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Committee on Obstetric Practice

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Physical Activity and Exercise During Pregnancy and the Postpartum Period

ABSTRACT: Exercise, defined as physical activity consisting of planned, structured, and repetitive bodily movements done to improve one or more components of physical fitness, is an essential element of a healthy lifestyle, and obstetrician–gynecologists and other obstetric care providers should encourage their patients to continue or to commence exercise as an important component of optimal health. Women who habitually engaged in vigorous-intensity aerobic activity or who were physically active before pregnancy can continue these activities during pregnancy and the postpartum period. Observational studies of women who exercise during pregnancy have shown benefits such as decreased gestational diabetes mellitus, cesarean birth and operative vaginal delivery, and postpartum recovery time. Physical activity also can be an essential factor in the prevention of depressive disorders of women in the postpartum period. Physical activity and exercise in pregnancy are associated with minimal risks and have been shown to benefit most women, although some modification to exercise routines may be necessary because of normal anatomic and physiologic changes and fetal requirements. In the absence of obstetric or medical complications or contraindications, physical activity in pregnancy is safe and desirable, and pregnant women should be encouraged to continue or to initiate safe physical activities. This document has been revised to incorporate recent evidence regarding the benefits and risks of physical activity and exercise during pregnancy and the postpartum period.

Recommendations

Regular physical activity in all phases of life, including pregnancy, promotes health benefits. Pregnancy is an ideal time for maintaining or adopting a healthy lifestyle and the American College of Obstetricians and Gynecologists makes the following recommendations:

- Physical activity and exercise in pregnancy are associated with minimal risks and have been shown to benefit most women, although some modification to exercise routines may be necessary because of normal anatomic and physiologic changes and fetal requirements.
- A thorough clinical evaluation should be conducted before recommending an exercise program to ensure that a patient does not have a medical reason to avoid exercise.
- Women with uncomplicated pregnancies should be encouraged to engage in aerobic and strength-conditioning exercises before, during, and after pregnancy.
- Obstetrician–gynecologists and other obstetric care providers should evaluate women with medical or obstetric complications carefully before making recommendations on physical activity participation during pregnancy. Activity restriction should not be prescribed routinely as a treatment to reduce preterm birth.
- Additional research is needed to study the effects of exercise on pregnancy-specific conditions and outcomes and to clarify further effective behavioral counseling methods and the optimal type, frequency, and intensity of exercise. Similar research is needed to create an improved evidence base concerning the effects of occupational physical activity on maternal–fetal health.

Introduction

This document has been revised to incorporate recent evidence regarding the benefits and risks of physical activity and exercise during pregnancy and the postpartum period. *Physical activity*, defined as any bodily movement produced by the contraction of skeletal muscles (1) in all stages of life, maintains and improves cardiorespiratory fitness, reduces the risk of obesity and associated comorbidities, and results in greater longevity. Women who begin their pregnancy with a healthy lifestyle (eg, exercise, good nutrition, nonsmoking) should be encouraged to maintain those healthy habits. Women who do not have healthy lifestyles should be encouraged to view the prepregnancy period and pregnancy as opportunities to embrace healthier routines. *Exercise*, defined as physical activity consisting of planned, structured, and repetitive bodily movements done to improve one or more components of physical fitness (1), is an essential element of a healthy lifestyle, and obstetrician–gynecologists and other obstetric care providers should encourage their patients to continue or to commence exercise as an important component of optimal health.

The World Health Organization and the American College of Sports Medicine have issued evidence-based recommendations indicating that the beneficial effects of exercise in most adults are indisputable and that the benefits far outweigh the risks (2, 3).

The 2018 update to the U.S. Department of Health and Human Services Physical Activity Guidelines for Americans reinforces prior recommendations of at least 150 minutes of moderate intensity aerobic activity per week during pregnancy and the postpartum period (4). This activity should be spread throughout the week. The guidelines advise that women who habitually engaged in vigorous-intensity aerobic activity or who were physically active before pregnancy can continue these activities during pregnancy and the postpartum period. Additionally, women who are pregnant should be under the care of an obstetrician-gynecologist or other obstetric care provider who can monitor the progress of the pregnancy. Women who are pregnant can consult their obstetrician–gynecologist or other obstetric care provider about whether or how to adjust their physical activity during pregnancy and postpartum (4).

