

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

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BACKGROUND

This is Part 4 in the series of reviews from the International Olympic Committee (IOC) expert committee on exercise and pregnancy in recreational and elite athletes. Part 1 focused on the effects of training during pregnancy and on the management of common pregnancy-related complaints experienced by athletes;¹ Part 2 addressed maternal and foetal perinatal outcomes;² Part 3 reviewed the implications of pregnancy and childbirth on return to exercise and on common illnesses and complaints in the postpartum period.³ Parts 1–3 are all open access papers.

In Part 4, we recommend future research based on Parts 1–3. The systematic reviews, on which the previous Parts were based, revealed many gaps in knowledge relating to strenuous exercise during pregnancy and in the postpartum period, in both regular recreational exercisers and elite athletes. Important research questions are listed below, in relation to the foci of Parts 1–3, under the following headings: exercise during pregnancy, exercise related to birth outcomes and exercise in the postpartum period. References to existing research in the respective areas are listed in the previously Parts 1–3 and are not repeated here.

Research questions related to exercise during pregnancy

(based on the review of the effects of training during pregnancy and on the management of common pregnancy-related complaints experienced by recreational and elite athletes¹).

FERTILITY

- ▶ Are athletes of reproductive age concerned about that their fertility may be limited?
 - Does duration and frequency of strenuous exercise impact fertility?
- ▶ Do factors that affect fertility differ in elite athletes and the general population (including recreational athletes, active and sedentary women)?

MEDICAL CONDITIONS

- ▶ Does the prevalence of, and risk factors for, the following conditions differ in pregnant elite athletes from those in pregnant women in

the general population (including recreational athletes, active and sedentary women)?

- Inferior vena cava syndrome
- Nausea
- Fatigue
- Depression
- Anxiety
- Gestational hypertension, pre-eclampsia
- Gestational diabetes
- Urinary incontinence, faecal incontinence
- Pelvic organ prolapse
- Low back and pelvic girdle pain
- Diastasis recti abdominis
- ▶ Do any specific types of exercise or training place elite athletes at higher risk of any of the conditions listed above?
- ▶ Is heavy work or strenuous exercise associated with miscarriage? If so, are there important windows of time, either before or during pregnancy, when the risk for engaging in these activities has a greater impact on outcomes?
- ▶ How common are eating disorders among pregnant recreational and elite athletes? What are the consequences for mother and child in this population?

PHYSIOLOGICAL AND ANATOMICAL CHANGES

- ▶ How does body posture change during pregnancy in elite athletes? In particular, what changes occur in the pelvis and lower back and are these associated with low back and pelvic girdle pain?
- ▶ What is the prevalence of, and what are the risk factors for, diastasis recti abdominis during pregnancy in elite athletes? How should this condition be managed in elite athletes?
- ▶ Does diastasis recti abdominis increase the risk of low back and pelvic girdle pain and how do these conditions impact athletic performance?
- ▶ Are athletes at increased risk of falls or injuries during pregnancy, compared with non-pregnant stage and compared with the general pregnant population?
- ▶ How do changes in flexibility and joint relaxation during pregnancy influence musculoskeletal injury, pain and performance in elite athletes?



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Consensus statement

- ▶ What is the typical weight gain during pregnancy in elite athletes? What proportions of elite athletes comply with, exceed, or do not meet the weight gain recommended in the Institute Of Medicine guidelines? How does weight gain influence the development of the fetus in this population?
- ▶ What eating guidelines should pregnant elite athletes follow?

EXERCISE TESTING

- ▶ How reliable and valid are different tests of submaximal and maximal exercise capacity in pregnant women and in elite athletes?
- ▶ Which testing protocols are safe and appropriate for use in pregnant elite athletes?

ATHLETIC TRAINING

- ▶ Do elite athletes exercise more than recreational athletes during pregnancy?
- ▶ What are the maternal and neonatal outcomes if elite athletes exercise at more strenuous levels than recommended ACOG,⁴ RCOG⁵ and SOGC⁶?
- ▶ How does training change during pregnancy in elite athletes in different sports and how does this influence foetal growth and development?
- ▶ What is the impact of heavy lifting and strenuous strength training (especially involving the Valsalva manoeuvre) on intra-abdominal pressure and pelvic floor muscle function in pregnant elite athletes, and on the well-being of the fetus?
- ▶ What is the effect of flexibility training on range of motion during pregnancy?
- ▶ What is the effect of strenuous physical activity during pregnancy on pelvic floor muscle function and pelvic floor disorders?

