

# Pregnancy Considerations for the Active Individual

---

Kayla Causey, Sammi Iannucci, and Sarah McClellen

# Learning Objectives

1. Learner will appreciate the physiologic adaptations throughout pregnancy.
2. Learner will understand general safety limits of exercise for each trimester in a normal, healthy pregnant individual.
3. Learner will be able to list contraindicated treatment techniques as well as know when to stop activities.
4. Learner will identify benefits of aerobic and resistance training during pregnancy.
5. Learner will be able to provide practical recommendations for women who wish to continue running or training during pregnancy.

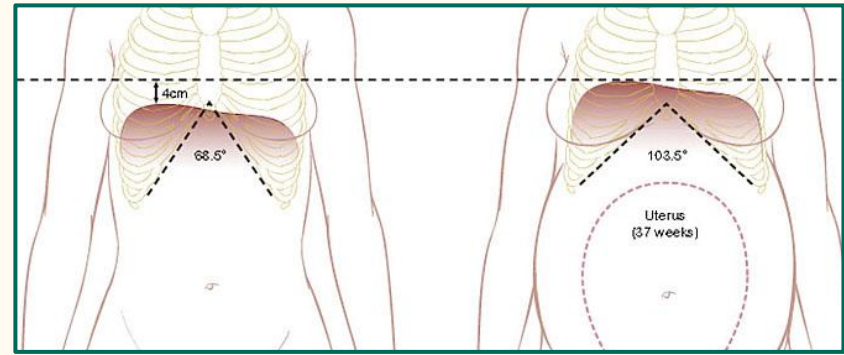
# Why should we consider this? (*Barakat 2010, ACOG 2020*)

- Only 20% of healthy pregnant women meet activity recommendations.
- Exercise during pregnancy is *safe*, *beneficial*, and *encouraged*
- We need to be able to answer our patients' questions
  - 51% of women sought information from their PT (*Prevett 2023*)
- For our higher performing athletes:
  - Return to sport / recover from physiologic changes more quickly



# Physiologic Changes

- **Musculoskeletal** (*ACOG 2020, Carmichael 2021*)
  - Center of gravity, gait changes, relaxin
- **Cardiovascular** (*Carmichael 2021, Melzer 2010*)
  - Increased blood volume, heart rate, preload, afterload
- **Respiratory** (*Carmichael 2021, Melzer 2010*)
  - 50% increased minute ventilation
  - Reduced pulmonary reserve → reduced and lagged anaerobic capabilities
  - Elevated diaphragm
- **Metabolic** (*Carmichael 2021, ACOG 2020, Milunsky 2002*)
  - Enhanced blood glucose drops during exercise
  - Suggested increase of carbohydrate intake
  - Reduced temperature regulatory abilities → proper hydration



# General Contraindications

- **Consult with doctor:** vaginal bleeding, dizziness, lightheadedness, dyspnea, racing heart rate, chest pain, unusual pains, limited movement of fetus (*ACOG 2020*)
- Avoid activities with contact sports and activities with high risk of falls
- Caution with altitude training (*Huch 1996, Hinman 2015*)
  - Above 8250 feet without 4-5 days of acclimation
  - Increased risk of fetal hypoxemia
- Avoid scuba diving (*Hinman 2015*)
  - Fetus not protected from decompression sickness and gas embolism
- Avoid exercise in hot, humid environments (*Melzer 2010, Selman 2022*)
  - Increased risk for neural tube defects during 1st trimester

# Contraindications to Exercise *(Ribeiro 2019)*

## Absolute Contraindications

- Ruptured membranes
- Premature labor
- Unexplained persistent vaginal bleeding
- Placenta previa after 28 weeks
- Pulmonary Embolism
- Incompetent cervix
- Intrauterine growth restriction
- High-order multiple pregnancy (ex. triplets)
- Uncontrolled Type 1 DM
- Uncontrolled hypertension
- Uncontrolled thyroid disease
- Respiratory or systemic disorders

## Relative Contraindications

- Recurrent pregnancy loss
- History of spontaneous preterm birth
- Twin pregnancy after 28th week
- Mild/moderate cardiovascular or respiratory disease
- Symptomatic anemia
- Malnutrition
- Eating disorders

# Benefits of Exercise

- Decreased incidence of *(Ribeiro 2021)*
  - Gestational diabetes
  - Hypertensive disorders
  - Operative deliveries
  - Excess weight gain
  - Weight retention postpartum
  - Postpartum depression
  - Preterm birth
  - Musculoskeletal discomfort *(Melzer 2010)*
  - WB exercise can improve work efficiency *(Melzer 2010)*
- Improved cardiovascular function *(Melzer 2010)*



