Review of Recent Physical Activity Guidelines During Pregnancy to Facilitate Advice by Health Care Providers

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Importance: Physical activity during pregnancy can offer many maternal and fetal health benefits.

Objective: The aim was to summarize American, Canadian, and international recommendations published recently on physical activity during pregnancy to aid health care providers in their delivery of advice on the topic.

Evidence Acquisition: A descriptive review of 3 national guidelines and 1 international guideline on physical activity during pregnancy was conducted. The guidelines included the 2019 Canadian recommendations, the 2018 United States' Physical Activity Guidelines for Americans (second edition), the 2015 (reaffirmed in 2017) American College of Obstetrics and Gynecology guideline, and the 2016–2018 International Olympic Committee recommendations for recreational and elite athletes.

Results: For apparently healthy women, under the guidance of their health care provider, moderate-intensity physical activity using both aerobic and muscle conditioning activities is recommended. The guidelines recommended at least 150 min/wk spread throughout the week (Canada, United States) or at least 20 to 30 min/d (American College of Obstetrics and Gynecology).

Conclusions and Relevance: This summary of 4 recent guidelines can facilitate use of updated recommendations by health care providers regarding physical activity during pregnancy. More detailed evidence-based guidelines on physical activity during postpartum are needed.

Target Audience: Obstetricians and gynecologists, family physicians

Learning Objectives: After completing this activity, the learner should be better able to describe the most recent recommendations for physical activity during pregnancy; explain the relative and absolute contraindications to physical activity during pregnancy; and identify the warning signs for pregnant women to stop physical activity.

In the late 19th and early 20th century, the first recorded scientific studies on the impact of maternal physical activity on health outcomes were recorded.¹ The health

benefits of physical activity during pregnancy are now widely recognized.^{2–7} With the accumulation of scientific evidence regarding physical activity during pregnancy,

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evidence-based guidelines have been developed to summarize recommendations and optimize patient care. Health-related guidelines are generally informed by systematic evidence reviews and assessment of the benefits and harms.⁸ Pregnancy-related guidelines offer guidance for women at a unique time in their life, when they are generally more open to behavior modification and have more frequent access to health care providers.¹

The earliest US recommendations on physical activity during pregnancy came in the 1950s.¹ At that time, the guidelines had little scientific basis, reinforced the idea that women were frail, and discouraged exercises such as swimming, cycling, and tennis after the first trimester.⁹ Through the years, recommendations for physical activity during pregnancy have been released by many organizations worldwide.¹⁰ Despite the promulgation of these recommendations, women report misconceptions and confusion about physical activity during pregnancy.^{11,12} Because many pregnant women seek and receive advice from multiple sources, such as family members and friends, as well as the Internet, print, and social media,^{13–16} these multiple sources of advice may have conflicting messages.

The health care provider can offer tailored evidence-based advice to their patient, as well as provide referrals as needed. However, the opportunity to provide advice is often missed. For example, the 2005–2010 National Ambulatory Medical Care Survey and the National Hospital Ambulatory Medical Care Survey indicated that providers report counseling pregnant women about exercise and nutrition significantly less compared with nonpregnant women.¹⁷ Furthermore, pregnant women who were overweight or obese were 30% less likely to receive counseling compared with nonpregnant overweight or obese women.¹⁷ This is unfortunate because studies indicate that pregnant women often seek advice about physical activity, nutrition, and weight during pregnancy from their health care provider.^{12,18,19} Moreover, pregnant women whose providers discussed physical activity were more likely to report exercising during pregnancy, particularly later in pregnancy.^{20,21}

Studies from the patient's perspective corroborate the findings regarding a lack of advice on physical activity during pregnancy.^{12,18,22} For women who reported receiving advice, some stated it was confusing or overwhelming or that the advice seemed vague and conservative with regard to physical activity.^{12,13,15,16,23} Moreover, the advice provided may not be congruent with current guidelines.^{18,19,24,25} At times, there seems to be a discrepancy between what the woman comprehends and the advice the provider reports sharing.²³ Reasons for this discrepancy are likely multifactorial in nature.

Health care providers report barriers to communicating with women about physical activity, nutrition, and weight including lack of knowledge, a belief that intervening might cause negative consequences, an unsupportive environment, and a lack of resources.²⁶ Other barriers include the short time of the health care visit, competing demands, lack for reimbursement for providing detailed counseling, and provider's lack of self-efficacy in treating patients with obesity.^{27,28} Qualitative studies that included providers report they are concerned that their counseling may not be consistent with current guidelines and that they may not impact women's behaviors.^{24,29}

The purpose of the current article was to review and compare the most recent selected physical activity guidelines during pregnancy to facilitate recommendations health care providers give to their patients. Specifically, we contrasted and summarized the (i) 2018 US Physical Activity Guidelines for Americans, second edition⁶; (ii) the 2015/2017 American College of Obstetrics and Gynecology (ACOG) guideline³; (iii) the 2019 Canadian Guideline for Physical Activity Throughout Pregnancy,³⁰ and (iv) the 2016–2018 International Olympic Committee recommendations for recreational and elite athletes.³¹

RECENT PHYSICAL ACTIVITY GUIDELINES DURING PREGNANCY

In this section, we provide the historical background on the 4 guidelines included in this review, followed by their findings on any benefits or harms and a summary of their recommendations. In 2008, the US Guideline for Americans was released by the government,³² based on a systematic literature review of studies published through 2006.³³ Ten years later, another literature review was conducted from 2006 to 2016 by primarily reviewing 73 systematic reviews and meta-analyses on the impact of physical activity on maternal and fetal outcomes.³⁴ Another updated search provided evidence through February 2018.³⁵ Based on the reviews, recommendations were released in 2018.⁶ Both the 2008 and 2018 recommendations included specific guidance for pregnant women.