EXERCISE INTERVENTION STUDIES

- ▶ What are the effects of different types of physical activity/exercise intervention on medical conditions that are associated with pregnancy including, but not limited to (see above list of medical conditions also):
 - Nausea, fatigue
 - Depression, anxiety
 - Gestational hypertension, mild pre-eclampsia
 - Gestational diabetes mellitus
 - Fetal heart rate and well-being (small for gestational age, large for gestational age, Apgar Score)
 - Maximal oxygen uptake, strength and range of motion
- ▶ Can abdominal exercise during pregnancy prevent and/or treat diastasis recti abdominis?

Research questions related to labour and birth

(based on the review of the effects of training during pregnancy on maternal and foetal perinatal outcomes in elite athletes²).

- ▶ Is heavy work or strenuous exercise during pregnancy associated with premature labour, preterm birth or adverse neonatal outcomes?
- ▶ What is the prevalence of, and risk factors for, the following maternal and perinatal outcomes in elite athletes, and how do these compare with estimates for the general population?
 - Induction of labour, prolonged labour
 - Epidural, analgesia
 - Episiotomy
 - Acute and elective Caesarean section
 - Major levator ani defects, anal sphincter tears
 - Birth weight, body fat, Apgar score, complications

Research questions related to exercise in the postpartum period

(based on the review of factors relating to return to exercise and common illnesses and complaints in the postpartum period in elite athletes³).

ATHLETIC TRAINING

- ▶ When do elite athletes return to sport after delivery and what influences the decision about when to return to sport?⁷
- ▶ When do elite athletes in different sports resume the same level of competition and performance as before pregnancy?
- ▶ When athletes return to sport, what is their perception of problems and performance after childbirth?
- ▶ Does training during pregnancy influence the time of return to competition at the same level as before pregnancy?

BREASTFEEDING

- ▶ What proportion of elite athletes breastfeed after delivery and for how long?
- ▶ Does level of competition (international, national, subelite) influence the mother's choice relating to breastfeeding?
- ▶ Does whether the athlete is planning to return to competition after childbirth affect the choice and length of breastfeeding?
- ▶ How does breastfeeding influence nutritional status (body vitamin and mineral stores and so on) maternal weight, postpartum weight retention and performance in postpartum elite athletes?
- ▶ How does strenuous exercise influence lactation in elite athletes?
- ▶ How does strenuous exercise influence the baby after being breastfed?

PHYSIOLOGICAL AND ANATOMICAL CHANGES

- ▶ What is the trajectory of postpartum weight retention or loss in elite athletes?
- ▶ What is the trajectory of pelvic floor muscle recovery in athletes and strenuous exercisers?
- ▶ At what point postpartum does VO₂ max revert to prepregnancy values?

MEDICAL CONDITIONS

- ▶ What is the prevalence of and risk factors for the following symptoms and conditions in postpartum elite athletes, and how should these be managed?
 - Low back and pelvic girdle pain
 - Urinary incontinence, faecal incontinence, pelvic organ prolapse
 - Diastasis recti abdominis
 - Depression, anxiety
- ▶ What are the effects of different abdominal exercises on diastasis recti abdominis in postpartum elite athletes and in the general postpartum population? Is this condition associated with postpartum abdominal strength, low back and pelvic girdle pain or sports performance?

CONCLUSION

There have been very few studies on recreational and elite athletes in any of the topics listed above. The impact of strenuous physical activity, exercise and high-intensity strength training has been little studied during pregnancy and in the postpartum period. Where evidence exists, it relates to light and moderate exercise. Because randomised controlled trials are not feasible for most of the questions listed, many recommendations will rely

on data from cohort studies. We call for international collaboration to advance research in this area so that athletes can be given advice based on evidence, rather than anecdote.

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