Physical inactivity is the fourth-leading risk factor for early mortality worldwide (2). In pregnancy, physical inactivity and excessive weight gain have been recognized as independent risk factors for maternal obesity and related pregnancy complications, including gestational diabetes mellitus (GDM) (5–7). Concerns that regular physical activity during pregnancy may cause miscarriage, poor fetal growth, musculoskeletal injury, or premature delivery have not been substantiated for women with uncomplicated pregnancies (8–12). In the absence of obstetric or medical complications or contraindications, physical activity in pregnancy is safe and desirable, and pregnant women should be encouraged to continue or to initiate safe physical activities (Box 1, Box 2).

Most pregnant patients can exercise. There are few maternal medical conditions in which aerobic exercise is absolutely contraindicated. When questions exist regarding safety of aerobic exercise in pregnancy, consultation with relevant specialists and subspecialists (eg, obstetrics and gynecology, maternal–fetal medicine, cardiology, pulmonology), when indicated, is advised. In women who have obstetric or medical comorbidities, exercise regimens should be individualized. Obstetrician–gynecologists and other obstetric care providers should evaluate women with medical or obstetric complications carefully before making recommendations on physical activity participation during pregnancy.

Anatomic and Physiologic Aspects of Exercise in Pregnancy

Pregnancy results in anatomic and physiologic changes that should be considered when prescribing exercise. The most distinct changes during pregnancy are weight gain and a shift in the point of gravity that results in progressive lordosis. These changes lead to an increase in the forces across joints and the spine during weight-bearing exercise. As a result, more than 60% of all pregnant women experience low back pain (13). Strengthening abdominal and back muscles could minimize this risk. Blood volume, heart rate, stroke volume, and cardiac output normally increase during pregnancy, and systemic vascular resistance decreases (Table 1). These hemodynamic changes establish the circulatory reserve necessary to sustain the pregnant woman and fetus at rest and during exercise. Maintaining a supine position during exercise after 20 weeks of gestation may result in decreased venous return due to aortocaval compression from the gravid uterus, leading to hypotension, and this hemodynamic change should be

Box 1. Examples of Exercises That Have Been Extensively Studied in Pregnancy and Found to Be Safe and Beneficial

Walking
Stationary cycling
Aerobic exercises
Dancing
Resistance exercises (eg, using weights, elastic bands)
Stretching exercises
Hydrotherapy, water aerobics

Modified from Berghella V, Saccone G. Exercise in pregnancy! Am J Obstet Gynecol 2017;216:335–7.

Box 2. Benefits of Exercise in Pregnancy

Higher incidence of:

- Vaginal delivery

Lower incidence of:

- Excessive gestational weight gain
- Gestational diabetes mellitus
- Gestational hypertensive disorders*
- Preterm birth
- Cesarean birth
- Lower birth weight

*Defined as gestational hypertension or preeclampsia

Modified from Berghella V, Saccone G. Exercise in pregnancy! Am J Obstet Gynecol 2017;216:335–7.

considered when prescribing exercise modifications in pregnancy (14–16).

In pregnancy, there also are profound respiratory changes. Minute ventilation increases up to 50%, primarily as a result of the increased tidal volume. Because of a physiologic decrease in pulmonary reserve, the ability to exercise anaerobically is impaired, and oxygen availability for aerobic exercise and increased work load consistently lags. The physiologic respiratory alkalosis of pregnancy may not be sufficient to compensate for the developing metabolic acidosis of strenuous exercise. Decreases in subjective work load and maximum exercise performance in pregnant women, particularly in those who are overweight or obese, limit their ability to engage in more strenuous physical activities (17). Aerobic training in pregnancy has been shown to increase aerobic capacity in normal weight and overweight pregnant women (18–20).