# Trimester Considerations

- 1st trimester (Weeks 1 - 12)
  - Avoid exposure in excessive heat (*Milunsky 2022*)
  - Prevalence of nausea, fatigue, discomfort (*Selman 2022*)
  - Begin deep core and pelvic floor exercises
- 2nd trimester (Weeks 12 - 26)
  - Increased weight gain and greater changes in center of gravity
  - Caution with **prolonged** supine exercise supine after 20 weeks (*ACOG 2020, Hinman 2015*)
  - May need to substitute dumbbells for barbell (*Selman 2022*)
- 3rd trimester (Weeks 27 - birth)
  - Continue to monitor symptoms during exercise
  - May need to increased rest times (*Selman 2022*)
  - Intensity of exercise will most likely decrease due to:
    - Center of gravity changes
    - Increased joint laxity
    - Discomfort
    - Increased load on pelvic floor muscles





---

# Sport and Activity-Specific Implications

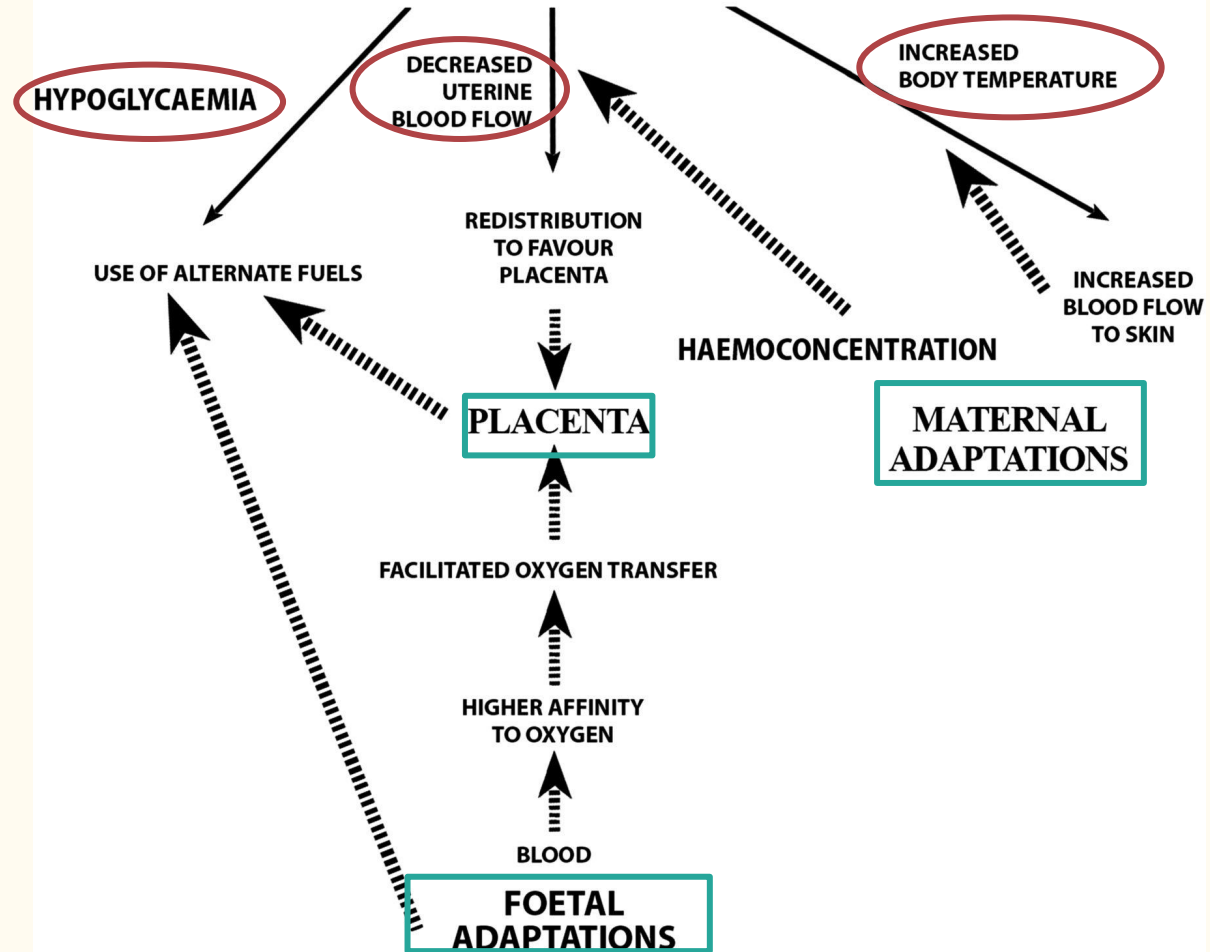
# General Considerations for the Active Individual

In general: vigorous intensity exercise into the 3rd trimester is safe for most healthy pregnancies.