The ACOG released guidelines on physical activity during pregnancy in 1985.³⁶ As evidence accumulated, the guidelines were updated in 1994³⁷ and 2002.³⁸ The most recent guideline included in this review was released in 2015³ and reaffirmed in 2017.³⁹ The draft guidelines are evidence-based documents subject to peer review by other ACOG committees and independent reviewers before finalizing.⁴⁰

In 2003, the Canadian guidelines were created, supported by the Canadian Society for Exercise Physiology

and the Society of Obstetricians and Gynecologists of Canada.^{41,42} Country-specific guidelines were updated by convening an expert panel and conducting systematic reviews on specific outcomes that the panel deemed vital for guideline development and followed rigorous methodology.⁴³ These systematic reviews included the impact of exercise on congenital anomalies and hyperthermia,⁴⁴ urinary incontinence,⁴⁵ low back and lumbopelvic pain,⁴⁶ prenatal and postnatal anxiety and depressive symptoms,⁴⁷ prevention of gestational diabetes and hypertensive disorders of pregnancy,⁴⁸ excessive gestational weight gain and postpartum weight retention,⁴⁹ and other maternal harms, labor, and delivery outcomes.⁵⁰ The panel reviewed the impact of maternal exercise on fetal heart rate, umbilical and uterine blood flow,⁵¹ fetal mortality,⁵² and neonatal and childhood outcomes.⁵³ The panel also explored glucose responses to acute and chronic exercise during pregnancy⁵⁴ and the impact of supine exercise on adverse pregnancy outcomes.⁵⁵ Based on these reviews, the panel developed a guideline document for physical activity throughout pregnancy.³⁰

Lastly, an international expert panel was convened by the International Olympic Committee to review the literature and provide recommendations for recreational and elite athletes. The panel reviewed the impact of exercise in women planning pregnancy and those who are pregnant⁴; examined the effect of exercise on the fetus, labor, and birth⁵; explored the impact of exercise during postpartum⁵⁶; made recommendations for future research⁵⁷; and provided recommendations for health professionals.³¹

BENEFITS AND HARMS

The guidelines^{3,6,30,31} identified numerous benefits associated with physical activity during pregnancy from the scientific literature. Maternal benefits included lower risk of preeclampsia, gestational hypertension, gestational diabetes mellitus, excessive gestational weight gain, and lumbopelvic pain. Additional benefits of physical activity during pregnancy included increased or maintenance of cardiorespiratory fitness, enhancement of psychological well-being, lower prenatal depression, and decreased severity of depressive symptoms, as well as reduced symptoms of postpartum depression. Additional benefits included reduced length of labor, lower caesarean rate, and instrumental delivery rate, as well as shorter postpartum recovery and lower risk of urinary incontinence. Fetal benefits to maternal physical activity included fewer newborn complications and less risk of macrosomia.

The Canadian guideline specifically mentions that no harms were identified from their systematic reviews, including lack of association with preterm birth, preterm/prelabor rupture of membranes, miscarriage, stillbirth, neonatal death, and neonatal hypoglycemia, low birth weight, birth defects, induction of labor, or birth complications.³⁰ Therefore, “the difference between desirable and undesirable consequences (net benefit) is expected to be moderate.”^{30(p1339)} However, there is a lack of scientific evidence for exercising specifically above the guidelines provided.^{30,31} There is also a need for improving the evidence-based guidance

TABLE 1
Physical Activity Recommendations During Pregnancy From 3 Guideline Documents

	Canada 2019 ³⁰	ACOG 2015/2017 ³	US 2018 ⁶
Duration	≥150 min/wk	≥20–30 min/d	≥150 min/wk
Frequency	Minimum of 3 d/wk; being active every day is encouraged	Most or all days of the week	Spread throughout the week
Intensity	Moderate intensity defined as physical activity intense enough to noticeably increase heart rate; a person can talk but not sing during activities of this intensity Target heart rate zones for pregnant women based on age, “talk test”	Moderate intensity, RPE 13–14 on a scale of 6 to 20, “talk test”—can talk while exercising	Light to moderate intensity, RPE 5–6 on a scale of 0 to 10, “talk test”—can talk while exercising; additionally women who engaged in vigorous-intensity aerobic activity can continue these activities if they remain healthy and discuss with their health care provider
Type	Aerobic and resistance training activities including brisk walking, stationary cycling (moderate effort), swimming or aquafit, carrying moderate loads, household chores (eg, gardening, washing windows)	Aerobic and strength-conditioning exercises including walking, swimming, stationary cycling, low-impact aerobics, modified yoga or pilates, running, racquet sports	Aerobic and muscle strengthening

