

Pregnancy and Postpartum Training: Coaching Considerations

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ABSTRACT

Exercise is beneficial for women to continue during pregnancy and the postpartum period. However, many women do not meet the minimum guidelines set forth by the American College of Obstetricians and Gynecologists. Strength and conditioning coaches and personal trainers working specifically with athletes and nonathletes during childbearing years should continue to encourage their clientele to exercise. Educating them on altering their current exercise program and adapting it as they progress through their pregnancy into the postpartum period is important. General recommendations for exercise and certain modifications may be needed as many physical and physiological adaptations occur within the body during this time.

INTRODUCTION

When a woman becomes pregnant, it is time to maintain and prioritize health and fitness for herself and the baby. It is a time to consider how being pregnant will affect athletic performance and physical activity. Although exercising and pregnancy has

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been researched over the past 2 decades showing that exercise is safe and beneficial to both the mother and fetus (9,10,16,28,30), some women may still be hesitant to continue to train at the same level before pregnancy. In addition, some coaches and personal trainers may be unsure of what precautions to take or how to modify activities when an athlete reports that she is pregnant. This article aims to help the strength and conditioning coach and personal trainer to understand the unique needs and considerations of training during pregnancy and how to gradually and safely return during the postpartum period.

PREGNANCY GUIDELINES

Many guidelines that have been established for exercise and pregnancy generally agree on the benefits of prenatal exercise and the recommendations when exercising (1,5,6,9,28). A comparison of the American College of Obstetricians and Gynecologists (ACOG) and the Canadian Guidelines for physical activity throughout pregnancy are described (Table 1) and vary slightly due to country of origin and level of research evidence (1,28). Pregnant women should follow the same exercise principles recommended for the general population, but with modifications. Some modifications may

be necessary due to anatomical and physiological changes that occur during the progression of pregnancy (Table 2) (1,5). Women should engage in aerobic and resistance training exercise before, during, and after pregnancy if they have been cleared by their physician and present with an uncomplicated pregnancy (free from absolute and relative contraindications) (Table 3) (1,4). Evidence has shown that not participating in physical activity beginning in the first trimester increased pregnancy-related complications such as preeclampsia, gestational diabetes, gestational hypertension, and excessive weight gain compared to those who exercise (9,16,28,39). Although multiple body changes occur during this period and physiological symptoms may vary day to day, it is important for women to begin or continue to exercise throughout their pregnancy (1).

Even with evidence to support the benefits of exercise during pregnancy, most women are still not meeting the minimum guidelines. Only 12.7–45.0% of women meet the target set by the ACOG (20). Women also

KEY WORDS:

pregnancy; postpartum; diastasis recti; pelvic floor dysfunction; strength training

Table 1
Anatomical and physiological maternal changes that may affect exercise during pregnancy

Trimester	Anatomical and physiological maternal changes	How it may affect exercise
First	<ul style="list-style-type: none"> Increase in blood volume Increase in cardiac output Weight gain Elevated basal body temperature Increase in ligamentous laxity 	<ul style="list-style-type: none"> Reaching maximum intensity sooner May have complaints of being out of breath Reaching critical body temperatures sooner Increase in ROM and enhanced injury risk
Second	<ul style="list-style-type: none"> Increase in blood volume Increase in cardiac output Period of highest weight gain Increase in ligamentous laxity Shifting center of gravity Loss of balance Fluid retention and edema 	<ul style="list-style-type: none"> Reaching maximum intensity sooner May have complaints of being out of breath Unable to complete certain exercises due to loss of balance Increase in ROM and enhanced injury risk May experience tightness and limited ROM due to swelling
Third	<ul style="list-style-type: none"> Increase in blood volume Weight gain Increase in ligamentous laxity Shifting of center of gravity Lumbar lordosis Loss of balance Fluid retention and edema Increase in foot size Compression neuropathies 	<ul style="list-style-type: none"> Unable to complete certain exercises due to loss of balance May have complaints of being out of breath Increase in ROM and enhanced injury risk May experience tightness and limited ROM due to swelling Alter or modify activity to decrease discomfort or symptoms related to neuropathy

ROM = range of motion.