- No higher than 90% HRM (*Salvesen 2021*)
- RPE 12-14 (*Evenson 2021*)
- “Talk Test” to measure exercise intensity (*ACOG 2020*)
- Maintain appropriate hydration to prevent hyperthermia (*Bo et al. 2016, ACOG 2020*)
- Maintain appropriate caloric intake especially carbs around exercise (*Carmichael 2021*)
- Consider pre pregnancy fitness level and intensity of exercise

# EFFECTS OF MODERATE MATERNAL EXERCISE

(Bo et al. 2016)



# Running Considerations

- **Cardiovascular** (Salvesen et al. 2012)
  - Keep HR <90% max
  - Avoid high intensity runs at altitude
- **Thermoregulation** (Bo et al. 2016)
  - 60%–70% of VO<sub>2</sub>max to keep core temp from raising > 103 °F
  - Hydration, avoid direct sun, avoid blacktop, light loose clothing
- **Metabolical** (Carmichael 2021)
  - Make sure adequate carb intake is being met
- **Musculoskeletal** (Carmichael 2021) (Bo et al. 2016)
  - Repetitive nature and heavy impact of running combined with postural changes and joint laxity may cause increased discomfort especially in 3rd trimester
  - Changes to gait including decreased step length, increased double support time, and wider stance
  - Running on a slight incline which encourages a forward lean improves lordosis



<https://www.runnersworld.com/training/a20849722/what-you-need-to-know-about-running-and-pregnancy/> (runnersworld.com)

# Managing Running Expectations (Bo et al. 2016)

- Most runners decrease training volume and fewer than  $\frac{1}{3}$  continue into 3rd trimester
- Goal of fitness maintenance and not setting PRs or marathon training
- Using RPE/HR/talk test and not mileage/speed
- Expectations each trimester
  - 1st - increased fatigue, body is adapting
  - 2nd - best time to moderately challenge the body
  - 3rd - increased discomfort due to postural changes, larger demand on hips and knees with weight gain, and laxity is greatest, Braxton Hicks contractions



<https://www.bing.com/images/search?view>

# Resistance Training in Pregnancy

Few studies have been performed at high % RM and heavy weight

**Prevett et al (2023):** Survey-based study of 679 women who lifted  $\geq 80\%$  1RM

- Most adjusted/modified weight around 28-30 weeks ( $\sim 60\%$  1RM)
- Delivery complications not affected between-groups by presence of
  - Supine lifts (71% engaged in)
  - Valsalva (34% engaged in)
  - Olympic lifts (72% engaged in)

*What does this tell us?*

Perhaps, we are being too cautious.

Perhaps, no one wants to advise incorrectly.

**Definitely, we need more research.**



# Approaching the Valsalva Maneuver and Supine Lifting

## Valsalva “flagged” for concern but not proven

- Concern for decrease in maternal BP affecting fetal blood flow (*Pivarnik 2016*)
- Valsalva medical  $\neq$  valsalva weightlifting
- Modification: free-breathing through press, especially later in pregnancy

Two additional studies disprove a harmful reaction (*Meah 2021, Gould 2021*)

- Limitations exist in % 1RM and population

## Supine Lifting (*Prevett 2023, ACOG 2020, Hinman 2015*)

- Symptomatic supine lifting needs modification
- No supine lifting in 3rd trimester
- Further research and guidelines also being explored



# Resistance Training: Other PT Implications

1. Pain (*ACOG 2020*)
  - Musculoskeletal changes
  - Lower resistance, focus on form, reduce overhead lifting
2. Form (*Selman 2022*)
  - Check barbell form as to not put pressure on abdomen (olympic lifts, hip thrusts)
  - Less core engagement as pregnancy progresses
3. Intensity (*Salvesen 2012*)
  - $< 90\%$  HR max so as to not compromise fetal BF



# Multidisciplinary Team

- OB
- Pelvic floor PT
- Dietician
- Psychologist - general, sport psychologist
- Primary Care Provider
- Coach/Trainer
  - Athletic Trainer
  - Strength/Conditioning Coach
  - Personal trainer
  - Recreational coach - (e.g. CrossFit)



<https://www.theguardian.com/sport/2022/may/18/im-a-pregnant-woman-making-choices-shauna-coxsey-on-climbing-and-the-bullies-who-want-her-to-stop>

