal psychosocial stress to the fetus. Neurosci Biobehav Rev. 2017 Feb 22:S0149-7634(16)30719-9. doi: 10.1016/j. neubiorev.2017.02.019. Epub ahead of print. PMID: 28237726. Available at:https://www.sciencedirect.com/science/article/abs/pii/S0149763416307199?via%3Dihub . Accessed November 4, 2024.
17. Shafiq S. An exploration of psychological and socio-cultural facets in perinatal distress of Pakistani couples: a triangulated qualitative study. BMC Pregnancy Childbirth. 2024 Sep 11;24(1):596. doi: 10.1186/s12884-024-06780-w. PMID: 39367297; PMCID: PMC11451069. Available at:https://pmc.ncbi.nlm.nih. gov/articles/PMC11451069/#Sec7 . Accessed November 4, 2024.
18. Spry E, Moreno-Betancur M, Becker D, Romaniuk H, Carlin JB, Molyneaux E, Howard LM, Ryan J, Letcher P, McIntosh J, Macdonald JA, Greenwood CJ, Thomson KC, McAnally H, Hancox R, Hutchinson DM, Youssef GJ, Olsson CA, Patton GC. Maternal mental health and infant emotional reactivity: a 20-year two-cohort study of preconception and perinatal exposures. Psychol Med. 2020 Apr;50(5):827-837. doi: 10.1017/S0033291719000709. Epub 2019 Apr 10. PMID: 30968786. Available at:https://pubmed.ncbi.nlm.nih.gov/30968786/ . Accessed November 4, 2024.
19. Wang L, Zhang M, Sha K, Qiao Y, Dong Q. Prediction models for postpartum stress urinary incontinence: A systematic review. Heliyon. 2024 Sep 16;10(18):e37988. doi: 10.1016/j.heliyon.2024.e37988. PMID: 39381208; PMCID: PMC11458976. Available at:https://pubmed.ncbi.nlm.nih.gov/39381208/ . Accessed November 4, 2024.

ACKNOWLEDGMENTS (OPTIONAL)

We would like to thank the support and advice of the professors of the medicine course at the Aparício Carvalho University Center: Dr. Thais Camila Alves Lessa Duran, Dr. Ernesto Duran Neto and Dr. Marco Aurelio da Silva Reis, specialists in Gynecology and Obstetrics.