RPE indicates rating of perceived exertion from the Borg scale.⁵⁹

regarding the effects of occupational physical activity on the mother and her baby.³

SUMMARY OF THE GUIDELINES

Health care providers should carefully evaluate pregnant women for obstetric or medical complications before making recommendations on physical activity participation.³ Women with disabilities or medical conditions should consult with their health care

provider for additional guidance.⁵⁵ Additionally, it is recommended that women should consult with their health care provider (who monitors the progress of the pregnancy) about whether or how to adjust their exercise during and following pregnancy.⁶ The preponderance of evidence supports exercise during pregnancy as being safe and beneficial for both the mother and baby. Based on the 12 systematic reviews conducted by the Canadian initiative, the evidence was summarized succinctly in that “across dozens of various

TABLE 2

Absolute and Relative Contraindications for Physical Activity During Pregnancy From 3 Guideline Documents

	IOC 2016–2018 ³¹	Canada 2019 ³⁰	ACOG 2015/2017 ³
Absolute Contraindications			
Hemodynamically significant heart disease or other serious cardiovascular disorders	x	x	x
Incompetent cervix, cervical insufficiency, or cerclage	x	x	x
Intrauterine growth restriction	x	x	x*
Multiple gestation at risk of premature labor	x	x*	x
Persistent second- or third-trimester bleeding	x		x
Placenta previa after 26th week (ACOG, IOC) to 28th week (Canada) of gestation	x	x	x
Preeclampsia (all) or pregnancy-induced hypertension (ACOG, IOC)	x	x†	x
Premature labor during the current pregnancy	x	x	x
Restrictive lung disease or other serious respiratory disorders	x	x	x
Ruptured membranes	x	x	x
Severe anemia	x		x
Uncontrolled or poorly controlled hypertension	x	x	x§
Uncontrolled thyroid disease		x	x
Uncontrolled type 1 diabetes or other serious systemic disorders		x	x
Unexplained persistent vaginal bleeding (Canada), such as in second or third trimester (IOC)	x	x	
Relative Contraindications			
Anemia (ACOG) or symptomatic anemia (Canada)	x	x	
Cervical dilation	x		
Chronic bronchitis (ACOG, IOC), mild/moderate respiratory disease (Canada), or other respiratory disorders (IOC)	x	x	x
Eating disorder		x	
Extreme morbid obesity			x
Heavy smoker			x
History of extremely sedentary lifestyle			x
History of spontaneous preterm birth (Canada, IOC), premature labor (IOC), miscarriage (IOC), or fetal growth restriction (IOC)	x	x	
Malnutrition (Canada) or extreme underweight (ACOG, IOC)	x	x	x
Mild/moderate cardiovascular disease		x	
Orthopedic limitations	x		x
Poorly controlled seizure disorder	x		x
Poorly controlled type 1 diabetes	x		x
Recurrent pregnancy loss		x	
Unevaluated maternal cardiac arrhythmia	x		x
Other significant medical conditions		x	

Note: The Canadian guideline document also states that women with absolute contraindications may continue the usual activities of daily living but should not participate in more strenuous physical activity. Women with relative contraindications should discuss the advantages and disadvantages of moderate to vigorous intensity with their health care provider.

*The ACOG guideline specifies intrauterine growth restriction in current pregnancy as a relative contraindication.

†The Canadian guideline specifies triplets and higher as an absolute contraindication and a twin pregnancy after the 28th week as a relative contraindication.

‡The Canadian guideline specifies gestational hypertension as a relative contraindication.

§The ACOG guideline specifies poorly controlled hypertension as a relative contraindication.

||The ACOG guideline specifies poorly controlled hyperthyroidism as a relative contraindication.

IOC indicates International Olympic Committee.

aerobic and resistance training protocols, the systematic reviews identified no increase in maternal, fetal, or neonatal complications; this can reassure women and their care providers that exercise throughout gestation is a safe and healthy activity.^{25,58(p81)} Furthermore, prenatal physical activity should be considered a frontline therapy for reducing the risk of pregnancy complications and enhancing maternal physical and mental health and healthy pregnancy outcomes.³⁰

Specific advice on the frequency, duration, intensity, and type of exercise was provided by the country-specific guidelines for Canada³⁰ and the United States,⁶ as well as from the ACOG³ (Table 1). Apparently healthy women are encouraged to engage in physical activity for at least 20 to 30 min/d³ or 150 minutes spread throughout the week.^{6,30} All 3 guidelines recommended moderate-intensity physical activity. The Canadian document presented exercise intensity target heart rate zones based on pregnant women of specific ages and fitness levels.³⁰ The “talk test” can also be used to monitor intensity. A woman should be able to maintain a conversation during exercise and reduce the intensity if she cannot speak without being out of breath.³⁰