Temperature regulation is highly dependent on hydration and environmental conditions. During exercise, pregnant women should stay well hydrated, wear loose-fitting clothing, and avoid high heat and humidity to protect against heat stress, particularly during the first trimester (1). Although exposure to heat from sources such as hot tubs, saunas, or fever has been associated with an increased risk of neural tube defects (21), exercise would not be expected to increase core body temperature into the range of concern. At least one study found no association between exercise and neural tube defects (22).

Fetal Response to Maternal Exercise

Most of the studies addressing fetal response to maternal exercise have focused on fetal heart rate changes and birth weight. Studies have demonstrated minimum to moderate increases in fetal heart rate by 10–30 beats per minute over the baseline during or after exercise (23–26). Three meta-analyses concluded that the differences in birth weight were minimal to none in women who exercised during pregnancy compared with controls (27–29). However, women who continued to exercise vigorously during the third trimester were more likely to deliver infants weighing 200–400 g less than comparable controls, although there was not an increased risk of fetal growth restriction (27–29). A cohort study that assessed umbilical artery blood flow, fetal heart rates, and biophysical profiles before and after strenuous exercise in the second trimester demonstrated that 30 minutes of strenuous exercise was well tolerated by women and fetuses in active and inactive pregnant women (26). More data are needed from athletes who may exert beyond the accepted "vigorous" definition of up to 85% of capacity, and it is possible that there is an absolute level of intensity (or duration, or both) that exists, and if exceeded, could place the fetus at risk. Individualized exercise prescriptions may be warranted in pregnant athletes to ascertain whether there is a threshold beyond which fetal well-being may be compromised (30).

Benefits of Exercise During Pregnancy

The benefits of exercise during pregnancy are numerous (Box 2) (31). Regular aerobic exercise during pregnancy has been shown to improve or maintain physical fitness (8, 9, 27). Observational studies of women who exercise during pregnancy have shown benefits such as decreased GDM (Odds Ratio [OR] 0.103; 95% CI, 0.013–0.803) (6, 32–34), cesarean birth (Relative Risk 0.69, 95% CI, 0.42, 0.82) (35) and operative vaginal delivery (9, 35, 36), and postpartum recovery time (9). Physical activity also can be an essential factor in the prevention of depressive disorders of women in the postpartum period (37, 38). In pregnancy, greater self-reported overall physical fitness and cardiorespiratory fitness are associated with less bodily pain, lumbar and sciatic pain, and reduced pain disability (39). Studies are needed to explore whether improving physical fitness before and during pregnancy could decrease pain during the peripartum period.

A 2017 randomized controlled trial that included 300 overweight or obese women with uncomplicated, singleton gestations at less than 13 weeks of gestation found that cycling exercises initiated in the first trimester and performed at least 30 minutes, 3 times per week until 37 weeks of gestation, significantly reduced the incidence of GDM, significantly reduced gestational weight gain at less than 25 weeks of gestation, and lowered neonatal birth weight (40). Although these investigators found no significant differences between the exercise and control groups in the incidence of other outcomes, such as preterm birth, gestational hypertension, cesarean birth, and macrosomia, all these outcomes were less frequent in the exercise group.

Table 1. Cardiovascular Changes in a Normal Pregnancy*

	First Trimester	Second Trimester	Third Trimester	Stage 1 Labor	Stage 2 Labor	Early Postpartum	3–6 months Postpartum
Cardiac Output	↑5–10%	↑↑35–45%		↑30%	↑↑50%	↑↑↑60–80% immediately, then rapidly decreases within the first hour	Return to prepregnancy values
Heart Rate	↑3–5%	↑10–15%	↑15-20%	During uterine contractions: ↑40–50%		Remains elevated at third trimester values	Return to prepregnancy values
Blood Pressure	↓10%	↓5%	↑5%	During uterine contractions: ↑SBP 15–25% ↑DBP 10–15%		↓SBP 5–10% within 48 hours; may increase again between days 3–6 due to fluid shifts	Return to prepregnancy values
Plasma Volume	↑	↑↑40–50%		↑	↑↑	↑↑↑500 mL due to autotransfusion	Return to prepregnancy values

Abbreviations: SBP, systolic blood pressure; DBP, diastolic blood pressure.

