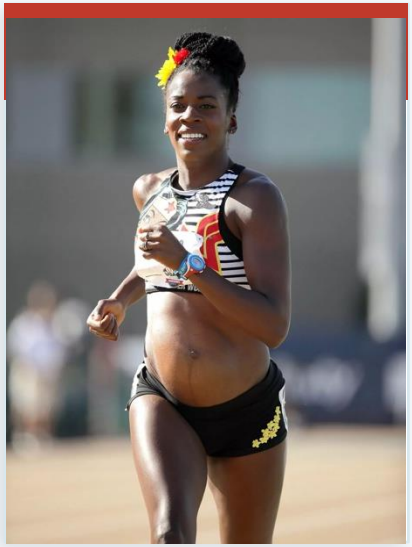
Dr. Katie Massoudian
- No relationships to disclose

STAYING FIT
IN PREGNANCY

2026 PRIMARY CARE CONFERENCE HAWAI'I

Presenter: KATIE MASSOUDIAN, MD, FACOG, MSCP
CO-LEAD WOMEN'S MIDLIFE WELLNESS
WOMEN'S HEALTH SERVICE LINE
SOUTHERN CALIFORNIA PERMANENTE MEDICAL GROUP
CLINICAL FACULTY - BERNARD TYSON SCHOOL OF MEDICINE

Which one of these Olympians was not pregnant during their competitions?



Learning Objectives

01 

Understand evidence-based, trimester-specific exercise prescriptions aligned with ACOG guidelines

02 

Identify absolute/relative contraindications and warning signs requiring activity modification

03 

Apply maternal and fetal benefit data to motivate physical activity across all trimesters

Why This Matters: The Activity Gap

Evenson et al., BJOG 2014

<40%

Pregnant women meet physical activity guidelines

150

Minutes/week of moderate activity recommended (ACOG)

700K

U.S. pregnancies annually prescribed bedrest

0

High-quality RCTs supporting routine antepartum bedrest

Sources: Evenson et al. BJOG 2014 · Maloni, Nurs Womens Health 2010 · Grobman et al. Obstet Gynecol 2018

Physiologic Foundations

[Why the prescription changes — but doesn't stop]

Cardiovascular

↑ plasma volume 40–50% · ↑ CO · ↑ resting HR
→ RPE-based prescriptions essential

Respiratory

↑ tidal volume · ↑ O_2 consumption
Diaphragmatic elevation → reduced ceiling

Musculoskeletal

Relaxin-mediated laxity · shifting Center of Gravity
Diastasis recti risk from 2nd Trimester

Thermoregulation

↑ BMR · hyperthermia threshold: >39°C
Hydration & environment critical

Key principle: Exercise is not a stressor — it is a modulator of these adaptations

ACOG Committee Opinion 804 Framework (2020)

Physical Activity and Exercise During Pregnancy and the Postpartum Period

PRESCRIPTION

- 150 min/week moderate-intensity aerobic activity
- Moderate = conversational pace · RPE 12–14 (Borg)
- Resistance training 2–3×/week
- Avoid Valsalva maneuver
- Pelvic floor training throughout

ABSOLUTE CONTRAINDICATIONS (select)

- Placenta previa >26 wks
- Preeclampsia / HELLP
- Incompetent cervix / cerclage
- Preterm labor (current pregnancy)
- Ruptured membranes
- Hemodynamically significant heart disease

WARNING SIGNS — STOP & REFER

- ⚠ Vaginal bleeding
- ⚠ Regular painful contractions
- ⚠ Dyspnea before exertion
- ⚠ Calf pain / swelling
- ⚠ Decreased fetal movement
- ⚠ Dizziness / chest pain / headache

Trimester-by-Trimester Prescription

Evidence-based modifications — goals remain constant

1st Trimester

Wks 1–13

- Continue/initiate walking, swimming, cycling
- RPE 12–14; avoid hyperthermia
- No hot yoga
- Sedentary women: START a walking program
- Modify for nausea symptoms

2nd Trimester

Wks 14–27

- No supine heavy loading >20 wks
- Transition to low-impact / stationary cycling
- Begin targeted pelvic floor training
- Screen for diastasis recti
- Attenuates excess gestational weight gain

3rd Trimester

Wks 28–40

- Water exercise — high tolerability
- Light-to-moderate resistance safe to term
- Pelvic floor training → ↓ postpartum incontinence
- Side-lying / seated / standing positions only
- Exercise does NOT need to stop at 36 wks

ACOG CO-804 · Davenport et al. Br J Sports Med 2019 · Barakat et al. 2011

Pregnancy as a Sarcopenic State

Skeletal muscle vulnerability and why it matters

KEY MECHANISMS

Anabolic Resistance

Skeletal muscle becomes less responsive to protein synthesis signals, esp. T3 (Herring et al., J Physiol 2018)