Table 2
Guidelines for exercise during pregnancy

ACOG guidelines (2015)

1. Physical activity in pregnancy has minimal risks and can benefit most women.
2. A thorough evaluation should be conducted before recommending an exercise program.
3. Aerobic and strength-conditioning exercises should be encouraged before, during, and after pregnancy.
4. Regular physical activity during pregnancy improves or maintains physical fitness, helps with weight management, reduces risk of gestational diabetes in obese women, and enhances psychological well-being.
5. Due to anatomic and physiologic changes and fetal requirements, modifications may be necessary during exercise routines.

Canadian guidelines (2019)

1. All women without contraindication should be physically active throughout pregnancy.
2. Pregnant women should accumulate at least 150 minutes of moderate-intensity physical activity each week to achieve clinically meaningful health benefits and reductions in pregnancy complications.
3. Physical activity should be accumulated over a minimum of 3 days per week; however, being active every day is encouraged.
4. Pregnant women should incorporate a variety of aerobic and resistance training activities to achieve greater benefits. Adding yoga and/or gentle stretching may also be beneficial.
5. Pelvic floor muscle training (PFMT) may be performed on a daily basis to reduce the risk of urinary incontinence. Instruction on proper technique is recommended to obtain optimal benefits.
6. Pregnant women who experience light-headedness, nausea, or feel unwell when they exercise flat on their back should modify their exercise position to avoid the supine position.

Table 3
Contraindications

Absolute contraindications	Relative contraindications
Hemodynamically significant heart disease Restrictive lung disease Incompetent cervix/cerclage Persistent second or third trimester bleeding Placenta previa after 26 weeks gestation Premature labor during current pregnancy Ruptured membranes Severe anemia Preeclampsia or pregnancy induced hypertension Higher order multiple pregnancy (triplets, etc.) Other serious cardiovascular, respiratory, or systemic disorder	Severe anemia Poorly controlled type 1 diabetes Extreme morbid obesity Extremely underweight (BMI <12) Intrauterine growth restriction Orthopedic limitations Poorly controlled hypertension Poorly controlled seizure disorder Poorly controlled hyperthyroidism Heavy smoker History of spontaneous preterm birth Heavy smoker Eating disorder Malnutrition

BMI = body mass index.

decrease their participation in competitive sports and moderate-heavy activities as they progress through pregnancy (30). Multiple reasons emerged as factors influencing the decision to engage in high-intensity and body weight training exercise in pregnant women aged 26–39 years. These factors included support and community engagement, overcoming judgments and typical stereotypes, personal empowerment, and to ease pregnancy and delivery outcomes (35). Common judgments and stereotypes

encompassed treating pregnancy as a disease/illness, believing exercise would cause harm to the women and the baby, perceiving previous miscarriages were due to training, and exercising could affect breastmilk production (35). Women are able to adhere to their exercise programs more readily with the support and encouragement of their physician, coaches, and personal trainers. The community created within the training environment may help women as they transition to new life as a parent postpartum.

SAFETY PRECAUTIONS

Safety during exercise is always paramount and is especially a concern during pregnancy and postpartum. Although this article does not address the full maternal and fetal physiologic changes that occur during pregnancy nor the specific responses to exercise, it is important to understand some general concepts. A few areas of concern will be addressed, as well as additional modifications to aid the professional in certain exercises or environments (Table 4).

Table 4
Exercise modifications and recommendations

Modifications	Recommendations
Avoid high-risk sports Avoid overstretching or stretching to full range Avoid bouncy, jerky movements Avoid exercise in hot, humid environments or move exercise sessions indoors to a cooler environment Avoid high-intensity, high-altitude training ($\geq 1,500$ m/4,921 ft) Avoid exercises in the supine position after the first trimester; alter to a 45° position, side-lying, or standing position If experiencing high pregnancy-related symptoms (fatigue, nausea, etc.), consider cancelling workout or performing very light activities If experiencing lower leg edema, consider incorporating aquatic exercise If experiencing dyspnea, lower intensity or alter exercise	Focus on balance training during the beginning and middle stages of pregnancy Encourage continued hydration Encourage a small snack before exercise to prevent hypoglycemia Ensure adequate calories are being consumed as additional calories are needed as pregnancy progresses. The type, frequency, intensity, and duration of exercise will also play a factor. Encourage contraction of the pelvic floor before and during heavy strength training Consider using Borg RPE scale to assess intensity

RPE = rating of perceived exertion.