*Hemodynamic changes that occur during pregnancy, labor, and postpartum (compared with prepregnancy) should be understood to identify early interventions (such as blood pressure control and diuresis) that may be needed to prevent clinical deterioration in a woman with cardiovascular disease.

Data from Kuhn JC, Falk RS, Langesaeter E. Haemodynamic changes during labour: continuous minimally invasive monitoring in 20 healthy parturients. Int J Obstet Anesth 2017;31:74–83; Ouzounian JG, Elkayam U. Physiologic changes during normal pregnancy and delivery. Cardiol Clin 2012;30:317–29; Sanghavi M, Rutherford JD. Cardiovascular physiology of pregnancy. Circulation 2014;130:1003–8; Shen M, Tan H, Zhou S, Smith GN, Walker MC, Wen SW. Trajectory of blood pressure change during pregnancy and the role of pre-gravid blood pressure: a functional data analysis approach. Sci Rep 2017;7:6227; Sohnchen N, Melzer K, Tejada BM, Jastrow-Meyer N, Othenin-Girard V, Irion O, et al. Maternal heart rate changes during labour. Eur J Obstet Gynecol Reprod Biol 2011;158:173–8; *and* Walters BN, Walters T. Hypertension in the puerperium [letter]. Lancet 1987;2:330.

A 2017 systematic review and meta-analysis (41) showed a significantly reduced risk of gestational hypertensive disorders, gestational hypertension, and cesarean birth in women who performed aerobic exercise 30–60 minutes 2–7 times per week, as compared with women who were more sedentary (41). Studies have shown that exercise during pregnancy can lower glucose levels in women with GDM (42, 43) or help prevent preeclampsia (44). Exercise has shown only a modest decrease in overall weight gain (1–2 kg) in normal weight, overweight, and obese women (45, 46). Another 2017 systematic review and meta-analysis (47) showed that, for overweight and obese women with a singleton pregnancy, compared with women who were more sedentary, aerobic exercise for about 30–60 minutes 3–7 times per week during pregnancy is associated with a reduction in the incidence of preterm birth (RR 0.62, 95% CI, 0.41–0.95) (47). Aerobic exercise in overweight and obese pregnant women also is associated with a significantly lower incidence of GDM and, therefore, should be encouraged (47). A 2016 systematic review and meta-analysis in normal-weight pregnant women with a singleton uncomplicated gestation showed that aerobic exercise for 35–90 minutes 3–4 times per week is not associated with an increased risk of preterm birth or with a reduction in mean gestational age at delivery. Exercise was associated with a significantly higher incidence of vaginal delivery and a significantly lower incidence of cesarean birth, with a significantly lower incidence of GDM and hypertensive disorders (48). Finally, a 2019 systematic review and meta-analysis (49) found that in mothers with pregestational medical conditions (chronic hypertension, type 1 diabetes and type 2 diabetes), prenatal exercise reduced the odds of cesarean birth by 55% and did not increase the risk of adverse maternal and neonatal outcomes (OR 0.45; 95% CI, 0.22–0.95) although findings are based on limited evidence, suggesting a need for high-quality investigations on exercise in this population of women.

Recommending an Exercise Program

Motivational Counseling

Pregnancy is an ideal time for behavior modification and adoption of a healthy lifestyle because of increased motivation and frequent access to medical supervision. Patients are more likely to control weight, increase physical activity, and improve their diet if their physician recommends that they do so (50). Motivational counseling tools such as the Five A's (Ask, Advise, Assess, Assist, and Arrange), originally developed for smoking cessation, have been used successfully for diet and exercise counseling (51, 52). Obstetrician–gynecologists and

other obstetric care providers can consider adopting the Five A's approach for women with uncomplicated pregnancies who have no contraindications to exercise.