Fat > Lean Deposition

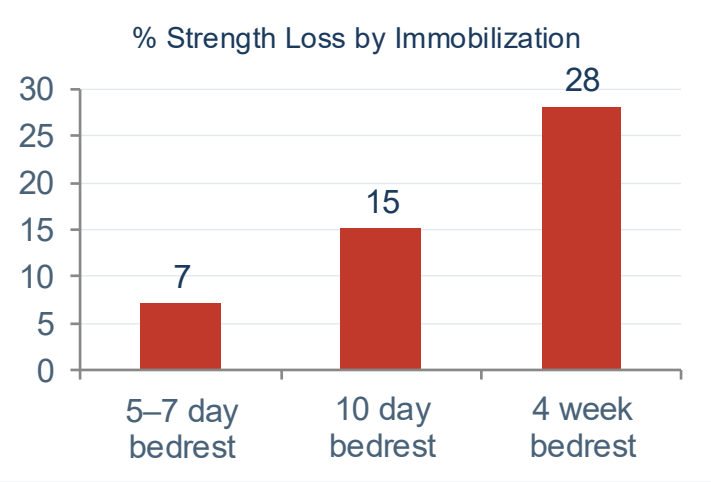
Gestational weight gain preferentially deposits fat mass without exercise stimulus

Postpartum Deficit

Sedentary women exit pregnancy with measurably lower lean mass than baseline (Gjerdalen et al., 2015)

Age Amplifies Risk

Gravidas ≥35 have age-related ↓ type II fiber density — population is aging



Kortebein et al. JAMA 2007 · Suetta et al. J Appl Physiol 2009 · Convertino et al. Med Sci Sports Exerc 1997

⚠ **These are non-pregnant data — pregnancy-related anabolic resistance likely ACCELERATES these losses**

Herring et al. J Physiol 2018 · Gjerdalen et al. Scand J Med Sci Sports 2015

WHAT ARE PATIENT'S FEARS? FEAR OF MISCARRIAGE/FETAL LOSS

WHAT DOES THE DATA SAY?

- **No significant association** between exercise during pregnancy and miscarriage (RR = 0.83, 95% CI) in a 2023 systematic review and meta-analysis of 13 randomized clinical trials (3,728 pregnant women)
- Larger 2019 systematic review identified **no associations between volume, intensity, or frequency** of exercise and fetal or newborn death (n=266,756)

ACOG GUIDELINES

- The **ACOG Committee Opinion No. 804** states that concerns about physical activity causing miscarriage, poor fetal growth, or premature delivery "have not been substantiated for women with uncomplicated pregnancies“

WHAT DOES SMFM SAY?

- The **SMFM Consult Series #50** (2020) **recommends against the routine use of any type of activity restriction** in preg Davenport et al. Br J Sports Med 2019 Pregnant women at risk of preterm birth based on preterm labor symptoms, arrested preterm labor, or shortened

Barakat et al, Journal Clin Med 2023, Davenport et al. Br J Sports Med 2019

Antepartum Bedrest: Outdated & Harmful

No high-quality RCT evidence supports routine bedrest for any obstetric indication

↑ VTE Risk

4–5× ↑ DVT risk: immobility + pregnancy hypercoagulable state
James et al., Circulation 2006

↓ Insulin Sensitivity

Bedrest independently worsens insulin resistance — counterproductive in GDM risk
Convertino et al., 1997

↓ Bone Density

↓ weight-bearing + ↑ fetal Ca demand = accelerated trabecular loss
Naylor et al., J Clin Endocrinol Metab 2000

↑ Depression

OR 2.5 for depressive symptoms with antepartum bedrest
Maloni et al., Res Nurs Health 2002

Delayed Recovery

Prolonged postpartum functional recovery; delayed return to physical baseline
Maloni, Nurs Womens Health 2010

No Benefit Shown

No RCT demonstrates improved outcomes for any indication
Grobman et al., Obstet Gynecol 2018

Pelvic rest ≠ Full bedrest · Define MINIMUM necessary restriction · Encourage what patients CAN do

Grobman et al. Obstet Gynecol 2018 · Maloni JA. Nurs Womens Health 2010

Hospital-Associated Deconditioning (HAD)

The admission itself as a hazard — Creditor, Ann Intern Med 1993

Hospitalized patients spend 83–99% of inpatient time lying in bed — even when ambulatory orders exist

Functional decline begins within 24–48 hours · Corcoran et al., J Hosp Med 2019 · Creditor, Ann Intern Med 1993

Triple Vulnerability in Antepartum Admissions

Layer	Mechanism
Pregnancy-baseline anabolic resistance	↓ Muscle protein synthesis response
Antepartum bedrest prescription	Immobility-driven catabolism
Hospital environment itself	IV lines, fetal telemetry, patient fear → structural immobility

INPATIENT MOBILITY OPTIONS

- Seated resistance band exercises
- In-room ambulation 2–3×/day
- Pelvic floor + deep core activation
- Upper extremity arm ergometer
- Supine → seated positional changes

PT consult for ANY antepartum stay >72 hrs · Language: 'monitored' ≠ 'cannot move' · Explicit mobility orders

