PROGRAM FOR PREGNANCY & POSTPARTUM HEALTH

EXERCISE IN PREGNANCY.

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FACULTY OF PHYSICAL EDUCATION AND RECREATION

"uplifting the whole people"
— HENRY MARSHALL TORY, FOUNDING PRESIDENT, 1908

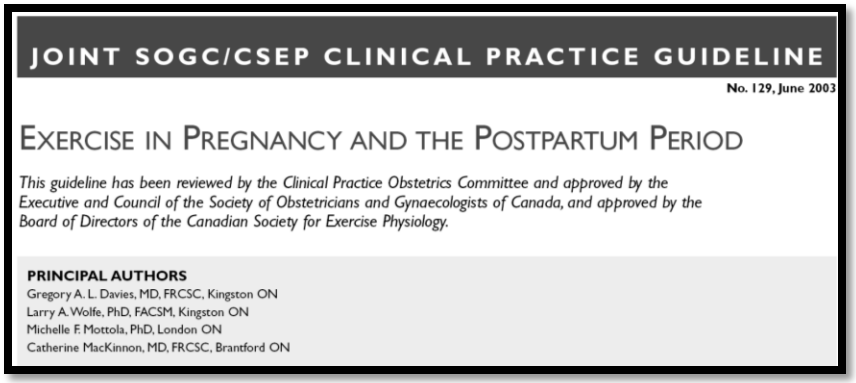
Conflict of Interest:

Nothing to disclose.

Learning objectives:

1) Identify the principal barriers and contraindications to exercise in pregnancy.
2) Describe the impacts associated with exercise on maternal and fetal physiology.
3) Summarize the current data on exercise and gestational diabetes and preeclampsia.

Guidelines for Prenatal Exercise


JOINT SOGC/CSEP CLINICAL PRACTICE GUIDELINE

No. 129, June 2003

EXERCISE IN PREGNANCY AND THE POSTPARTUM PERIOD

This guideline has been reviewed by the Clinical Practice Obstetrics Committee and approved by the Executive and Council of the Society of Obstetricians and Gynaecologists of Canada, and approved by the Board of Directors of the Canadian Society for Exercise Physiology.

PRINCIPAL AUTHORS

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ACOG

Committee on Obstetric Practice

Reaffirmed 2009

Committee Opinion

Number 267, January 2002

This document reflects emerging clinical and scientific advances as of the date issued and is subject to change. The information should not be construed

Exercise During Pregnancy and the Postpartum Period

- **Current evidence based guidelines demonstrate benefits and safety of prenatal exercise.**
- **2002: ACOG → 30 minutes on most/all days of the week.**
- **2003: SOGC → 3-4 times per week up to 80% maximal exertion.**
  - New Canadian Guidelines to be released in 2016.
- **Exercise is safe and improves outcomes during pregnancy.**

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Davies et al 2003
ACOG Committee Opinion No. 267 2002

But do pregnant women exercise?

Sedentary Behaviour **vs.** **Exercise**

- **15% of pregnant women meet guidelines for PA.**
- **Women become increasingly sedentary with gestation.**

Evenson and Wen, 2011
Hawkins et al 2014

Barriers to prenatal exercise

Two biggest reasons pregnant women don't exercise:

1) **Lack of time.**
2) **Lack of energy.**
3) **Support of partner/family.**
4) **Childcare.**
5) **Concern for the baby.**

However, women who are *counseled by their HCP* about prenatal exercise are more likely to continue or begin an exercise program.

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Evenson and Moos, 2009
Canella et al 2010

Contraindications to exercise

Physical Activity Readiness Medical Examination for Pregnancy

PARmed-X for PREGNANCY

PHYSICAL ACTIVITY READINESS MEDICAL EXAMINATION

PARmed-X for PREGNANCY is a guideline for health screening prior to participation in a prenatal fitness class or other exercise.

ABSOLUTE CONTRAINDICATIONS

Does the patient have:

1. Ruptured membranes, premature labour?
2. Persistent second or third trimester bleeding/ placenta previa?
3. Pregnancy-induced hypertension or pre-eclampsia?
4. Incompetent cervix?
5. Evidence of intrauterine growth restriction?
6. High-order pregnancy (e.g., triplets)?
7. Uncontrolled Type I diabetes, hypertension or thyroid disease, other serious cardiovascular, respiratory or systemic disorder?