Prescribing an Individualized Exercise Program

The principles of exercise prescription for pregnant women do not differ from those for the general population (4). A thorough clinical evaluation should be conducted before recommending an exercise program to ensure that a patient does not have a medical reason to avoid exercise. An exercise program that leads to an eventual goal of moderate-intensity exercise for at least 20–30 minutes per day on most or all days of the week should be developed with the patient and adjusted as medically indicated.

Because blunted and normal heart-rate responses to exercise have been reported in pregnant women, the use of ratings of perceived exertion may be a more effective means to monitor exercise intensity during pregnancy than heart-rate parameters (53). For moderate-intensity exercise, ratings of perceived exertion should be 13–14 (somewhat hard) on the Borg ratings of perceived exertion scale (Table 2). Using the "talk test" is another way to measure exertion: as long as a woman can carry on a conversation while exercising, she likely is not overexerting herself (54). Women should be advised to remain well hydrated, avoid long periods of lying flat on their backs, and stop exercising if they have any of the warning signs listed in Box 3.

Pregnant women who were sedentary before pregnancy should follow a more gradual progression of exercise. Although an upper level of safe exercise intensity has not been established, women who were regular exercisers before pregnancy and who have uncomplicated, healthy pregnancies should be able to engage in high-intensity exercise programs, such as jogging and aerobics, with no adverse effects. High-intensity or prolonged exercise in excess of 45 minutes can lead to hypoglycemia; therefore, adequate caloric intake before exercise, or limiting the intensity or length of the exercise session, is essential to minimize this risk (55).

Prolonged exercise should be performed in a thermoneutral environment or in controlled environmental conditions (facilities with air conditioning) and pregnant women should avoid prolonged exposure to heat (56) and pay close attention to proper hydration and caloric intake. In studies of pregnant women who exercised in which physical activity was self-paced in a temperature-controlled environment, core body temperatures rose less than 1.5°C over 30 minutes and stayed within safe limits (31). Table 3 lists suggestions for an exercise plan in pregnancy (31). Finally, although physical activity and dehydration in pregnancy have been associated with a small increase in uterine contractions (57), a 2016 systematic review and meta-analysis in normal-weight pregnant women with singleton uncomplicated gestations demonstrated that exercise for 35–90 minutes 3–4 times per week is not associated with an increased risk of preterm birth or with a reduction in mean gestational age at delivery (48).

Box 3. Warning Signs to Discontinue Exercise While Pregnant

- Vaginal bleeding
- Abdominal pain
- Regular painful contractions
- Amniotic fluid leakage
- Dyspnea before exertion
- Dizziness
- Headache
- Chest pain
- Muscle weakness affecting balance
- Calf pain or swelling

Table 2. The 15-Grade Scale for Ratings of Perceived Exertion

6	
7	Very, very light
8	
9	Very light
10	
11	Fairly light
12	
13	Somewhat hard
14	
15	Hard
16	
17	Very hard
18	
19	Very, very hard
20	

Reprinted from Borg GA. Psychophysical bases of perceived exertion. Med Sci Sports Exerc 1982;14:377–81.

Types of Exercises

Box 1 lists examples of safe exercises in pregnancy. Women with uncomplicated pregnancies should be encouraged to engage in aerobic and strength-conditioning exercises before, during, and after pregnancy. Contact activities with high risk of abdominal trauma or imbalance should be avoided. Scuba diving should be avoided in pregnancy because of the inability

Table 3. Characteristics of a Safe and Effective Exercise Regimen in Pregnancy

When to Start	First Trimester, More Than 12 Weeks of gestation
Duration of a session	30–60 minutes
Times per week	At least 3–4 (up to daily)
Intensity of exercise	Less than 60–80% of age-predicted maximum maternal heart rate*
Environment	Thermoneutral or controlled conditions (air conditioning; avoiding prolonged exposure to heat)
Self-reported intensity of exercise (Borg scale)	Moderate intensity (12–14 on Borg scale)
Supervision of exercise	Preferred, if available
When to end	Until delivery (as tolerated)

*Usually not exceeding 140 beats per minute.