A woman may exercise during pregnancy as long as she does not experience any relative or absolute contraindications (Table 3). It is important to note that although she may be clear of contraindications at the start of pregnancy, absolute or relative contraindications can still occur as pregnancy progresses. Absolute contraindications are conditions or circumstances that would render the woman unable to continue exercise. Relative contraindications are conditions or circumstances that would require close monitoring by a physician if continuing to exercise. Coaches and personal trainers need to be able to modify exercises and training accordingly if contraindications happen in conjunction with attending physician oversight. Recognition of the warning signs that may occur during training should alert everyone to terminate exercise training with immediate referral to the physician for further assessment before continuing to train (Table 5).

MUSCULOSKELETAL ADAPTATIONS

Due to hormonal changes (progesterone, estrogen, prolactin, and relaxin) that occur during pregnancy, there are increases in ligamentous laxity that may predispose the woman to risk of injury. Strains and sprains at the joints due to hypermobility increase during each trimester (5,44,46). In addition, weight gain associated with pregnancy increases the mechanical stress on the joints by 20–100% by the third trimester and increases hyperlordosis in the spine (44). This laxity may lead to

changes in pelvic girdle stability due to widening of the pubic symphysis in preparation for delivery (44). Decreases in foot arch height and rigidity combined with increases in foot length and arch drop are seen during pregnancy and seem to be permanent changes. These changes in laxity and structure may increase risk for musculoskeletal disorders in the feet and lower legs (34,38,44). Women will often need a change in shoe size or width during the third trimester and postpartum due to structural and hormonal changes leading to fluid retention increasing foot volume (34).

The expanding uterus during pregnancy contributes to a shift in the body's center of gravity moving it more forward and upward. This shift in pregnant women causes a decrease in functional reach, a decrease in hip extension, and an increase in ankle motion progressing through the second and third trimesters (42). The increasing weight gain and abdominal volume reduce visual feedback during the gait cycle, which may contribute to balance and stability issues as pregnancy progresses and up to 6–8 weeks postpartum (5,34,36,39,44). Pregnant women are 2–3 times more likely to fall than nonpregnant women (9).

METABOLIC AND THERMOREGULATORY ADAPTATIONS

Around 40% of women who have gestational diabetes mellitus (GDM) will develop type 2 diabetes mellitus within 4 years of giving birth (46). Regular physical activity will help reduce

pregnancy-induced insulin resistance and lower the risk of GDM by 30–70% (46). Maternal metabolism will adapt to supply adequate glucose for the body. In late gestation, the fetus can use 30–50% of the maternal glucose in the body (9). It is important to maintain adequate caloric intake during pregnancy because nutrients are required for the growth and development of the fetus. It is advised that the woman gain between 25 and 35 pounds during pregnancy (9). As the woman progresses through each trimester, more calories are needed to support the developing fetus. Typically, an additional 90 kcal/d are needed for the first trimester, whereas 300 kcal/d and 450 kcal/d are needed for the second and third trimesters, respectively (9). It is recommended that pregnant women consume a small snack before participating in sports or physical activity because exercise longer than 45 minutes can result in hypoglycemia (46). In addition, fluid intake should increase 300 mL/d while pregnant and between 300 and 1,100 mL/d when lactating to adjust for the physiological compensations of pregnancy and postpartum (4).

Thermoregulation is extremely important during exercise. As the core temperature increases while exercising, the body tries to maintain homeostasis by sweating and dissipating the heat by evaporation. The first 35–60 days of gestation are critical for the neural tube formation. Excessive increases in core body temperature (above 103°F) can potentially lead to congenital abnormalities; however, there have been no reports in the literature related to exercise (6,12). Moderate exercise (60–70% of $\dot{V}O_2\text{max}$) is safe for all cardiorespiratory exercise modes in pregnant women with no contraindication, except those listed in Table 3 (12). Due to the increased basal metabolic rate during pregnancy, heat dissipation from the body during exercise is important as fetal metabolism generates heat (6,12). A state of euhydration (neither hyperhydration nor dehydration) is optimal for health and

