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MATERNAL-FETAL HEALTH BENEFITS OF PRACTICING PHYSICAL ACTIVITY DURING PREGNANCY

BENEFITS FOR MATERNAL-FETAL HEALTH RELATED TO PHYSICAL ACTIVITY DURING PREGNANCY

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SUMMARY
Pregnancy is a critical period for the formation of a new human being, lasting approximately 40 weeks, which will culminate in childbirth. Practicing physical exercise during this period is associated with several benefits, such as reducing the risk of developing conditions such as depressive disorders, hypertension, diabetes and cardiovascular diseases. Thus, the article aims to analyze the most current and important research on the subject, prioritizing the effects of physical exercise on fetal and maternal health, with an emphasis on strengthening and preventing obstetric conditions. In this context, a descriptive exploratory review was carried out with a qualitative approach, using databases such as Web of

Science, Brazilian Bibliography (BDENF), MEDLINE/PUBMED and LILACS. The search was performed using descriptors and the Boolean operator "and". Results: Pregnancy associated with the practice of moderate physical activity is of utmost importance for the health of the mother and fetus, reducing the risks of gestational complications, as well as the worsening of comorbidities. Conclusion: The encouragement of moderate physical activity during pregnancy should be expanded as a way to avoid gestational complications and the development of serious diseases during and after delivery. However, high-intensity physical exercises are not recommended for pregnant women due to the harmful effects on the health of the mother and newborn. **Keywords:**Pregnant. Physical activities. Maternal benefits. Neonatal

ABSTRACT
Pregnancy is a critical period for the formation of a new human being, lasting approximately 40 weeks, which will result in childbirth. Practicing physical exercise during this period is associated with several benefits, such as reducing the risk of developing conditions such as depressive disorders, hypertension, diabetes, and cardiovascular diseases. Thus, the article aims to analyze the most current and important research on the subject, prioritizing the effects of physical exercise on fetal and maternal health, with an emphasis on strengthening and preventing obstetric disorders. In this context, a descriptive exploratory review was conducted with a qualitative approach, using databases such as Web of Science, Bibliographic Brasileira (BDENF), MEDLINE/PUBMED, and LILACS. The search was performed using descriptors and the Boolean operator "and". Results: Pregnancy associated with the practice of moderate physical activity is of utmost importance for the health of the mother and fetus, reducing the risks of gestational complications, as well as worsening of comorbidities. Conclusion: The encouragement of moderate physical activity during pregnancy should be expanded as a way to avoid gestational complications and the development of serious diseases during and after childbirth. However, high-intensity physical exercise is not recommended for pregnant women due to the harmful effects on the health of the mother and newborn.
Keywords: Pregnant. Physical activities. Maternal benefits. Neonatal

1. INTRODUCTION

Regarding the guidelines on physical activity throughout life, specific guidelines for exercise during pregnancy and the postpartum period were incorporated for the first time in the World Health Organization (WHO) update in 2020. In this context, based on reliable evidence, it was suggested that women should perform at least 150 minutes of moderate-intensity aerobic activity per week during pregnancy, as long as there are no contraindications (Silva & Boing et al., 2020). In this context, when there are no contraindications, physical activity during pregnancy is considered safe and beneficial for mother and child in several countries such as Australia, Brazil, Canada, the United States, and others (De Andrade Leão et al., 2022) .

The prevalence of sedentary behavior during pregnancy is largely associated with the inability of pregnant women to combine pathophysiological changes with physical activity (Du

et al., 2019). The continuous practice of physical activities, albeit of a lower intensity, is of great importance during this pre- and post-natal period (Shum, Ang & Shorey, 2022).

Among the main factors associated with a decrease in aerobic exercise during pregnancy are low back pain, gestational weight gain and psychological problems such as anxiety and depression. This trend is perverse, as it affects the health of both the pregnant woman and the embryo (Chan et al., 2019).

According to Cilar & Budler, (2022) aerobic and low/medium intensity physical exercises are extremely important during pregnancy, mainly because they are directly linked to the maintenance and improvement of the pregnant woman's cardiorespiratory quality, muscular strength and endurance, body composition and flexibility . These characteristics help to ensure a smooth delivery and a postpartum period with a lower risk of complications. The activities recommended by the authors include lumbar stabilization and stretching exercises, aquatic exercises, nerve and tendon gliding exercises, resistance training and strength training.