Modified from Berghella V, Saccone G. Exercise in pregnancy! Am J Obstet Gynecol 2017;216:335–7.

of the fetal pulmonary circulation to filter bubble formation (58). Women living at sea level were able to tolerate physical activity up to altitudes of 6,000 feet, suggesting this altitude is safe in pregnancy (59), although more research is needed. Women who reside at higher altitudes may be able to exercise safely at altitudes higher than 6,000 feet.

In those instances in which women experience low-back pain, exercise in water is an alternative (60). A study of the apparent weight reduction during water immersion in a third-trimester pregnant woman measured a mean of 82.9% of body weight, a reduction that lowers the maternal osteoarticular load due to buoyancy (61). There may be additional benefits of aquatic exercise as well. A randomized controlled trial of an aquatic physical exercise program during pregnancy consisting of three 60-minute exercises demonstrated a greater rate of intact perineum after childbirth (OR 13.54, 95% CI, 2.75–66.56) (62).

Special Populations

Pregnant Women With Obesity

Pregnant women with obesity should be encouraged to engage in a healthy lifestyle modification in pregnancy that includes physical activities and judicious diets (5). Women should start with low-intensity, short periods of exercise and gradually increase the period or intensity of exercise as they are able. In recent studies examining the effects of exercise among pregnant women with obesity, women assigned to exercise demonstrated modest reductions in weight gain and no adverse outcomes (45, 63).