Table 5
Warning signs

Warning signs for the athlete	Warning signs for the coach
Vaginal bleeding	Athlete grabbing stomach
Painful contractions	Observable fluid leakage
Amniotic fluid leakage	Athlete having trouble breathing/catching breath
Dizziness	Athlete not performing like previous session
Headache	Noticeable sluggishness/fatigue
Chest pain	Unsteadiness/decreased balance during activity
Calf pain or swelling	
Dyspnea before exercise	

performance. Dehydration or underhydration can lead to a change in performance and place the individual, pregnant or not, at risk for heat illness. It is recommended that women maintain proper hydration throughout pregnancy and postpartum and have unlimited access to fluids during exercise sessions. Water is the most essential fluid to consume when pregnant and postpartum due to maternal changes during pregnancy and lactation (4,24). Excess sugary drinks consumed during pregnancy have been linked to childhood obesity (19). If she feels dizzy or lightheaded during exercise, the exercise is prolonged more than 45 minutes, or if sweating profusely the use of a carbohydrate beverage would be considered to prevent hypoglycemia (40). But in general, the fluid of choice during pregnancy is water. Women may use the urine color chart to assess their hydration status; if the color is greater than 4 on the color chart, she needs to consume more fluids to improve her hydration status (24). Also, women should weigh themselves before and after exercise, and any weight loss should be replaced by fluid and food consumption before the next exercise session. In addition to fluid consumption, training adaptations may include avoiding very high-intensity exercises (greater than 85% $\dot{V}O_2\text{max}$ or greater than 90% max heart rate [HR]), avoiding exercise during hot, humid conditions (3,14), or moving exercise sessions indoors into a cooler environment (12).

PELVIC FLOOR DYSFUNCTION

Pelvic floor dysfunction (PFD) is the inability to correctly tighten and relax the pelvic floor and typically can present in many ways. The most common dysfunction seen during pregnancy is the presence of urinary incontinence (UI). Stress UI- “the complaint of involuntary leakage on effort or exertion (e.g., sporting activities), or on sneezing or coughing” (9). Prevalence is typically high in women and can range from 28 to 80% during sports and in female elite athletes (9). It is believed that a vaginal delivery may be responsible for PFD due to damaged soft tissue or nervous structures

supporting the pelvic floor. Although this is true, other factors such as hormonal changes during pregnancy and the increased pressure from the uterus may also play a role (9,13).

Pelvic floor muscle training (PFMT) is highly encouraged during pregnancy to help prevent UI after delivery (12,13,25). Women who perform PFMT are 40% less likely to report UI at 12 months postpartum than those who do not (11). Kegel exercises are one type of exercise that work the pelvic floor. To identify the pelvic floor muscles, stop urination midstream. When performing Kegel exercises, focus on contracting your pelvic floor while ensuring to not flex your abdomen or glutes. Women should start with contractions of 6–8 seconds and progress close to maximum with 3 sets of 8–12 contractions per day (11,32).

DIASTASIS RECTI ABDOMINIS

Due to the expanding abdominal cavity during pregnancy, many women may experience diastasis recti abdominis (DRA). DRA creates a thinning and widening of the linea alba that runs between your left and right rectus abdominis (18). It is reported that anywhere between 30 and 70% of women experience DRA during pregnancy (26). As well, it can remain in up to 60% of women in the immediate postpartum period and can still occur in 23–32% of women up to 1 year after delivery (15,18,26,41). Women are at a higher predisposition to have DRA if: they have had multiple gestations, are older in age, have experienced significant weight gain, delivered a child of larger birth weight or had a caesarean, had a larger abdominal circumference, or performed heavy lifting >20 times per week (11,15). Researchers have had difficulty in establishing clear risk factors for DRA (9,41).