According to Gascoigne et al., (2022), in addition to helping to reduce unwanted physical manifestations during pregnancy, such as high weight gain, joint pain, irritability and nausea, practicing physical activity during pregnancy helps to avoid more serious gestational complications, such as premature birth, pre-eclampsia and gestational diabetes mellitus. In this context, because gestational diabetes has an intrinsic relationship with the BMI of the pregnant woman and is more likely to develop in obese women, the practice of adequate physical activity throughout pregnancy is recommended in order to either prevent or curb the development of this comorbidity, however, the evidence on the combined effect of diet and physical activity is less clear (Moholdt, 2023).

In the context of the influence on the development and body composition of the embryo, Menke et al, (2022), points out that physical exercise during pregnancy does not negatively affect the fetus, in addition, some cohort studies note that newborns whose mothers performed aerobic activities during the prenatal period have lower body weight and less neonatal adiposity.

The aim of this paper was to discuss the position of the most recent and relevant studies on the subject, addressing the effects that physical activity has on maternal and fetal health, such as strengthening and preventing complications.

2 LITERATURE REVIEW

2.1 Changes during pregnancy

Research has revealed a high incidence of gestational complications, such as hypertension, infections and hemorrhages, as well as unfavorable pregnancy outcomes. In addition, there has been an increase in cases of maternal near miss (NMM), which can influence perinatal morbidity and mortality (Schmidt et al., 2021). This demonstrates that maternal, neonatal and fetal morbidity and mortality are fundamental indicators of the health of mothers and children, representing events of great relevance in Brazil. In this way, these problems highlight the lack of adequate access to healthcare and precarious social and economic conditions (Miranda et al., 2022)

In the process of normal human development, pregnancy represents a major transition, related to changes in identity and the emergence of a new social role. In this context, when daughters or wives become mothers for the first time, they end up occupying a third space in society. These factors contribute to triggering the various transformations related to the gestation process, which helps to adapt to this new phase and prepare for the arrival of the child (Pritschet et al., 2024).

During pregnancy, a woman's body undergoes various changes in its structure, metabolism, physiology and immunity for around 40 weeks. These changes ensure the development of the fetus during these weeks (Gomes et al., 2021). At the same time, there are changes in the central nervous system and other systems that are linked to the excretion of estrogen and progesterone. These can increase by 100 to 1000 times during pregnancy (Pritschet et al., 2024).

During pregnancy, the mother's wishes, dreams and hopes contribute to the subsequent 12 months of the child's life, especially in strengthening the mother -child relationship after childbirth (Muchon et al., 2022).

The gestational period is marked by complex phenomena in the bodily development of pregnant women, which has a direct impact on psychosocial issues relating to the lives of these women and their families (Delgado & Munhoz et al., 2024). These bodily changes during pregnancy, especially the hormonal and physical ones, have a direct impact on the self-esteem

and libido of many pregnant women, so issues related to sexuality during pregnancy should be addressed broadly, with the aim of understanding the particularities of each pregnant woman. Professional monitoring is essential to analyze, in some cases, the decrease in sexual desire, since libido is directly related to hormonal and psychological factors (Alves & Bezerra, 2020).

A healthy and safe pregnancy needs prenatal care, when the pregnant woman will receive help during her gestational cycle, with attention focused on promoting and preventing, aiming at maternal and fetal diseases well-being so that the child is formed in the best possible conditions (Baroni et al., 2024).

2.2 Benefits of exercise for pregnant women and babies

Practicing physical activity during pregnancy has many health benefits for both mother and baby, which is why pregnancy is a good time to start or maintain these habits (Dipietro et al., 2019), which can be recommended by obstetricians and gynecologists according to the WHO (Bull et al., 2020), as well as by public health societies around the world (Hayman et al., 2023).

The 2018 American Physical Activity Guidelines encourage pregnant women with comorbidities to actively participate in moderate-intensity physical activity for more than 150 minutes per week (ACOG, 2020). Although physiological and anatomical changes can be altered according to each individual, the practice of physical exercise during pregnancy offers low risk and is considered positive for health (ACOG, 2015). At least 20 to 30 minutes a day is recommended for pregnant women without associated pathologies, at a moderate intensity. In addition, medical recommendations can influence the practice of physical activity during pregnancy (Gonçalves et al., 2024).