All 3 guidelines recommended both aerobic and muscle-strengthening activities. Examples of safe moderate-intensity aerobic exercise, depending on fitness levels, include walking, swimming, stationary cycling, low-impact aerobics, and running.³ Research on the effects of muscle strengthening during pregnancy is growing,^{60,61} with most studies using resistance bands or light dumbbells for the strengthening portion of the intervention. Women who habitually participate in strengthening can continue to do so during pregnancy, but should discuss how to adjust their routine with their health care provider. The Canadian guideline also recommended pelvic floor muscle training, such as Kegel exercises, on a daily basis to decrease the risk of urinary incontinence during and after pregnancy.^{30,62}

Substitution of certain activities may be necessary given physiological changes the woman experiences over the time course of pregnancy.⁴ Women who are pregnant should avoid contact and collision sports/activities that have a high risk of falling or may cause loss of balance or trauma to the mother or fetus.^{3,6,30} Other activities to avoid include scuba diving,^{3,30} hot pilates and hot yoga,³ and physical activity on the back (eg, supine) after the first trimester.^{6,31} The Canadian guideline suggests that pregnant women who experience lightheadedness or nausea or feel unwell when they exercise flat on their back should modify their exercise position to avoid the supine position.^{30,55} During pregnancy, some women experience diastasis recti, indicated by a visible separation of their abdominal muscles.³⁰ These women should seek physical therapy advice and avoid abdominal strengthening exercises because they may worsen the condition. In any physical activity, the Valsalva maneuver and prolonged isometric contraction should be avoided.³⁰ Motionless standing, which may result in decreased venous return and hypotension, should also be avoided.^{3,30}

Women who were sedentary prior to pregnancy should follow a more gradual progression of exercise, such as a lower intensity and duration.³⁰ Physical activity recommendations for pregnant women should be modified according to the woman's prior exercise history as well as symptoms, discomforts, and abilities across the pregnancy time course, with consideration of possible absolute and relative contraindications. Three of the 4 guidelines described absolute and relative contraindications to physical activity, with some discrepancies between them as noted in Table 2.

There may be periods when following exercise recommendations is not possible because of fatigue or discomfort from pregnancy; women should do what they can and return to following the recommendations when they are able under the health care provider's care.³⁰ Exercise goals and progression may vary at different

TABLE 3
Warning Signs to Stop Physical Activity During Pregnancy From 3 Guideline Documents

	IOC 2016–2018 ³¹	Canada 2019 ³⁰	ACOG 2015/2017 ³
Amniotic fluid leakage (ACOG, IOC) or other vaginal fluid loss including rupture of the membranes (Canada)	x	x	x
Calf pain or swelling	x		x
Chest pain	x	x	x
Dizziness (all), syncope (IOC), or faintness that does not resolve on rest (Canada)	x	x	x
Headache	x		x
Muscle weakness (IOC) or muscle weakness affecting balance (ACOG)	x		x
Regular painful uterine contractions	x	x	x
Shortness of breath prior to exertion (ACOG, IOC) or that is persistent and excessive that does not resolve on rest (Canada)	x	x	x
Vaginal bleeding	x	x	x

IOC indicates International Olympic Committee.

TABLE 4

Selected Safety Precautions for Physical Activity During Pregnancy From 3 Guideline Documents

Safety Precaution	IOC 2016–2018 ³¹	Canada 2019 ³⁰	ACOG 2015/2017 ³
Heat	Hyperthermia should be avoided, especially in the first trimester.	Avoid physical activity in the excessive heat, especially with high humidity.	Prolonged exercise should be performed in a thermal-neutral or controlled environment. Wear loose fitting clothing, and avoid high heat and humidity to protect against heat stress, particularly in the first trimester.
High altitude	Refrain from high intensity training at altitudes >1500–2000 m during pregnancy for those not acclimated.	Women living <2500 m should avoid physical activity at higher altitudes. Those considering physical activity >2500 m should seek supervision from an obstetrician with knowledge of the impact of high altitude on maternal and fetal outcomes.	For lowlanders, physical activity up to 6000 ft (~1829 m) in altitude is safe.
Nutrition and hydration	Women are advised to follow their country-specific recommendations. Pregnant elite athletes should pay special attention to adequate energy intake to achieve recommended gestational weight gain.	Maintain adequate nutrition and hydration. Drink water before, during, and after physical activity.	Stay well hydrated.
Supine position, standing motionless	If dizziness occurs while engaging in supine or standing motionless and then discontinue the activity. To reduce risk, exercises normally done in the supine position may be modified by tilting the torso to 45 degrees or completing the exercises while standing, sitting, or side-lying.	If a woman experiences lightheadedness or nausea or feel unwell when lying on her back, she should modify her exercise position to avoid the supine position.	Motionless posture (eg, supine, certain yoga positions) should be avoided as much as possible.
High-intensity or competitive athletics	Pregnant elite athletes are recommended to refrain from training at intensities >90% of their maximal aerobic capacity.	Those exercising significantly above the recommendations or considering athletic competition should seek supervision from an obstetrician with knowledge of the impact of high-intensity physical activity on maternal and fetal outcomes.	Competitive athletes require frequent and closer supervision and should pay particular attention to avoiding hyperthermia, sustaining adequate calorie intake, and maintaining proper hydration.
Previously sedentary		Previously inactive women are strongly recommended to be physically active throughout pregnancy. They are encouraged to start gradually at lower intensity and increase duration and intensity as their pregnancy progresses.	Previously inactive women should follow a more gradual progression of exercise during pregnancy.
Overweight or obese		Women who are overweight or obese are strongly recommended to be physically active throughout pregnancy.	Women who are overweight or obese are encouraged to engage in health lifestyle modification during pregnancy that includes physical activity. Start with low intensity and short duration of exercise, and build up as able.