Training abdominal and lower-back muscles during pregnancy is supported to help not only the labor process, but also to promote posture and prevent low back pain, which is a common complaint of women during pregnancy (22,26). Some researchers recommend

avoiding certain abdominal exercises, such as sit-ups and curl-ups, during pregnancy or postpartum. These exercises increase intra-abdominal pressure increasing the inter-rectus distance (IRD) (18). Instead, it has been suggested to focus on “drawing in” exercises that engage deeper abdominal muscles, including the transverse abdominis (31). Although some studies have shown that the drawing in exercises increase the IRD compared to the traditional abdominal crunch, which showed a significant decrease in IRD, there are no data to support these exercises or others for the treatment of DRA after delivery (12,15,26,37,45). Common core stabilization exercises are typically used throughout these studies with beneficial reduction in the IRD and can be used during the postpartum period (Table 6) (47). In addition, specific exercises for the low back (i.e., lumbar extension, stability ball rotations, stability ball bridges, and dumbbell side-bends) help to strengthen and reduce low back pain and discomfort (31,33,48). Also, some experts disagree or question the practice of abdominal binding as a treatment for women with DRA (18).



TRAINING CONSIDERATIONS

As recommended by the ACOG and Canadian Guidelines, strength training should be an integral part of the exercise program in addition to the aerobic component. Strength gains can be obtained by performing regular resistance exercise. The addition of strength training not only contributes to overall body strength, but also to good posture (30). The benefit of light to moderate resistance training (1–3 sets of 12–15 repetitions or Borg rating of perceived exertion [RPE] 11–13) (16,17,27) can lead to decrease in musculoskeletal discomfort and increase in core strength aiding in labor (22,30,31). Women performing strenuous strength training are recommended to avoid using the Valsalva maneuver due to an increase in intra-abdominal pressure and decrease in blood flow to the fetus. However, one may continue training at the level they were before pregnancy

Table 6
Common abdominal exercises for diastasis recti abdominis

Exercise	Description	Suggested use	Modifications
<p>Plank</p> 	Place hands on the floor in line with the shoulders. Toes are on the ground with knees off the floor and the body in a straight line.	1st, 2nd, 3rd trimester, postpartum	Lower knees to ground May lower to elbows if abdomen does not touch floor
<p>Posterior pelvic tilt</p> 	Lying supine with knees flexed and feet flat on floor, engage abdominals and contract towards your spine, flattening your low back on the ground.	1st trimester, postpartum	After 1st trimester, this can be modified to a standing or seated position.
<p>Abdominal crunch</p> 	Lying on the ground with knees bent and feet flat on the floor, contract your upper abdominals lifting your head and shoulder blades off the floor. Arms can be behind the head or across your chest keeping chin up when performing the exercise.	1st trimester, postpartum	
<p>Russian twist</p> 	Sitting down and engaging your core, lift your feet off the ground while leaning back slightly. Keeping hands in front of you, slowly rotate to one side bringing your hands toward your hip. Repeat to the opposite side.	1st, 2nd, 3rd trimester, postpartum	Place feet on ground
<p>Dead-bug</p> 	Lie face up with arms straight up toward the ceiling. Core is engaged with hips and knees at 90°. Slowly extend left leg and right arm simultaneously and return to the starting position. Repeat on the other side.	1st trimester, postpartum	Keep arms facing the ceiling and extend one leg at a time

**Table 6
(continued)**

<p>Bird dog</p> 	<p>Both hands and knees are on the floor with body in a tabletop position. Engaging the core, reach your right arm and left leg straight out. Bring back to starting position and repeat on the other side.</p>	<p>1st, 2nd, 3rd trimester, postpartum</p>	<p>Keeping arms stationary, extend one leg at a time</p>
<p>Angry cat</p> 	<p>While on hands and knees, take a deep breath lifting your lower ribcage and arching your back towards the ceiling. Exhale and return to the starting position.</p>	<p>1st, 2nd, 3rd trimester, postpartum</p>	

(8,10,12,46). Proper technique when lifting should be advised to ensure the safety of the woman and fetus. Other methods of strength training practiced through yoga or Pilates can be beneficial and aid in low back pain, stress reduction, mental clarity, and sleep (7,29). If athletes start to experience round ligament or lower abdominal pain during running or low-level plyometric activities (high-impact aerobics), a pregnancy support belt is recommended. This belt is different than the traditional weightlifting belt in that it is elastic and helps to support the abdomen and lower back.