Increased muscle mass, reduced risk of gestational diabetes, improved physical endurance and increased quality of life are some of the many benefits of physical activity. However, few pregnant women practice physical activity during pregnancy, and studies in high-income countries suggest that the main reasons for pregnant women to avoid physical exercise (Araújo et al., 2024). Body practices and physical activity for pregnant and postpartum women can help with some issues such as: nausea, problems when doing physical activity, numbness in the legs such as cramps, increased body volume, uncertainty about the safety of exercise

during pregnancy, untrue information from family members or even the health team, and a lack of knowledge about the benefits of physical activity (Delgado & Munhoz, 2024).

Socio-cultural influences reinforce misconceptions, affecting how women in different scenarios maintain or adopt new habits, considering the consequences and benefits of physical activity (Costa et al., 2024). As a social manifestation, there is a caveat of values in social and historical contexts shaped by ancestral norms that affect these women's knowledge that pregnancy is a disease and absolute rest is necessary (Gonçalves et al., 2024).

Women undergo a process of cultural construction in relation to their bodies. In pregnancy, the main focus is on the woman's body and not her health. In addition, the dissemination of images of women soon after giving birth can change perceptions about physical activity during pregnancy, which hinders women from taking up physical activity due to the construction of a mental barrier for those who believe that they never fit into such pre-established standards (Betancourt Delgado et al., 2024).

According to Alves et al. (2024), considering that the health field only partially discusses these views on health in pregnancy and the practice of physical activity, it is believed that different socioeconomic contexts can influence the way women perceive physical activity and consider it risky, optional or necessary. This study aims to discuss contemporary perceptions of physical activity during pregnancy from the perspective of pregnant women and prenatal care professionals, with a focus on the barriers to being physically active.

In the population of pregnant and non-pregnant women, the practice of physical activity is related to a reduction in the rates of obesity, disease and overweight. One of the main concerns of pregnant women is weight gain, obesity and the consequences of pregnancy. In the United States (Okafor & Goon, 2021).

According to the criteria of the American College of Obstetricians and Gynecologists (ACOG) and the Institute of Medicine, it is assumed that 48% of pregnant women gain excess weight during pregnancy. Such gain during pregnancy is related to various maternal and fetal complications, including gestational diabetes mellitus (GDM), pre-eclampsia, premature birth and fetal macrosomia or large-for-gestational-age fetus and pre-eclampsia presenting an increased lifetime risk of various subtypes of cardiovascular diseases, including stroke (Alves et al., 2024), myocardial infarction, thromboembolism and death (Wichmann et al., 2019).

3. MATERIAL AND METHOD

This is an integrative review based on the formulation of a main question, through the development of strategies to obtain the necessary data to integrate the results. The following question was used as the guiding question: "What are the impacts of physical activity on maternal and fetal health?".

To obtain the articles, a search was carried out in the main databases:*Latin American and Caribbean Health Sciences Literature (LILACS), Medical Literature and Retrieval System onLine (MEDLINE/PubMed®) and Scientific Electronic Library Online (Scielo).*

The descriptors used in the search strategy were Mesh terms (Medical Subject Headings) and Health Sciences Descriptors (DeCs). The search strategy followed the criteria of the Boolean operator "AND", which combines terms.

The terms used were pregnant women "AND" physical activity "AND" maternal and fetal health, during the months of July to September 2024. The inclusion criteria were articles with up to 5 years of publication, articles with systematic or integrative literature review methodology and full text. Exclusion criteria were articles with more than 5 years of publication, articles with methodology contrary to that investigated and incomplete texts. The results were presented in a table showing the title/author/year, important points and neonatal outcomes.

4. RESULTS AND DISCUSSION

The search for articles resulted in 151 articles, of which 55 were excluded because they did not fit the criteria, 106 were selected by reading the title, then the abstract and, finally, 41 were selected and read in full and included in this review. Of these articles, 25 constitute a sample of the*campus*, as shown in**Table 1**.

Table 1: Summary of the main results highlighted by author/year, title and important findings.