IOC indicates International Olympic Committee.

time points during pregnancy, and exercise routines should remain flexible. Warning signs to stop physical activity during pregnancy were provided by 3 of the 4 guidelines and are summarized in Table 3. All pregnant women should be aware of the warning signs to stop physical activity and seek health care advice. General safety precautions for physical activity during pregnancy are summarized in Table 4.

TOOLS AND RESOURCES FOR PROVIDING ADVICE

Based on the summary of 4 physical activity guidelines during pregnancy, health care providers are challenged to address salient points during an office visit. This section provides suggestions for tools and resources to aid health care providers when discussing physical activity with their patients.

Theoretically derived behavior change techniques⁶³ to increase physical activity and reduce sedentary behavior can be incorporated into the provider visit.⁶⁴ Health care providers could prepare themselves to offer support for behavior change by reviewing the ACOG Committee Opinion titled “Motivational Interviewing:

A Tool for Behavior Change.”⁶⁵ The document encourages the use of motivational counseling using the 5 A's: assess, advise, ask (or agree), assist, and arrange (defined in Table 5). In support of the use of the 5 A's, a study analyzing prenatal visit conversations between obstetric providers and their patients indicated that the more A's that were used, the lower the gestational weight gain for the woman.⁶⁶ Assess and advise were most commonly incorporated into those conversations, not surprisingly because these are most consistent with data gathering that are part of clinical training. Arrange, agree, and assist were not often used in conversations and may be less familiar to providers.

The Canadian Society for Exercise Physiologist's Physical Activity Readiness Medical Examination for Pregnancy (PARmed-X for Pregnancy) or the electronic Physical Activity Readiness Medical Examination (ePARmed-X+) can be used for the health screening of pregnant women before their participation in exercise programs (<http://www.csep.ca/cmfiles/publications/parq/parmed-xpreg.pdf>).⁶⁷ Included in this resource is a tool to facilitate providing an exercise prescription specific for the woman.

Exercise Is Medicine is a global health initiative by the American College of Sports Medicine to encourage health

TABLE 5

Application of the 5 A's to Use by Health Care Providers to Counsel on Physical Activity During Pregnancy

Strategy	Definition	Example
Assess	Ask about physical activity	Provider: “How often did you exercise last week?” “What type of physical activities did you do last week that had your heart rate elevated and you breathing harder?”
Advise	Provide the patient with advice about physical activity	Provider: “You should consider walking every day for about 20–30 min each day.” “Because of the heat wave we are having, try walking indoors in an air conditioned space.”
Agree	Patient and provider agree to a specific course of action regarding physical activity	Provider: “Since exercise with impact is no longer comfortable, is there a place you could swim instead for exercise?” Patient: “Yes, there is a pool in my neighborhood that I can start using for exercise.”
Assist	Patient and provider work together to identify enablers and barriers for physical activity	Provider: “What helps you to stay more active?” Patient: “Being able to exercise with child care support for my other children.” Provider: “Before you leave today, we will provide you with a list of local exercise programs that offer child care support.”
Arrange	Provider refers patient for follow-up with a specialist, exercise physiologist, nutritionist, social worker, etc	Provider: “Would you like to talk to an exercise specialist who can take you through safe strengthening exercises you could perform during pregnancy?” “Since you have questions regarding eating while engaging in physical activity, I am going to suggest you visit our nutritionist to learn ways to eat healthy.”

A similar table on gestational weight gain can be found in Washington Cole et al.⁶⁶

care providers to include physical activity in treatment planning and refer patients to evidence-based exercise programs and qualified professionals.^{68,69} Safety screening tools, tips for starting the conversation, and referral resources are available at <http://www.exerciseismedicine.org/>.

CONCLUSIONS

Health care providers must address several key barriers to communicating with women about physical activity, including lack of knowledge, a belief that intervening might cause negative consequences, an unsupportive environment, and a lack of resources.²⁶ In their respective statements, the 2015/2017 ACOG,³ the 2018 Physical Activity Guidelines for Americans,⁶ the 2019 Canadian Guideline for Physical Activity Throughout Pregnancy,³⁰ and the International Olympic Committee reviews³¹ outlined both the importance of physical activity during pregnancy and provided evidence-based guidance for the minimization of risk and promotion of health benefits.