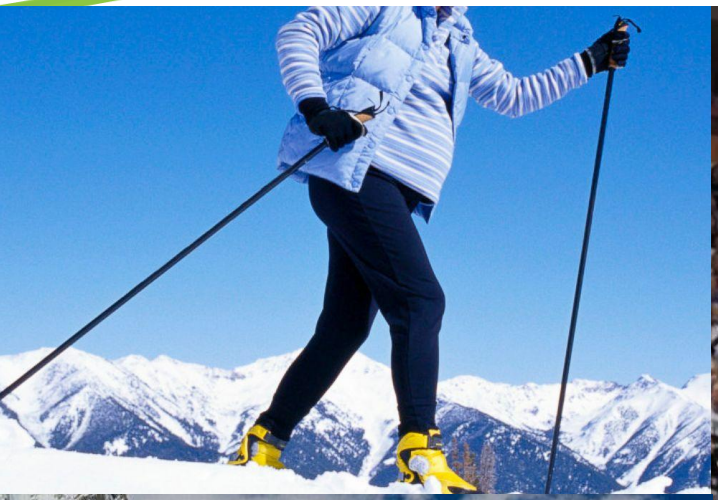
RELATIVE CONTRAINDICATIONS

Does the patient have:

1. History of spontaneous abortion or premature labour in previous pregnancies
2. Mild/moderate cardiovascular or respiratory disease (e.g., chronic hypertension, asthma)?
3. Anemia or iron deficiency? (Hb < 100 g/L)?
4. Malnutrition or eating disorder (anorexia, bulimia)?
5. Twin pregnancy after 28th week?
6. Other significant medical condition? Please specify:

http://www.csep.ca/cmfiles/publications/parq/parmed-xpreg.pdf

Activities to avoid



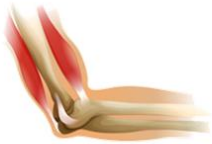
http://www.csep.ca/cmfiles/publications/parq/parmed-xpreg.pdf

Impact of acute exercise on the mother

ADAPTATIONS TO PREGNANCY

Metabolic

↑ Insulin & Insulin Resistance
↓ Glucose Availability
↑ Lipid Availability
↑ Resting VO_2



↑ Glucose Utilization
↔ Δ Free Fatty Acid
↑ VO2 for given workload
↔ Maximal VO_2

Respiratory

↑ Chemoreflex Sensitivity
↑ Resting Ventilation
↓ Arterial CO_2 / ↑ pH

↑ VE/VO_2 & VE/VCO_2
↑ Dyspnea
↔ Maximal Ventilation

Cardiovascular

↑ Heart Rate
↑ Stroke Volume
↑ Cardiac Output
↓ Vascular Resistance
↓ Blood pressure

↓ Heart Rate Reserve
↑ Stroke Volume Response
↔ Cardiac output response

Δ Blood flow to working muscle ?

RESPONSES TO EXERCISE

Davenport, Skow and Steinback, Under Review

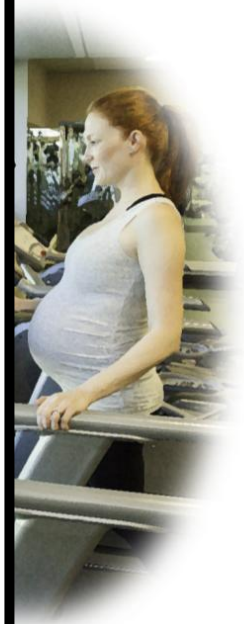
Impact of acute exercise on the mother

ADAPTATIONS TO PREGNANCY

RESPONSES TO EXERCISE

Metabolic

- ***Maximal responses are similar.***
- ***Cardiovascular responses ↑ for a given workload.***
- ***Perform less work for a given intensity.***



↓ Vascular Resistance
↓ Blood pressure

↔ Cardiac output response
Δ Blood flow to working muscle ?