N	Author and year	Title	Important findings
1	DiPietro et al., 2019	Benefits of Physical Activity During Pregnancy and Postpartum: An Umbrella Review.	A relationship was established between the physical exercise practiced by the pregnant women studied and a reduction in the risk of anxiety and depression after childbirth, as well as weight gain during pregnancy and gestational diabetes.
2	Souza, Mussi and Queiroz, 2019	Physical activity level of pregnant women treated at basic health units in a municipality in northeastern Brazil	Just over half of the patients were classified as insufficiently active, considering the energy expenditure of all domains, with the domestic activity domain being the most practiced by pregnant women.
3	Ehrlich, Neugebauer, Feng, Hedderson and Ferrara, 2019	Exercise During the First Trimester and Infant Size at Birth: Targeted Maximum Likelihood Estimation of the Causal Risk Difference	Exercising rigorously during the first trimester of pregnancy decreases the chance of babies being large for their gestational age, as well as increasing the chance of newborns being small for their gestational age, but this characteristic is not necessarily linked to harm. Such data has been observed with greater scientific evidence in non-obese women.
4	Sánchez-Polan, Franco, Pérez and Barakat, 2019	Influence of supervised physical exercise on maternal gestational age and preterm birth. Systematic review and meta-analysis	Physical exercise during pregnancy poses no risk of altering the length of pregnancy and, according to some studies, can prevent premature births.
5	Brik et al., 2019	Does exercise during pregnancy impact maternal weight gain and fetal cardiac function? THE randomized controlled trial	The practice of physical exercise during pregnancy does not show great results in terms of weight gain during pregnancy, but it does promote better weight loss after childbirth. It also shows that physical activity influences the patency of the fetal ductus arteriosus.

6	Melo et al., 2019	Is Moderate Intensity Exercise During Pregnancy Safe for the Fetus? An Open Clinical Trial	Fetal bradycardia was found in pregnant women who were overweight or obese, as well as a reduction in fetal movements associated with a sedentary lifestyle. On the other hand, pregnant women who maintained an active lifestyle had a lower incidence of fetal bradycardia.
7	Nascimento et al.,2020	Physical exercise and metformin in gestational obesity and prevention of pregnancy diabetes mellitus: the systematic review.	The pharmacokinetic action of metformin proved to be an excellent controller of gestational weight gain when combined with physical exercise. The correct dosage of this drug is still being studied.
8	Benabid et al., 2021	Relationships between Objectively Measured Sedentary Behavior During Pregnancy and Infant Birth Weight	It has been observed that sedentary behavior is associated with low birth weight, impaired placental perfusion and, consequently, fetal development.
9	Chen et al., 2021	Effects of Maternal Exercise During Pregnancy on Perinatal Growth and Childhood Obesity Outcomes: THE Goal-analysis and Goal-regression	It has been observed that the practice of physical exercise by pregnant women is associated with a reduced risk of premature birth, low birth weight, macrosomia and fetal growth restriction. In addition, pregnant women who exercise are less likely to develop pre-eclampsia, gestational diabetes, depression and anxiety.
10	Silva et al.,2021	Prevalence of physical activity and associated factors among pregnant women: the cross-sectional population-based study in southern Brazil.	Among the pregnant women in the study, it was observed that those living in poor neighborhoods practiced less physical activity than those living in better-off neighborhoods.
11	Malta et al.,2021	Effectiveness of an intervention focusing on diet and walking during pregnancy in the primary health care service.	The intervention to encourage physical exercise throughout pregnancy proved to be necessary, since the levels of physical activity recommended for pregnant women were below

			the average.
12	Ribeiro et al.,2021	Physical exercise in pregnancy: benefits, risks and prescription.	It found that the incidence of excessive gestational weight gain, postpartum weight retention and gestational diabetes was reduced due to the regular physical activity practiced by the pregnant women throughout their pregnancy, three times a week.
13	Schmidt et al.,2021	Physical activity in gestational trimesters and perinatal outcomes in SUS puerperal women.	Puerperae who exercised during the third trimester were more likely to have a cesarean section and less likely to give birth to low-birth-weight babies.
14	Miranda et al.,2022	Exercise and Physical Activity Levels and Associated Factors Among High-Risk Pregnant Women.	It was found that most of the high-risk pregnant women who suffered from a sedentary lifestyle lived with influencing agents - such as academic level and occupation - which made it difficult or easier for them to exercise during pregnancy.
15	Nulty et al., 2022	Maternal physical activity at term and spontaneous labor: the crossover case study	A relationship was established between physical activity and pre-labor, showing that this practice is highly beneficial for inducing spontaneous labor, since it stimulates the production of estrogen and oxytocin, essential hormones for this process.
16	Silva-José et al.,2022	Level of Physical Activity in Pregnant Populations from Different Geographic Regions: A Systematic Review.	It was noted that, despite the increase in the levels of physical activity carried out by pregnant women in various populations over the last 15 years, these levels are far from the ideal suggested by international guidelines.
17	Cilar & Budler et al.,2022	Physical activity during pregnancy: a systematic review for the assessment of current evidence with future recommendations.	Among the physical exercises suggested for pregnant women are body stretching and aerobic activities, such as climbing stairs and walking. These activities are