This review addressed some of the barriers identified by health care providers, by summarizing key recent recommendations and highlighting resources and tools to assist health care providers with counseling. Future reviews should consider other guidance offered around the world, which might lend further insight into best practices for physical activity recommendations during pregnancy. In addition, the Canadian guideline focused only on pregnancy, whereas the other guidelines included recommendations for postpartum women. More detailed evidence-based guidance for physical activity during postpartum is needed. Stepping up health care provider efforts offers one of multiple sources needed to address the inadequate levels of physical activity among pregnant women in the United States⁷⁰ and around the world.¹⁰

REFERENCES

1. Symons Downs D, Chasan-Taber L, Evenson K, et al. Physical activity and pregnancy: past and present evidence and future recommendations. *Res Q Exerc*. 2012;83:485–502.
2. Nascimento SL, Surita FG, Cecatti JG. Physical exercise during pregnancy: a systematic review. *Curr Opin Obstet Gynecol*. 2012;24:387–394.
3. ACOG. ACOG Committee Opinion No. 650: physical activity and exercise during pregnancy and the postpartum period. *Obstet Gynecol*. 2015;126:e135–e142.
4. Bo K, Artal R, Barakat R, et al. Exercise and pregnancy in recreational and elite athletes: 2016 evidence summary from the IOC expert group meeting, Lausanne. Part 1—exercise in women planning pregnancy and those who are pregnant. *Br J Sports Med*. 2016;50:571–589.
5. Bo K, Artal R, Barakat R, et al. Exercise and pregnancy in recreational and elite athletes: 2016 evidence summary from the IOC expert group meeting, Lausanne. Part 2—the effect of exercise on the fetus, labour and birth. *Br J Sports Med*. 2016;50:1297–1305.
6. US Department of Health and Human Services. *Physical Activity Guidelines for Americans*. 2nd ed. Washington, DC: US Department of Health and Human Services; 2018. Available at: <https://health.gov/paguidelines/second-edition/>. Accessed February 5, 2019.
7. Artal R. Exercise during pregnancy and the postpartum period. In: Lockwood C, Fricker P, eds. *UpToDate Inc*. Waltham, MA: Wolters Kluwer; 2019. Available at: <https://www.uptodate.com>. Accessed February 5, 2019.
8. Brouwers MC, Kerkvliet K, Spithoff K, Consortium ANS. The AGREE Reporting Checklist: a tool to improve reporting of clinical practice guidelines. *Br Med J*. 2016;352:i1152.
9. Kehler AK, Heinrich KM. A selective review of prenatal exercise guidelines since the 1950s until present: written for women, health care professionals, and female athletes. *Women Birth*. 2015;28:e93–e98.
10. Evenson K, Barakat R, Brown W, et al. Guidelines for physical activity during pregnancy: comparisons from around the world. *Am J Lifestyle Med*. 2014;8:102–121.
11. Evenson K, Bradley C. Beliefs about exercise among pregnant women. *Patient Educ Couns*. 2010;79:124–129.
12. Ferrari R, Siega-Riz A, Evenson K, et al. A qualitative study of women's perceptions of provider advice about diet and physical activity during pregnancy. *Patient Educ Couns*. 2013;91:372–377.
13. Clarke P, Gross H. Women's behavior, beliefs, and information sources about physical exercise in pregnancy. *Midwifery*. 2004;20:133–141.
14. Lewallen L. Healthy behaviors and sources of health information among low-income pregnant women. *Public Health Nurs*. 2004;21:200–206.
15. Krans EE, Gearhart JG, Dubbert PM, et al. Pregnant women's beliefs and influences regarding exercise during pregnancy. *J Miss State Med Assoc*. 2005;46:67–73.
16. Doran F, O'Brien AP. A brief report of attitudes towards physical activity during pregnancy. *Health Promot J Austr*. 2007;18:155–158.
17. Yamamoto A, McCormick MC, Burris HH. US provider-reported diet and physical activity counseling to pregnant and non-pregnant women of childbearing age during preventive care visits. *Matern Child Health J*. 2014;18:1610–1618.
18. De Jersey SJ, Nicholson JM, Callaway LK, et al. An observational study of nutrition and physical activity behaviours, knowledge, and advice in pregnancy. *BMC Pregnancy Childbirth*. 2013;13:115.
19. Stengel MR, Kraschnewski JL, Hwang SW, et al. "What my doctor didn't tell me": examining health care provider advice to overweight and obese pregnant women on gestational weight gain and physical activity. *Womens Health Issues*. 2012;22:e535–e540.
20. May LE, Suminski RR, Linklater ER, et al. Exercise during pregnancy: the role of obstetric providers. *J Am Osteopath Assoc*. 2013;113:612–619.
21. Aittasalo M, Pasanen M, Fogelholm M, et al. Physical activity counseling in maternity and child health care—a controlled trial. *BMC Womens Health*. 2008;8:1–9.
22. Liu J, Whitaker KM, Yu SM, et al. Association of provider advice and pregnancy weight gain in a predominantly Hispanic population. *Womens Health Issues*. 2016;26:321–328.
23. Duthie EA, Drew EM, Flynn KE. Patient-provider communication about gestational weight gain among nulliparous women: a qualitative study of the views of obstetricians and first-time pregnant women. *BMC Pregnancy Childbirth*. 2013;13:231.
24. Whitaker KM, Wilcox S, Liu J, et al. Patient and provider perceptions of weight gain, physical activity, and nutrition counseling during pregnancy: a qualitative study. *Womens Health Issues*. 2016;26:116–122.
25. Entin P, Munhall K. Recommendations regarding exercise during pregnancy made by private/small group practice obstetricians in the USA. *J Sport Sci Med*. 2006;5:449–458.
26. Heslehurst N, Newham J, Maniopoulos G, et al. Implementation of pregnancy weight management and obesity guidelines: a meta-synthesis of healthcare professionals' barriers and facilitators using the Theoretical Domains Framework. *Obes Rev*. 2014;15:462–486.
27. VanWormer J, Pronk N, Kroeninger G. Clinical counseling for physical activity: translation of a systematic review into care recommendations. *Diabetes Spectr*. 2009;22:48–55.
28. Perrin EM, Flower KB, Garrett J, et al. Preventing and treating obesity: pediatricians' self-efficacy, barriers, resources, and advocacy. *Ambul Pediatr*. 2005;5:150–156.