All women are encouraged to be physically active during pregnancy, including those who were previously inactive, those overweight or obese, or with gestational diabetes (28). Women should focus on maintaining fitness, or for those previously inactive, progressing toward it because it can reduce the risk of pregnancy-related complications and improve maternal physical and mental health (28). Women are recommended to engage

in exercise daily, but at a minimum of 3 times per week. If sedentary before becoming pregnant, it is advised to gradually progress up to 30 minutes a day of aerobic exercise (6,30) and use exercise machines for resistance training until exercise technique is achieved (27). Active women can continue to engage in their level of training or complete moderate-to-vigorous training at least 4 times a week for a minimum of 30 minutes (6,30). Vigorous exercise intensities can be continued through the third trimester of pregnancy as long as the woman experiences no discomfort or complications (8). Traditionally, intensity of exercise is monitored using an individual's HR. Although various methods to assess HR include using an HR monitor or palpation at the wrist, using the Borg RPE scale may be more appropriate. Using HR to determine "moderate" and "vigorous" intensities that a woman should train at are relative to the individual's prior fitness level (50). A sedentary or obese pregnant woman would have a lower fitness level and

would not require as high of an HR to reach moderate intensity than a woman who participates in regular aerobic activity. The Borg RPE scale is a better way to monitor intensity in all women, including those who are sedentary or overweight (1,50,51). For moderate-intensity exercise, women should aim for at least an RPE of 13–14 (somewhat hard—when the exercise is an effort to perform, feel tired but they can continue) on the 6–20 scale (1). Increasing intensity of the exercise has shown to decrease the risk of preeclampsia, GDM, gestational hypertension, and depressive symptoms (28). An upper level of intensity has not been established; however, intensity is typically self-paced, and women are more likely to lower their intensity and/or training volume as their pregnancy progresses (1,6,43,46). A warm-up and cool-down should still be an integral part of the program. The warm-up should consist of activities to increase HR (Borg RPE of fairly light 10–12), including walking and light jogging (1). The exercise session

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should conclude with a cool-down of walking and light static stretching (focus on major muscle groups, holding stretches for 10–30 seconds each). Stretching during the cool-down for 10–20 minutes may be beneficial in reducing preeclampsia risk in pregnant women by increasing parasympathetic tone (23,49).

EXERCISE MODIFICATIONS

Exercise modification to compensate for physiological and biomechanical changes may include avoiding overstretching and bouncy or jerky motions. This modification is done to decrease tissue stress and hypermobility (12,43). It is important to focus on balance training during the beginning to middle stages of pregnancy to improve the strength, postural balance, and proprioception of the lower extremity in preventing falls (36). An increase in the base of support during standing and gait cycles as the pregnancy advances helps to compensate for balance and stability decreases (34). Activities may need to be modified or eliminated from training if posture and balance during the performance of the exercise cannot be maintained.

Another major modification includes refraining from supine exercises during the second or third trimester. The

increased weight of the uterus can place pressure on the inferior vena cava and hamper blood flow and oxygen exchange to the fetus (1,30,51). Similarly, lying prone on your stomach after the first trimester causes decreased blood flow and increased discomfort to the fetus and mother (5,10,12,50). Other modifications may also be needed due to the symptoms they are experiencing. Some modifications to specific exercises can be seen in Table 7.

OTHER CONSIDERATIONS

As a strength and conditioning coach or personal trainer, it is important to have good relationships and open communication with your athletes and clients. As the woman adjusts to physical, mental, and emotional issues during pregnancy, having good communication will allow her to be forthcoming about physical and emotional concerns. Encourage her to check in before each session to let you know what her current symptoms are and how she is feeling. The session update can help identify ways that daily training may need to be adjusted. In addition to oral communication, have her keep a symptom log or journal with how she feels before, during, and after exercise. This feedback may help to determine if any session caused an increase in symptoms or discomfort allowing for training to

be adjusted accordingly. If she has continued emotional or mental health issues or concerns, the coach or personal trainer should make a referral to the appropriate psychological or mental health professional.