			recommended throughout pregnancy.
18	Kim et al.,2022	Effects of Exercise Training during Advanced Maternal Age on the Cognitive Function of Offspring.	Improving physical fitness through exercise for people of advanced gestational age has become essential for the optimal creation of a favorable environment for the well-being of the fetus, since it boosts metabolism in the neonate and the number of cells during the formation of the hippocampus.
19	Rinaldi et al.,2022	Trend in physical activity patterns of pregnant women women living in Brazilian capitals.	It was observed that pregnant women with more academic time are more willing to do physical activities, and that black, brown and indigenous people have less free time when compared to white and yellow people.
20	From Andrade Leão et al., 2022	Effects of Regular Exercise During Pregnancy on Early Enrolled in Longitudinal Analysis Randomized Controlled Trial.	Pregnant women who actively exercised gave birth to children who, throughout early childhood, showed higher cognitive and speech skills compared to the children of pregnant women who did not do the activities.
21	Malta et al.,2022	Leisure time physical activity in Amazonian pregnant women and offspring birth weight: A prospective cohort study.	Among pregnant women in the state of Amazonas, there was no connection between age and the regularity of physical exercise and the weight of the fetus. It was observed, however, that adult pregnant women practiced more physical activity than adolescents.
22	Ramon-Arbués et al, 2023	Physical activity during embarrassment and its relationship with gestational weight gain	The study traced a direct relationship between weight gain among women during pregnancy, especially in the last months of pregnancy, and the low frequency of physical activity during this period, while it analyzed the decrease in the time dedicated to physical exercise and metabolic

			expenditure to the pregnancy progressed.
23	Peter-Marske et al., 2023	Association Between Change in Physical Activity During Pregnancy and Infant Birth Weight	Physical exercise during pregnancy is not harmful, but it is still inconclusive whether it generates major changes in relation to the weight of the fetus at birth.
24	Claiborne et al., 2024	Exercise FITT-V during pregnancy: Association with birth outcomes	It was found that practicing physical exercise during the prenatal period is associated with a reduction of approximately 17% in the cesarean section rate. In addition, a greater volume of physical activity during pregnancy is related to a reduction in the length of neonatal hospital stays and an improvement in the neuromotor development of the fetus.
25	Gonçalves et al., 2024	Why are pregnant women physically inactive? THE qualitative study on the beliefs and perceptions about physical activity during pregnancy	The study sought to describe the beliefs and perceptions of pregnant women and health professionals on the subject of physical activity during pregnancy. Thirty pregnant women and 14 health professionals were interviewed. It was observed that the pregnant women changed their sports practices for fear of miscarriage, contractions, bleeding or malformations due to a lack of support, uncertainty or consistency on the part of health professionals about the benefits of the practice.

Source: Authors, 2024.

According to the studies by DiPietro et al. (2019) and Ribeiro et al. (2021), there was a positive relationship between the regular practice of physical exercise and a reduction in the risk of common disorders during pregnancy, such as excessive weight gain and its postpartum retention, gestational diabetes and psychological illnesses such as anxiety and depression.

Cilar & Budler et al., (2022), Silva-José et al., (2022) and Malta et al., (2021) describe in their research papers that activities such as stretching, walking and climbing stairs, performed regularly three times a week at a light to moderate intensity, have favorable effects on the fetus and the pregnant woman.

Thus, according to De Andrade Leão et al., (2022), Kim et al., (2022) and Schmidt et al. (2021), the neonates of pregnant women who practiced physical activities during pregnancy have high cognitive and speech skills thanks to the better development of the hippocampus, in addition to impulsive metabolism.

However, according to Miranda et al. (2022), Silva et al. (2021), Rinaldi et al. (2022) and Malta et al. (2022), there are external and personal influencers that dictate the habits of pregnant women, such as academic level and gestational age - strongly linked to the precariousness of the individual's place of residence (slums, city centers, rural areas) and their phenotype (white, yellow, black, indigenous).