Davenport, Skow and Steinback, Under Review

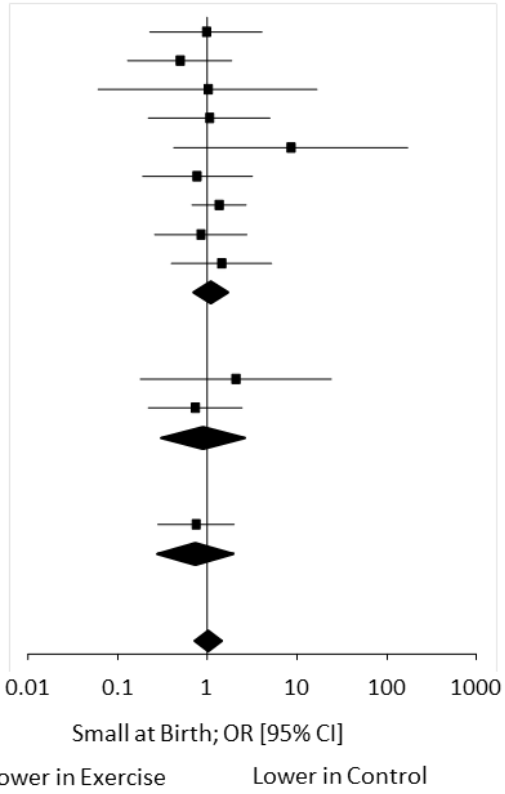
Impact of acute exercise on the fetus

- **Measuring uterine blood flow during exercise is technically difficult.**
  - Typically measure pre- and post-exercise (peak over).
- **During submaximal exercise (up to ~70% of max), fetal heart rate doesn't change. At <u>maximal</u> levels bradycardia may occur (<110bpm) which may be suggestive of inadequate oxygen delivery.**
  - Long term effects?
- **Chronic responses would result in growth restriction.**

Carpenter et al 1998
McMurray et al 1993

Impact of exercise on SGA

Author, year	Exercise Events	Exercise Total	Control Events	Control Total	Weight
Low Risk					
Barakat 2009	4	72	4	70	6.4%
Cordero 2014	3	101	9	156	11.5%
Haakstad 2011	1	52	1	53	1.6%
Hopkins et al. 2010	4	47	3	37	5.1%
Murtezani 2014	3	30	0	33	0.7%
Price 2012	4	31	5	31	7.3%
Ruiz 2013	19	335	15	352	23.1%
Tomic 2013 Multiparous	5	91	7	108	10.1%
Tomic 2013 Nuliparous	7	75	4	60	6.7%
Subtotal	50	834	48	900	72.5%
Odds Ratio: 1.10 [0.73, 1.66], p=0.64, Heterog.: Chi^2=4.12, p=0.85, I^2=0%					
Overweight and Obese					
Nascimento 2011	2	33	1	33	1.6%
Ruiz 2013	5	146	6	129	10.3%
Subtotal	7	179	7	162	11.8%
Odds Ratio: 0.90 [0.31, 2.63], p=0.85, Heterog.: Chi^2=0.56, p=0.45, I^2=0%					
Hypertension/Preeclampsia					
Kasawara 2013	9	55	11	53	15.7%
Subtotal	9	55	11	53	15.7%
Odds Ratio: 0.75 [0.28, 1.98], p=0.56, Heterog.: n/a					
Total	66	1068	66	1115	100.0%
Odds Ratio: 1.02 [0.72, 1.46], p=0.75, Heterog.: Chi^2=5.20, p=0.92, I^2=0%					



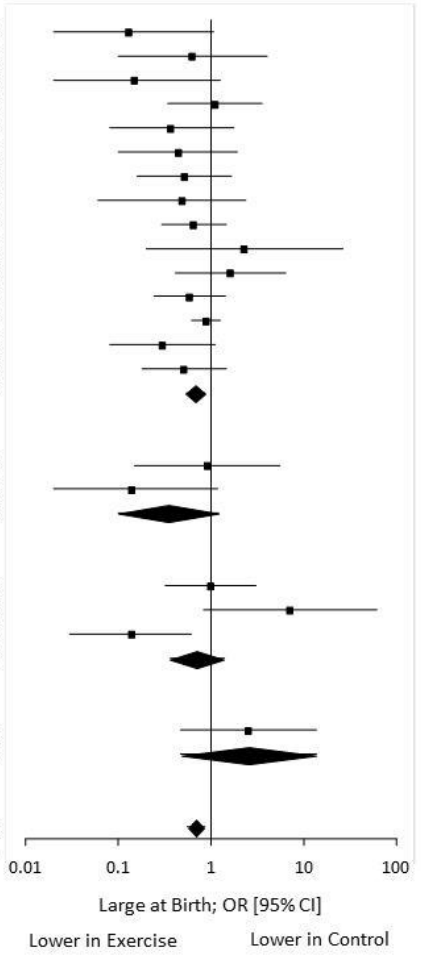
- **RCT's of supervised exercise (n=2183).**
- **Exercise was not associated with increased risk of SGA.**