# Clinician Resources

- American College of Obstetrics and Gynecology Guidelines: [Physical Activity and Exercise During Pregnancy and the Postpartum Period: ACOG Committee Opinion, Number 804 - PubMed \(nih.gov\)](#)
  - Clinical Guideline
- [Running In Pregnancy](#) - Webinar from the American Academy of Sports PT given by Carey Rothschild (must be a member of AASPT)
  - Expert opinion with analysis of RCTs
- [Pregnant & Postpartum Running with Dr. Rachel Selman DPT, CSCS](#) - Episode from the Strength Running Podcast
  - Expert opinion
- [Heavy Resistance Podcast with Dr. Christina Prevett, PT PhD](#) - Episode from The Pelvic Health Podcast
  - Expert opinion with research overview

# References

1. Barakat R, Refoyo I, Coteron J, Franco E. Exercise during pregnancy has a preventative effect on excessive maternal weight gain and gestational diabetes. A randomized controlled trial. *Braz J Phys Ther.* 2019;23(2):148-155. doi:10.1016/j.bjpt.2018.11.005
2. American College of Obstetrics and Gynecologists. Physical Activity and Exercise During Pregnancy and the Postpartum Period: ACOG Committee Opinion, Number 804. *Obstet Gynecol.* 2020;135(4):e178-e188. doi:10.1097/AOG.0000000000003772
3. Prevett C, Kimber ML, Forner L, de Vivo M, Davenport MH. Impact of heavy resistance training on pregnancy and postpartum health outcomes. *Int Urogynecol J.* 2023;34(2):405-411. doi:10.1007/s00192-022-05393-1
4. Carmichael RD. Considerations for the Pregnant Endurance Athlete. *Strength and Conditioning Journal.* 2021;43(6):35-41. doi:https://doi.org/10.1519/SSC.0000000000000655
5. Melzer K, Schutz Y, Boulvain M, Kayser B. Physical activity and pregnancy: cardiovascular adaptations, recommendations and pregnancy outcomes. *Sports Med.* 2010;40(6):493-507. doi:10.2165/11532290-000000000-00000
6. Milunsky A, Ulcickas M, Rothman KJ, Willett W, Jick SS, Jick H. Maternal heat exposure and neural tube defects. *JAMA* 1992;268:882 –5
7. Huch R. Physical activity at altitude in pregnancy. *Semin Perinatol* 1996; 20: 303–14
8. Hinman SK, Smith KB, Quillen DM, Smith MS. Exercise in Pregnancy: A Clinical Review. *Sports Health.* 2015;7(6):527-531. doi:10.1177/1941738115599358

# References

9. Selman R, Early K, Battles B, Seidenburg M, Wendel E, Westerlund S. Maximizing Recovery in the Postpartum Period: A Timeline for Rehabilitation from Pregnancy through Return to Sport. *Int J Sports Phys Ther.* 2022;17(6):1170-1183. Published 2022 Oct 1. doi:10.26603/001c.37863
10. Ribeiro MM, Andrade A, Nunes I. Physical exercise in pregnancy: benefits, risks and prescription. *J Perinat Med.* 2021;50(1):4-17. Published 2021 Sep 6. doi:10.1515/jpm-2021-0315
11. Evenson KR, Hesketh KR. Monitoring Physical Activity Intensity During Pregnancy. *Am J Lifestyle Med.* 2021;17(1):18-31. Published 2021 Nov 25. doi:10.1177/15598276211052277
12. Salvesen KÅ, Hem E, Sundgot-Borgen J. Fetal wellbeing may be compromised during strenuous exercise among pregnant elite athletes. *Br J Sports Med.* 2012;46(4):279-283. doi:10.1136/bjsm.2010.080259
13. Bø K, Artal R, Barakat R, et al. Exercise and pregnancy in recreational and elite athletes: 2016/2017 evidence summary from the IOC expert group meeting, Lausanne. part 5. recommendations for health professionals and active women. *British Journal of Sports Medicine.* 2018;52(17):1080-1085. doi:10.1136/bjsports-2018-099351
14. Pivarnik JM, Szymanski LM, Conway MR. The elite athlete and strenuous exercise in pregnancy. *Clin Obstet Gynecol* 2016;59(3):613–9.
15. Meah VL, Strynadka MC, Steinback CD, Davenport MH. Cardiac Responses to Prenatal Resistance Exercise with and without the Valsalva Maneuver. *Med Sci Sports Exerc.* 2021;53(6):1260-1269. doi:10.1249/MSS.0000000000002577
16. Gould S, Cawyer C, Dell'Italia L, Harper L, McGwin G, Bamman M. Resistance Training Does Not Decrease Placental Blood Flow During Valsalva Maneuver: A Novel Use of 3D Doppler Power Flow Ultrasonography. *Sports Health.* 2021;13(5):476-481. doi:10.1177/19417381211000717

Questions?