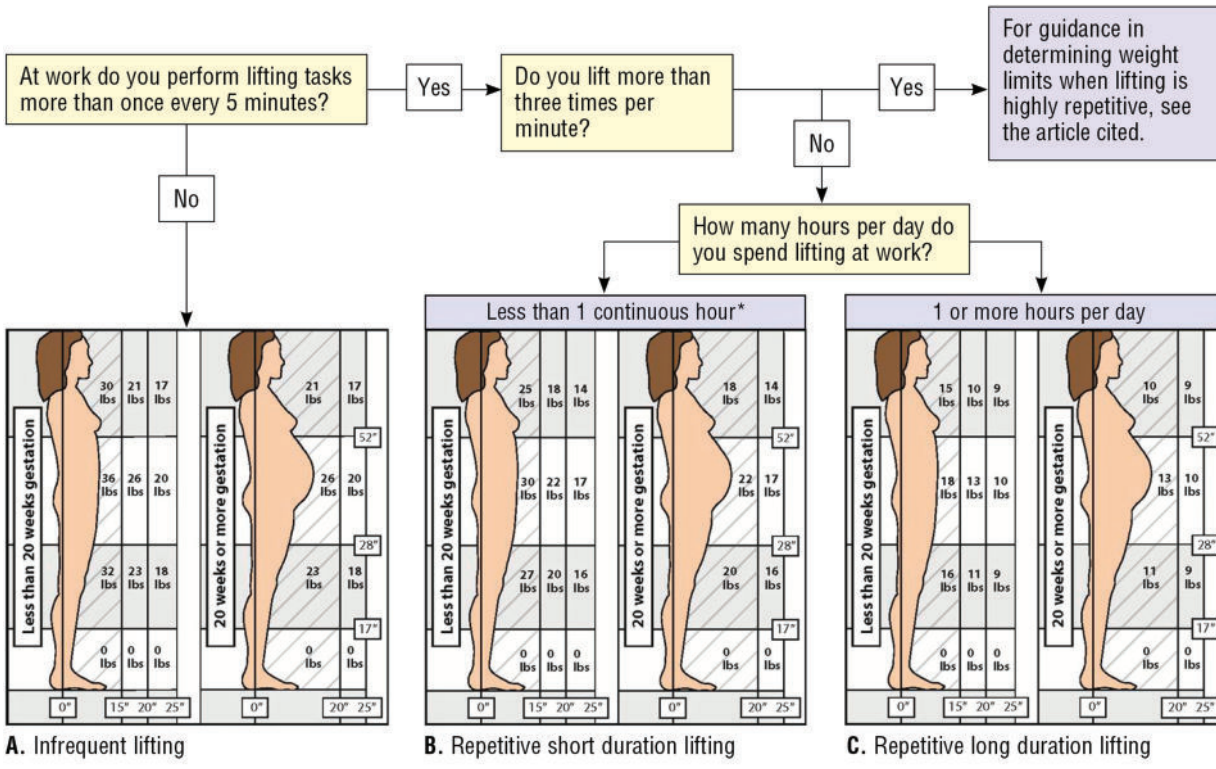
Athletes

Vigorous-intensity exercise completed into the third trimester appears to be safe for most healthy pregnancies. Further research is needed on the effects of vigorous-intensity exercise in the first and second trimesters and of exercise intensity exceeding 90% of maximum heart rate (64). Competitive athletes require frequent and close supervision because they tend to maintain a more strenuous training schedule throughout pregnancy and resume high-intensity training postpartum sooner than other women. Such athletes should pay particular attention to avoiding hyperthermia, maintaining proper hydration, and sustaining adequate caloric intake to prevent weight loss, which may adversely affect fetal growth.

An *elite athlete* can be defined generally as an athlete with several years of experience in a particular sport or sports who has competed successfully against other high level performers and trains year-round at a high level; an elite athlete generally trains at least 5 days per week, averaging close to 2 hours per day throughout the year (30). In addition to aerobic training, elite athletes in most sports also participate in resistance training to increase muscular strength and endurance; however, this training was not considered a safe activity in early guidelines for exercise during pregnancy because of potential injury and possible fetal heart decelerations resulting from Valsalva maneuvers. Consequently, there is sparse literature on this topic (30). It is prudent for elite athletes who wish to continue strenuous activity during pregnancy to have a clear understanding of the risks, to obtain approval from their health care providers, and to consider decreasing resistance load compared with prepregnant conditions. High-impact activities with increased risk of blunt trauma should be avoided, and it also is important that the pregnant elite athlete avoid overheating when performing their sport or participating in intense training (30).

Activity Restriction

Several reviews have determined that there is no credible evidence to prescribe bed rest in pregnancy for the prevention of preterm labor, and it should not be routinely recommended (65, 66). Patients prescribed prolonged bed rest or restricted physical activity are at risk of venous



Steps for determining the Recommended Weight Limit (RWL).

1) Answer the questions in the yellow-colored text boxes above to select the one graphic (A, B, or C) that best describes the lifting frequency or frequency/duration pattern.
2) When less than 20 weeks pregnant, select the image on the left of the graphic; when pregnant for 20 weeks or more, select the image on the right.
3) Underline the numerical value on the graphic that best corresponds with the object location at the start of the lift (height from the floor and the distance in front of the body); repeat for the object location at the end of the lift. Now underline all other numerical values along the entire path the object would travel during the lift (between the start and end points). Circle the lowest numerical value underlined.
4) The number circled in step 3 is the RWL (in pounds) for the gestation period and lift conditions specified in steps 1–3. Repeat these steps when the gestation period or task conditions change.

Figure 1. Provisional recommended weight limits for lifting at work during pregnancy. *This task duration category can encompass multiple hours of lifting in one work day provided that each continuous lifting period is less than 1 hour and followed by a minimum of 1 hour of nonlifting activity before lifting resumes. Modified from MacDonald LA, Waters TR, Napolitano PG, Goddard DE, Ryan MA, Neilsen P, et al. Clinical guidelines for occupational lifting in pregnancy: evidence summary and provisional recommendations. Am J Obstet Gynecol 2013;209:80–8.

thromboembolism, bone demineralization, and deconditioning. There are no studies documenting an improvement in outcomes in women at risk for preterm birth who are placed on activity restriction, including bed rest, and there are multiple studies documenting untoward effects of routine activity restriction on the mother and family, including negative psychosocial effects. Activity restriction should not be prescribed routinely as a treatment to reduce preterm birth (67). Additionally, there is no evidence that bed rest reduces preeclampsia risk, and it should not be routinely recommended for the primary prevention of preeclampsia and its complications (68).