The results therefore demonstrate the importance of physical exercise during pregnancy for the health of both mother and fetus. However, it is important to remember that these results do not apply universally to pregnant women, since a medical assessment is required to determine the type of exercise, frequency, duration and intensity, as well as whether there is a typical or at-risk pregnancy , since for at-risk pregnancies there may be a series of complications arising from this practice in the case of sedentary pregnant women (Netto et al., 2020).

As a result, it has been shown that high-intensity physical exercise, especially in pregnant women who are not physically active, can cause a number of maternal and fetal metabolic changes that can jeopardize the progression of pregnancy in high-risk situations, such as : worsening of pre-existing comorbidities, premature labor due to increased uterine contractions, reduced blood flow to the fetus caused by redirection of blood flow from the placenta to the muscles, premature detachment of the placenta and restriction of fetal growth leading to a fetus classified as small for gestational age (SGA) (Netto et al., 2020).

On the other hand, for light and moderate intensities, metabolic disorders such as diabetes and hypertension, which can lead to serious problems such as gestational diabetes and pre-eclampsia, have been shown to be controlled since physical exercise at these intensities favors maternal weight control and pelvic pain, prevention of exhaustion, improvements in physical and cardiorespiratory conditioning (Ribeiro et al.,2021).

Therefore, the positive and negative impacts of physical activity during pregnancy are evident, which is why the importance of ideal advice on its practice and the individual particularities of each pregnant woman is emphasized, so that no damage occurs as a result of the practice of physical exercise, in order to guarantee the full maintenance and development of fetal and maternal health (Alves et al., 2020).

FINAL CONSIDERATIONS

The practice of physical activity during pregnancy is an extremely important issue given its direct influence on maternal and fetal health. Research suggests that there are benefits associated with the practice of physical exercise by pregnant women, as long as the physical activity is of a light to moderate intensity. The main benefits include control of gestational diabetes, improved neurological development of the fetus, control of anxiety and depression, and improved weight management for the mother and fetus.

However, it is important to note that there is a risk in practicing high-intensity physical exercise with pregnant women. Evidence indicates that there is a worsening of pre-existing illnesses, an increased risk of premature birth and restricted fetal blood circulation.

It is therefore essential that the practice of physical exercise by pregnant women is planned and monitored, with special attention paid to ensuring that the activity is appropriate to the stage of pregnancy and respects the individual conditions of the pregnant woman, always aiming for safety and effectiveness .

In short, it is recommended and beneficial for pregnant women to exercise. However, a multidisciplinary team assessment and monitoring is necessary to ensure maternal and fetal health and safety.

REFERENCE

Alves, TV, & Bezerra, MMM (2020). Main Physiological and Psychological changes during the management period. ID on line. Revista de psicologia, 14(49), 114-126

Alves, TL, Lima, VAP, Gomes, GS, & de Almeida, WG (2024). The role of physical exercise during pregnancy for the prevention of gestational diabetes: a literature review.*Journal Archives of Health*,*5*(3), e2206-e2206.

ACOG Committee Opinion No. 650: physical activity and exercise during pregnancy and the postpartum period. Obstet Gynecol 2015; 126:e135-42.

Araújo, BCD, Melo, RCD, Tafarello, EC, Da Silva, JDL, Silva, LALBD, Poderoso, RE, ... & Barreto, JOM (2024).

Araújo, TSD (2021). Motivational reasons related to the practice of physical activity in the elderly - a pilot study to support strategies in primary health care in the municipality of Caicó (Master's thesis, Federal University of Rio Grande do Norte).

Baroni, NF, Carvalho, MR, da Silva Santos, I., Chaves, AVL, de Andrade Miranda, DEG, Crivellenti, LC, & Sartorelli, DS (2024). Effect of a lifestyle intervention among pregnant women with overweight on neonatal adiposity: A randomized controlled clinical trial. *Early Human Development*,*194*, 106038.

Benabid, A., Deslauriers, L., Sinclair, I., St-Pierre, M., Vaillancourt, C., Gagnon, S., & Dancause, KN (2021). Relationships between objectively measured sedentary behavior during pregnancy and infant birthweight.*International Journal of Environmental Research and Public Health*,*18*(19), 10000.

Betancourt Delgado, S., de Souza Serapião, AB, & Jimenez Muñoz, JA (2024). Body practices and mobile health. Reflecting on an experience with pregnant women.*Retos: New Perspectives on Physical Education, Sports and Recreation*,*53*.