POLICIES RELATED TO THE PREGNANT ATHLETE

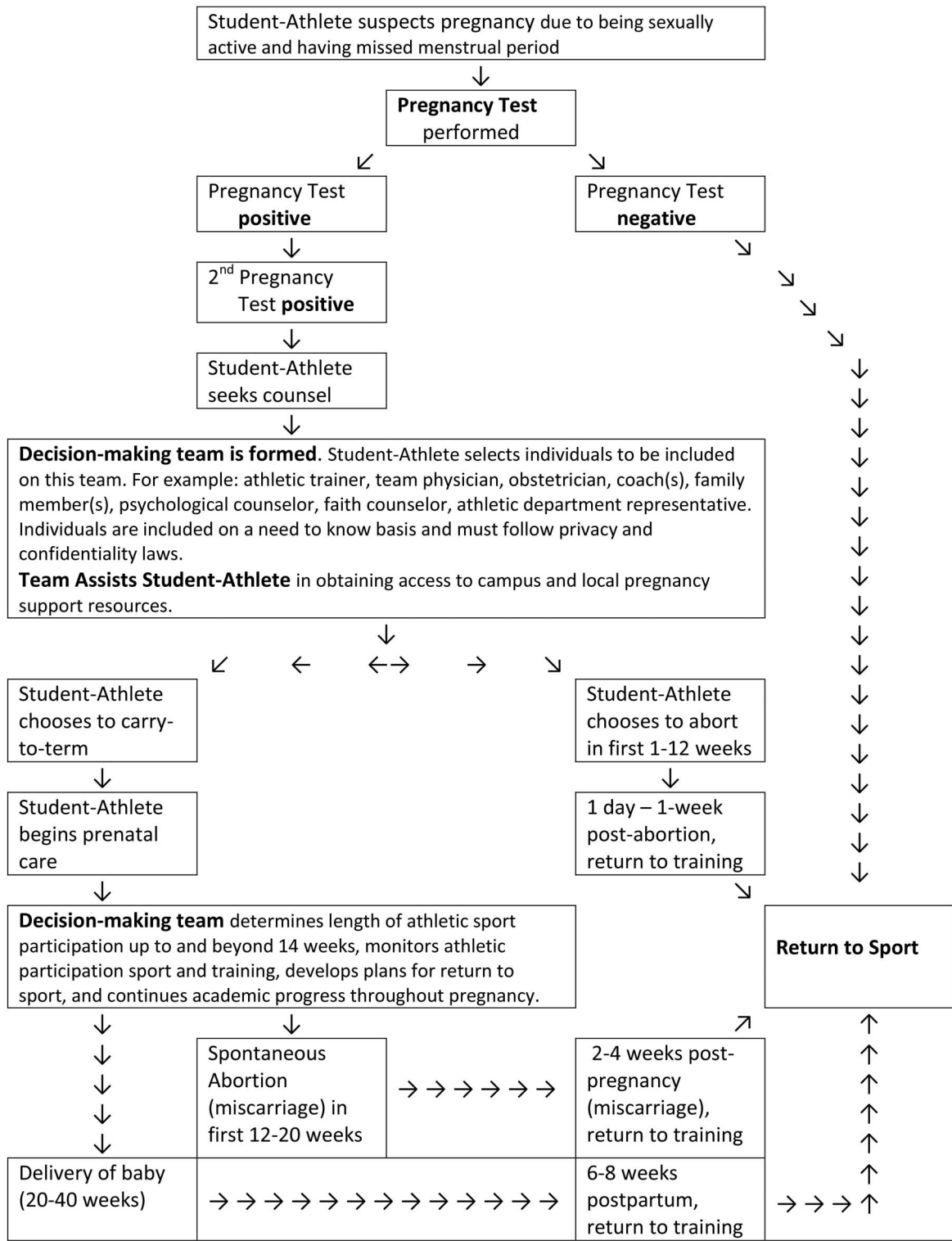
As a strength and conditioning coach or personal trainer, you may come in contact with an athlete who is competing at a high level of competition or who is a scholarship athlete who becomes pregnant. This occurrence would necessitate understanding the laws and rules related to pregnancy and athletic competition. The implementation of the 1975 Title IX regulations prohibits sex discrimination in education to include athletics, thus allowing student-athletes (SA) who become pregnant to be treated the same as an SA with a knee injury. To coincide with this, the NCAA created a *Model Policy for Pregnant and Parenting Student-Athletes* to help prevent discrimination of SA. In doing so, rules and regulations for pregnant SA and any pregnancy-related condition they experience are to be provided the same modifications as any other SA to allow continued team participation (21). Also, an SA's athletic career that is interrupted due to a pregnancy-related condition will typically be entitled to a waiver to extend her athletic career (21). The policy also includes a model decision flow chart on how to respond to pregnancy (Figure). This flowchart is beneficial to the SA, but also to the strength and conditioning coach who may be approached by an SA for advice on training during her pregnancy.