Corcoran et al. J Hosp Med 2019 · Yeo et al. Biol Res Nurs 2000 · Brown et al. JAGS 2009

FEAR OF MISCARRIAGE

- WHAT DOES THE DATA SAY?
  - **No significant association** between exercise during pregnancy and miscarriage (RR = 0.83, 95% CI) in a 2023 systematic review and meta-analysis of 13 randomized clinical trials (3,728 pregnant women)

    Larger 2019 systematic review identified **no associations between volume, intensity, or frequency** of exercise and fetal or newborn death (n=266,756)

- ACOG GUIDELINES
  - The **ACOG Committee Opinion No. 804** states that concerns about physical activity causing miscarriage, poor fetal growth, or premature delivery "have not been substantiated for women with uncomplicated pregnancies“

- WHAT DOES SMFM SAY?
  - The **SMFM Consult Series #50** (2020) **recommends against the routine use of any type of activity restriction** in pregnant women at risk of preterm birth based on preterm labor symptoms, arrested preterm labor, or shortened cervix (GRADE 1B)

Barakat et al, Journal Clin Med 2023, Davenport et al. Br J Sports Med 2019

Evidence-Based Benefits of Prenatal Exercise

Davenport et al., Br J Sports Med 2018 — Umbrella Review, 58 Systematic Reviews

MATERNAL BENEFITS

RR 0.64

↓ Gestational diabetes risk (−36%)

RR 0.59

↓ Preeclampsia risk

↓ GWG

Excess weight gain attenuated

↓ C/S

Cesarean delivery rate reduced

+ ↓ Prenatal depression & anxiety symptoms
McCurdy et al., Ment Health Phys Act 2017

FETAL / NEONATAL BENEFITS

- ↓ Risk of macrosomia and LGA infants
- No ↑ preterm birth, low birth weight, or miscarriage with moderate exercise
- Emerging data: improved fetal cardiac autonomic function in exercising mothers (May et al., Early Human Dev 2010)
- No evidence of fetal harm in uncomplicated pregnancies — well-established across 23 RCTs

3 FACTS TO SHARE WITH PATIENTS

1

Exercise cuts your GDM risk nearly in half.

Regular moderate exercise reduces gestational diabetes risk by ~36%. For high-risk patients — elevated BMI, family history, prior GDM — this is frontline prevention, not a lifestyle suggestion.
— Davenport et al., Br J Sports Med 2018

2

Your baby benefits too.

Babies of exercising mothers are less likely to be born overweight and show measurable cardiovascular health markers at birth. No credible evidence links moderate exercise to fetal harm in uncomplicated pregnancies.
— ACOG CO-804 · May et al., Early Human Dev 2010

3

You don't have to stop — you just have to adapt.

Exercise is safe to continue to term. The goal — 150 min/week moderate activity — doesn't change. Modifications are adaptations, not limitations. 36 weeks is not a finish line.
— ACOG CO-804 · Barakat et al. 2011

Your Role as a Physician to an Active Patient

Bridging the evidence-to-practice gap

Biomechanics & Performance

OBs reassure on safety. You counsel on performance, movement mechanics, and return to sport — a critical gap.

Challenge Bedrest Prescriptions

Partner with OBs to define minimum necessary restriction. Prescribe what patients CAN do within real clinical constraints.

Advocate for PT Consults

Standing PT protocol for antepartum admissions >72 hrs: low-cost, high-yield, no known obstetric harm.

Use the PARmed-X for Pregnancy

Validated screening tool. Normalize exercise prescription as standard prenatal care — not optional wellness advice.

Postpartum return-to-sport: pelvic floor readiness > calendar time · Groom et al., Br J Sports Med 2019

Pregnancy and the Elite Athlete

Data is scarce and skews towards recreational athletes

KEY FINDINGS

- ✓ **No adverse maternal or fetal outcomes** were reported across the 16 included studies, suggesting high-level training during pregnancy is not inherently harmful.
- ✓ **Fetal heart rate decelerations** were observed in some fetuses only during acute maximal-intensity exercise (>90% maternal max HR) — the one intensity threshold flagged as a potential concern.
- ✓ **Elite athletes tolerate higher training loads** than recreational athletes throughout pregnancy, but evidence specific to this population remains sparse; current clinical recommendations largely reflect expert opinion, not high-quality trials.
- ✓ **Pelvic floor dysfunction, musculoskeletal injury, and stress fractures** are recognized complications, though direct outcome data from elite cohorts is limited.
- ✓ **Return-to-sport postpartum** is feasible and documented, but the review highlights a lack of standardized protocols or prospective data guiding timing and intensity.
- ✓ **Major evidence gap:** prospective cohort studies using non-invasive wireless monitoring are needed to characterize fetal and maternal stress tolerance during elite-level exertion before evidence-based guidelines can be finalized.

*Elite or competitive amateur athlete defined as >10hours per week in sport

THANK YOU!
QUESTIONS?

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