Bull, F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., ... & Willumsen, J. F. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behavior.*British journal of sports medicine*,*54*(24), 1451-1462.

Chan, C. W., Au Yeung, E., & Law, B. M. (2019). Effectiveness of physical activity interventions on pregnancy-related outcomes among pregnant women: a systematic review. International journal of environmental research and public health, 16(10), 1840.

Chen, Y., Ma, G., Hu, Y., Yang, Q., Deavila, J.M., Zhu, M.J., & Du, M. (2021). Effects of maternal exercise during pregnancy on perinatal growth and childhood obesity outcomes: a meta-analysis and meta-regression.*Sports Medicine*,*51*(11), 2329-2347.

Cilar Budler, L., & Budler, M. (2022). Physical activity during pregnancy: a systematic review for the assessment of current evidence with future recommendations. BMC Sports Science, Medicine and Rehabilitation, 14(1), 133.

Costa, AV, & Dias, MFS (2024). Physical activity for pregnant women: a study with practitioners and non-practitioners.*Vox Humana: Journal of Social Affairs*,*3*(1), 32-36.)

de Andrade Leão, OA, Domingues, MR, Bertoldi, AD, Ricardo, LIC, de Andrade Müller, W., Tornquist, L., ... & Mielke, GI (2022). Effects of regular exercise during pregnancy on early childhood neurodevelopment: the physical activity for mothers enrolled in longitudinal analysis randomized controlled trial. Journal of Physical Activity and Health, 19(3), 203-210.

DiPietro, L., Evenson, K.R., Bloodgood, B., Sprow, K., Troiano, R.P., Piercy, K.L., ... & Powell, K.E. (2019). Benefits of physical activity during pregnancy and postpartum: an umbrella review. Medicine and science in sports and exercise, 51(6), 1292.

Delgado, SB, & Munoz, JAJ (2024). Body practices and mobile health: Reflecting on an experience with pregnant women. Challenges: new trends in physical education, sport and recreation, (53), 316-322.

Du, M. C., Ouyang, Y. Q., Nie, X. F., Huang, Y., & Redding, S. R. (2019). Effects of physical exercise during pregnancy on maternal and infant outcomes in overweight and obese pregnant women: A meta-analysis. Birth, 46(2), 211-221.

Gascoigne, E.L., Webster, C.M., Honart, A.W., Wang, P., Smith-Ryan, A., & Manuck, T.A. (2023). Physical activity and pregnancy outcomes: an expert review. American journal of obstetrics & gynecology MFM, 5(1), 100758.

Gomes, PRL, Motta-Teixeira, LC, Gallo, CC, do Carmo Buonfiglio, D., de Camargo, LS, Quintela, T., ... & Cipolla-Neto, J. (2021). Maternal pineal melatonin in gestation and lactation physiology, and in fetal development and programming. General and comparative endocrinology, 300, 113633.

Gonçalves, H., Soares, ALG, Domingues, MR, Bertoldi, AD, Santos, MGD, Silveira, MFD, & Coll, CDVN (2024). Why are pregnant women not physically active? A qualitative study on beliefs and perceptions regarding physical activity during pregnancy. Cadernos de Saúde Pública, 40, e00097323.)

Hayman, M., Brown, W.J., Brinson, A., Budzynski-Seymour, E., Bruce, T., & Evenson, K.R. (2023). Public health guidelines for physical activity during pregnancy from around the world: a scoping review. British Journal of Sports Medicine,57(14), 940-947.

Kim, TW, Park, SS, & Park, HS (2022). Effects of Exercise Training during Advanced Maternal Age on the Cognitive Function of Offspring. International Journal of Molecular Sciences, 23(10), 5517.

Luft, C., da Costa, MS, Antunes, GL, de Oliveira, JR, & Donadio, MVF (2022). The role of maternal exercise on placental, behavioral and genetic alterations induced by prenatal stress. Neurochemistry International, 158, 105384.

Malta, MB, Gomes, CDB, Barros, AJ, Baraldi, LG, Takito, MY, Benício, MHDA, & Carvalhaes, MADBL (2021). Effectiveness of an intervention focusing on diet and walking during pregnancy in the primary health care service. Cadernos de Saúde Pública, 37, e00010320.