29. Chang T, Llanes M, Gold KJ, et al. Perspectives about and approaches to weight gain in pregnancy: a qualitative study of physicians and nurse midwives. *BMC Pregnancy Childbirth*. 2013;13:47.
30. Mottola MF, Davenport MH, Ruchat SM, et al. 2019 Canadian guideline for physical activity throughout pregnancy. *Br J Sports Med*. 2018;52:1339–1346.
31. Bo 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. *Br J Sports Med*. 2018;52:1080–1085.
32. US Department of Health and Human Services. 2008 *Physical Activity Guidelines for Americans*. ODPHP Publication No. U0036. Washington, DC: US Department of Health and Human Services; 2008. Available at: <http://www.health.gov/paguidelines/>. Accessed November 1, 2018.
33. US Department of Health and Human Services, Physical Activity Guidelines Advisory Committee. *Physical Activity Guidelines Advisory Committee Report*. Washington, DC: US Department of Health and Human Services; 2008. Available at: <http://www.health.gov/PAGuidelines/Report/>. Accessed November 22, 2009.
34. 2018 Physical Activity Guidelines Advisory Committee. 2018 *Physical Activity Guidelines Advisory Committee Scientific Report*. 2018. Washington, DC: Department of Health and Human Services; 2018. Available at: <https://health.gov/paguidelines/second-edition/report.aspx>. Accessed February 5, 2019.
35. DiPietro L, Evenson K, Bloodgood B, et al. The benefits of physical activity during pregnancy and postpartum: an umbrella review. *Med Sci Sports Exerc*. 2019;51:1292–1302.
36. ACOG. *Exercise During Pregnancy and the Postnatal Period*. Washington, DC: American College of Obstetricians and Gynecologists; 1985.
37. ACOG. Exercise during pregnancy and the postpartum period. ACOG Technical Bulletin Number 189—February 1994. *Int J Gynaecol Obstet*. 1994;45:65–70.
38. ACOG. Exercise during pregnancy and the postpartum period. ACOG Committee Opinion No. 267. *Obstet Gynecol*. 2002;99:171–173.
39. ACOG. Physical Activity and exercise during pregnancy and the postpartum. 2017. Available at: <https://www.acog.org/Clinical-Guidance-and-Publications/Practice-Guidelines-and-Reports-Search?IsMobileSet=false>. Accessed December 30, 2018.
40. ACOG. Practice Bulletins. 2019. Available at: <https://www.acog.org/Clinical-Guidance-and-Publications/Practice-Bulletins-List>. Accessed February 5, 2019.
41. Wolfe L, Davies G. Canadian guidelines for exercise in pregnancy. *Clin Obstet Gynecol*. 2003;46:488–495.
42. Davies G, Wolfe L, Mottola M, et al. Joint SOGC/CSEP clinical practice guideline: exercise in pregnancy and the postpartum period. *Can J Appl Physiol*. 2003;28:330–341.
43. Davenport MH, Ruchat SM, Mottola MF, et al. 2019 Canadian Guideline for Physical Activity Throughout Pregnancy: methodology. *J Obstet Gynaecol Can*. 2018;40:1468–1483.
44. Davenport MH, Yoo C, Mottola MF, et al. Effects of prenatal exercise on incidence of congenital anomalies and hyperthermia: a systematic review and meta-analysis. *Br J Sports Med*. 2019;53:116–123.
45. Davenport MH, Nagpal TS, Mottola MF, et al. Prenatal exercise (including but not limited to pelvic floor muscle training) and urinary incontinence during and following pregnancy: a systematic review and meta-analysis. *Br J Sports Med*. 2018;52:1397–1404.
46. Davenport MH, Marchand AA, Mottola MF, et al. Exercise for the prevention and treatment of low back, pelvic girdle and lumbopelvic pain during pregnancy: a systematic review and meta-analysis. *Br J Sports Med*. 2019;53:90–98.
47. Davenport MH, McCurdy AP, Mottola MF, et al. Impact of prenatal exercise on both prenatal and postnatal anxiety and depressive symptoms: a systematic review and meta-analysis. *Br J Sports Med*. 2018;52:1376–1385.
48. Davenport MH, Ruchat SM, Poitras VJ, et al. Prenatal exercise for the prevention of gestational diabetes mellitus and hypertensive disorders of pregnancy: a systematic review and meta-analysis. *Br J Sports Med*. 2018;52:1367–1375.