Occupational Physical Activity

The evidence regarding a possible association between fetal–maternal health outcomes and occupational physical activity is mixed and limited. A meta-analysis based on 62 reports assessed the evidence relating preterm delivery, low birth weight, small for gestational age, preeclampsia, and gestational hypertension to five occupational exposures (work hours, shift work, lifting, standing, and physical work load) (69). Although the analysis was limited by the heterogeneity of exposure definitions, especially for lifting and heavy work load,

most of the estimates of risk pointed to small or null effects. In contrast, a cohort study of more than 62,000 Danish women reported a dose–response relationship between total daily burden lifted and preterm birth with loads more than 1,000 kg per day (70). In this study, lifting heavy loads (greater than 20 kg) more than 10 times per day was associated with an increased risk of preterm birth.

The National Institute for Occupational Safety and Health uses an equation that determines the maximum recommended weight limit for lifting that would be acceptable to 90% of healthy women (71). This equation has been used to define recommended weight limits for a broad range of lifting patterns for pregnant women, as well as lifting conditions that pose a higher risk of musculoskeletal injury (72) (Fig. 1). Obstetrician–gynecologists and other obstetric care providers can use their best clinical judgment to determine a recommended plan for the patient. This plan may include a formal request for an occupational health professional to perform an analysis to determine maximum weight limits based on actual lifting condition or assist with writing appropriate letters to employers to help obtain accommodations (73).

Exercise in the Postpartum Period

Several reports indicate that women's level of participation in exercise programs diminishes after childbirth, frequently leading to overweight and obesity (74, 75). The postpartum period is an opportune time for obstetrician–gynecologists and other obstetric care providers to recommend and reinforce a healthy lifestyle. Resuming exercise or incorporating new exercise routines after delivery is important in supporting lifelong healthy habits. Exercise routines may be resumed gradually after pregnancy as soon as medically safe, depending on the mode of delivery (vaginal or cesarean birth) and the presence or absence of medical or surgical complications. Some women are capable of resuming physical activities within days of delivery. Pelvic floor exercises can be initiated in the immediate postpartum period. Abdominal strengthening exercises, including abdominal crunch exercises and the drawing-in exercise, a maneuver that increases abdominal pressure by pulling in the abdominal wall muscles, have been shown to decrease the incidence of diastasis recti abdominus and decrease the inter-rectus distance in women who gave birth vaginally or by cesarean birth (76, 77).

Regular aerobic exercise in lactating women has been shown to improve maternal cardiovascular fitness without affecting milk production, composition, or infant growth (78). Women who are lactating should consider feeding their infants or expressing milk before exercising to avoid discomfort of engorged breasts. They also should ensure adequate hydration before commencing physical activity.

Conclusion

Physical activity and exercise in pregnancy are associated with minimal risks and have been shown to benefit most women, although some modification to exercise routines may be necessary because of normal anatomic and physiologic changes and fetal requirements. In the absence of obstetric or medical complications or contraindications, physical activity in pregnancy is safe and desirable, and pregnant women should be encouraged to continue or to initiate safe physical activities. Obstetrician–gynecologists and other obstetric care providers should evaluate women with medical or obstetric complications carefully before making recommendations on physical activity participation during pregnancy. Although the evidence is limited, exercise results in benefits to pregnancy outcomes, and there is no evidence of harm when exercise is not contraindicated. Physical activity and exercise during pregnancy promote physical fitness and may prevent excessive gestational weight gain. Exercise may reduce the risk of gestational diabetes, preeclampsia, and cesarean birth. Additional research is needed to study the effects of exercise on pregnancy-specific conditions and outcomes and to clarify further effective behavioral counseling methods and the optimal type, frequency, and intensity of exercise. Similar research is needed to create an improved evidence base concerning the effects of occupational physical activity on maternal–fetal health.

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