When an SA becomes pregnant, it can be a time of uncertainty. Time is usually needed to process the emotions and realities, as well as what their future holds. Because of this, mandatory pregnancy disclosure requirements are discouraged. A safe and protected environment will provide better facilitation for disclosure (21). At no point should the strength and conditioning coach disclose the pregnancy status of an SA unless the SA

Table 7
Specific exercise modifications

Specific exercise modifications
Supine bench press → Incline bench press
Supine dumbbell fly → Standing cable fly
Skullcrushers → Seated triceps overhead extension
Push-ups → Incline/wall push-ups
Deadbug → Bird dog ^a
Lunges → Single-leg leg press
Squats → Hack squat
Straight-leg (Romanian) deadlift → Traditional deadlift

^aThe modification would change muscles being activated during this exercise; however, still works the core in a position, challenges balance, and does not impede blood flow.



Adapted from 'Pregnant and parenting student athletes: resources and model policies' (14)

Figure. Model decision flow chart—responding to student-athlete pregnancy.

gives written authorization. Protection of the SA medical condition (pregnancy) is protected under the Health Information Portability Accountability Act and the Federal Education Rights and Privacy Act as all other conditions.

RETURNING TO SPORT

Depending on the level of exercise during pregnancy, mode of birth (vaginal or cesarean), and presence or absence of any medical or surgical complications, women can return to activity in as little as a few days to months as cleared by their physician. Because elite athletes tend to have a higher level of training while pregnant than recreational athletes, it allows them to resume their high-intensity training sooner. Thirty-eight percent of elite athletes returned to running within 6 weeks compared to only 4% in nonathletes (11). Women should be encouraged to start slowly, gradually progress, and watch for any symptoms that would require termination of exercise. Such symptoms would include increased bleeding, abdominal or pelvic floor pain, or dizziness. Even a 15- to 30-day detraining period can result in muscle atrophy and diminished cardiovascular endurance, thus requiring more time to recondition (9). There are no reported maternal complications associated with the resumption of training (6). Continuing an exercise routine or starting a new one helps women to develop lifelong habits (1,16).

Seventy-seven percent of elite athletes returned to compete at the same level after childbirth (11). Although most athletes are not at the elite level, it is still important to gradually return. In 2016, the First World Congress in Sports Physical Therapy released a consensus statement on the return to sport after injury. The continuum described can be a model for returning to exercise and sport after childbirth in the postpartum period (2,12). The continuum is broken down into 3 phases as seen below:

1. Return to participation: Rehabilitation, training, or sports participation, but a lower level than pregnancy.
2. Return to sport: Returned to defined sport, but not to the same intensity of performance.

3. Return to performance: Returning back to the same or better performance level in their sport.

For some women, returning to sport may be satisfactory for them and they may not desire to return to the performance level. It is imperative to discuss this once they have been cleared for exercise because this can help shape and define your goals and intensity through the program.

CONCLUSION

No new information regarding exercise during pregnancy has been added to the already well-established benefits for the mother and fetus. Women who are regularly active continue to participate when pregnant due to the health benefits, support and community, and empowerment and pride. As pregnancy progresses, modifications including changes in the amount of weight lifted and positional changes during exercise may be necessary to allow the woman to continue with the program. A coach's and personal trainer's knowledge of returning to exercise in the postpartum period is often lacking. Because pregnancy is multifactorial, these programs should be individualized to the woman and address any current issues she may be experiencing. With the new responsibilities of motherhood becoming a priority in the daily schedule, being able to create an efficient and effective training program will allow her to see the results she wants in the time available.

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