49. Ruchat SM, Mottola MF, Skow RJ, et al. Effectiveness of exercise interventions in the prevention of excessive gestational weight gain and postpartum weight retention: a systematic review and meta-analysis. *Br J Sports Med*. 2018;52:1347–1356.
50. Davenport MH, Ruchat SM, Sobierajski F, et al. Impact of prenatal exercise on maternal harms, labour and delivery outcomes: a systematic review and meta-analysis. *Br J Sports Med*. 2019;53:99–107.
51. Skow RJ, Davenport MH, Mottola MF, et al. Effects of prenatal exercise on fetal heart rate, umbilical and uterine blood flow: a systematic review and meta-analysis. *Br J Sports Med*. 2019;53:124–133.
52. Davenport MH, Kathol AJ, Mottola MF, et al. Prenatal exercise is not associated with fetal mortality: a systematic review and meta-analysis. *Br J Sports Med*. 2019;53:108–115.
53. Davenport MH, Meah VL, Ruchat SM, et al. Impact of prenatal exercise on neonatal and childhood outcomes: a systematic review and meta-analysis. *Br J Sports Med*. 2018;52:1386–1396.
54. Davenport MH, Sobierajski F, Mottola MF, et al. Glucose responses to acute and chronic exercise during pregnancy: a systematic review and meta-analysis. *Br J Sports Med*. 2018;52:1357–1366.
55. Mottola MF, Nagpal TS, Bgeginski R, et al. Is supine exercise associated with adverse maternal and fetal outcomes? A systematic review. *Br J Sports Med*. 2019;53:82–89.
56. Bo K, Artal R, Barakat R, et al. Exercise and pregnancy in recreational and elite athletes: 2016/17 evidence summary from the IOC Expert Group Meeting, Lausanne. Part 3—exercise in the postpartum period. *Br J Sports Med*. 2017;51:1516–1525.
57. Bo K, Artal R, Barakat R, et al. Exercise and pregnancy in recreational and elite athletes: 2016/17 evidence summary from the IOC expert group meeting, Lausanne. Part 4—recommendations for future research. *Br J Sports Med*. 2017;51:1724–1726.
58. Davies G, Artal R. It's time to treat exercise in pregnancy as therapy. *Br J Sports Med*. 2019;53:81.
59. Borg G, Linderholm H. Perceived exertion and pulse rate during graded exercise in various age groups. *Acta Med Scand*. 1974;472:194–206.
60. Barakat R, Perales M. Resistance exercise in pregnancy and outcome. *Clin Obstet Gynecol*. 2016;59:591–599.
61. Perales M, Santos-Lozano A, Ruiz JR, et al. Benefits of aerobic or resistance training during pregnancy on maternal health and perinatal outcomes: a systematic review. *Early Hum Dev*. 2016;94:43–48.
62. Morkved S, Bo K. Effect of pelvic floor muscle training during pregnancy and after childbirth on prevention and treatment of urinary incontinence: a systematic review. *Br J Sports Med*. 2014;48:299–310.
63. Michie S, Ashford S, Snihotta FF, et al. A refined taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours: the CALO-RE taxonomy. *Psych Health*. 2011;26:1479–1498.
64. Currie S, Sinclair M, Liddle DS, et al. Application of objective physical activity measurement in an antenatal physical activity consultation intervention: a randomised controlled trial. *BMC Public Health*. 2015;15:1259.
65. ACOG. Motivational interviewing: a tool for behavioral change. ACOG Committee Opinion No. 423. *Obstet Gynecol*. 2009;113:243–246.
66. Washington Cole KO, Gudzone KA, Bleich SN, et al. Influence of the 5A's counseling strategy on weight gain during pregnancy: an observational study. *J Womens Health*. 2017;26:1123–1130.
67. Wolfe L, Mottola M. *Physical Activity Readiness Medical Examination for Pregnancy: PARmed-X for Pregnancy*. Ottawa, ON, Canada: Canadian Society of Exercise Physiology & Health Canada; 2013.
68. American College of Sports Medicine. Health care providers' action guide. Version 2. Available at: <https://www.exerciseismedicine.org>. 2019. Accessed February 5, 2019.
69. Sallis RE, Matuszak JM, Baggish AL, et al. Call to action on making physical activity assessment and prescription a medical standard of care. *Curr Sports Med Rep*. 2016;15:207–214.
70. Hesketh K, Evenson K. Prevalence of US women meeting 2015 American College of Obstetrics and Gynecology guidelines for physical activity during pregnancy. *Am J Prev Med*. 2016;51:e87–e89.