Malta, MB, Neves, PA, Lourenço, BH, Benício, MHD, Werneck, GL, Castro, MC, . . . & MINA-Brazil Study Working Group. (2022). Leisure-time physical activity in Amazonian pregnant women and offspring birth weight: A prospective cohort study. Plos one, 17(3), e0265164.

Menke, BR, Duchette, C., Tinius, RA, Wilson, AQ, Altizer, EA, & Maples, JM (2022). Physical Activity During Pregnancy and Newborn Body Composition: A Systematic Review. International Journal of Environmental Research and Public Health, 19(12), 7127.

Melo, ASO, Silva, JLPE, Melo, FDO, Barros, ES, Santos, HL, Amorim, MMR, & Souza, ASR (2019). Is moderate intensity exercise during pregnancy safe for the fetus? an open clinical trial.*Brazilian Journal of Gynecology and Obstetrics*,*41*(09), 531-538.

Miranda, LA, Moura, ACRD, Kasawara, KT, Surita, FG, Moreira, MA, & Nascimento, SLD (2022). Exercise and physical activity levels and associated factors among high-risk pregnant women. Brazilian Journal of Gynecology and Obstetrics, 44(04), 360-368.

Moholdt, T. (2023). Diet, exercise and gestational diabetes mellitus. Nutrients, 15(10), 2251.

Muchon, JD, Forte, GV, Marsura, AM, & de Serqueira, JR (2022). PHYSIOLOGICAL CHANGES AND MENTAL HEALTH OF WOMEN DURING PREGNANCY. In Proceedings of the State Colloquium on Multidisciplinary Research (ISSN-2527-2500) & National Congress on Multidisciplinary Research.

Nascimento, IBD, Fleig, R., Souza, MLRD, & Silva, JC (2020). Physical exercise and metformin in gestational obesity and prevention on gestational diabetes mellitus: a systematic review. Brazilian Journal of Maternal and Child Health, 20(1), 7-16.

Nulty, AK, Bovbjerg, ML, Savitz, DA, Herring, AH, Bradley, CB, & Evenson, KR (2022). Maternal physical activity at term and spontaneous labor: a case-crossover study. *Journal of Physical Activity and Health*,*19*(2), 99-107.

Okafor, U. B., & Goon, D. T. (2021). Physical activity in pregnancy: beliefs, benefits, and information-seeking practices of pregnant women in South Africa. Journal of Multidisciplinary Healthcare, 787-798.

Pritschet, L., Taylor, C.M., Cossio, D., Faskowitz, J., Santander, T., Handwerker, D.A., ... & Jacobs, E.G. (2024). Neuroanatomical changes observed over the course of a human pregnancy. Nature Neuroscience, 1-8.

Ramón-Arbués, E., Granada-López, J.M., Martínez-Abadía, B., Echániz-Serrano, E., Sagarra-Romero, L., & Antón-Solanas, I. (2023). Physical activity during embarrassment and its relationship with gestational weight gain.*Latin American Journal of Nursing*,*31*, e3875.

Ribeiro, MM, Andrade, A., & Nunes, I. (2021). Physical exercise in pregnancy: Benefits, risks and prescription. Journal of perinatal medicine, 50(1), 4-17.

Rinaldi, AEM, Paula, JAD, Almeida, MAM, Corrente, JE, & Carvalhaes, MABL (2022). Trends in physical activity patterns of pregnant women living in Brazilian capitals. Journal of Public Health, 56, 42.

Rodrigues da Silva, V., & Fernando Boing, A. (2021). Prevalence of physical activity and associated factors among pregnant women: a cross-sectional population-based study in

southern Brazil. Brazilian Journal of Mother & Child Health (BJMCH), 21(3).

Schmidt, T. P., Tuon, T., Wagner, K. J. P., Boing, A. F., & Danielewicz, A. L. (2021). Physical activity in gestational trimesters and perinatal outcomes in SUS puerperal women. Revista de Saúde Pública, 55, 58.

Shum, K. W., Ang, M. Q., & Shorey, S. (2022). Perceptions of physical activity during pregnancy among women: a descriptive qualitative study. Midwifery, 107, 103264.

Wichmann, JL, Takx, RA, Nunez, JH, Vliegenthart, R., Otani, K., Litwin, SE, ... & Schoepf, UJ (2019). Relationship between pregnancy complications and subsequent coronary artery disease assessed by coronary computed tomographic angiography in black women. Circulation: Cardiovascular Imaging, 12(7), e008754.

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