Wiebe et al 2015

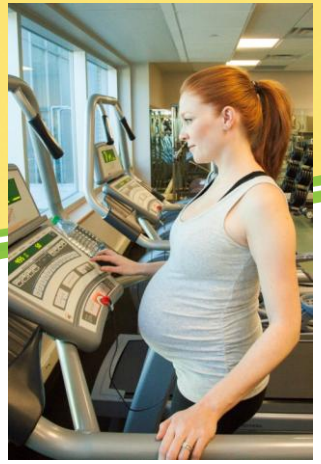
Impact of exercise on LGA

- **RCT's of supervised exercise (n=3982).**
- **Exercise was associated with 31% decrease in the risk of a large baby.**
- **AND a 20% reduction in c-sections.**

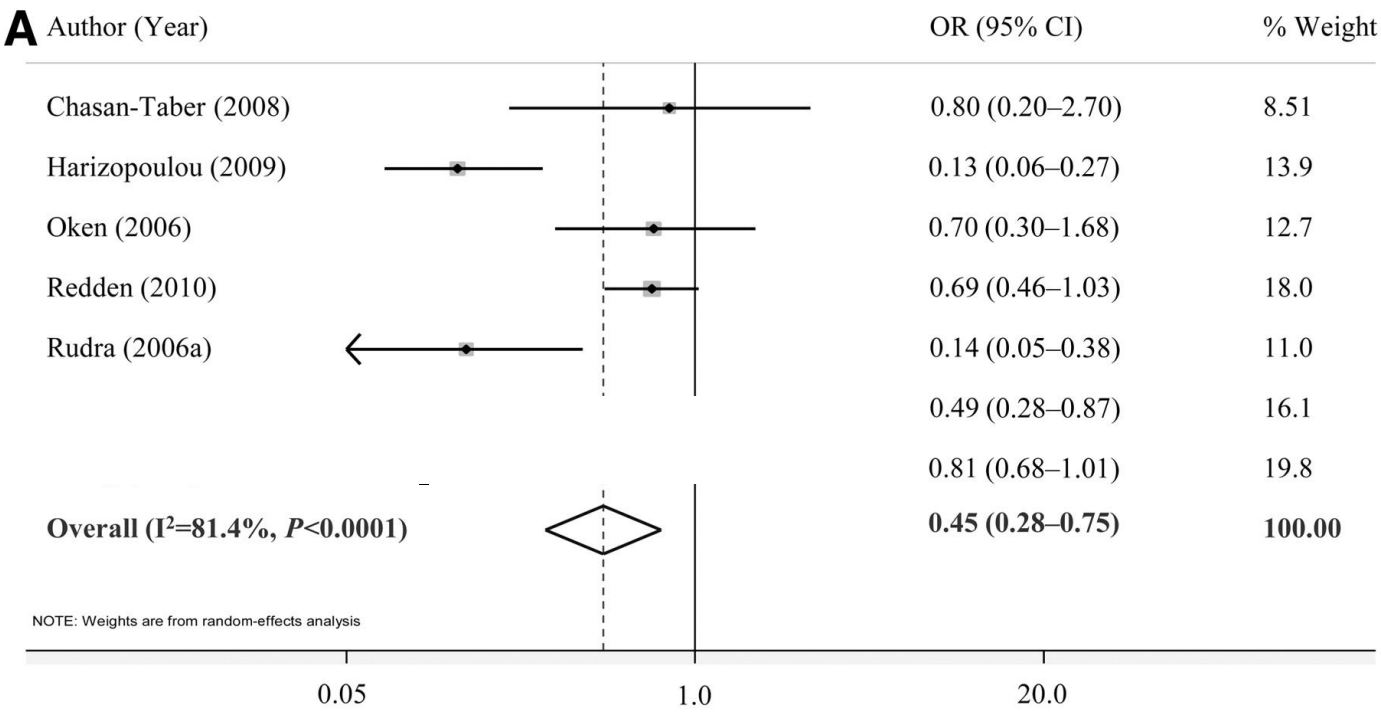
Author, year	Exercise Events	Exercise Total	Control Events	Control Total	Weight
Low Risk					
Barakat 2009	1	72	7	70	3.7%
Barakat 2011	2	34	3	33	1.5%
Barakat 2013 no GDM	1	169	6	157	3.2%
Cordero 2014	5	101	7	156	2.7%
de Oliveria Melo 2012*	3	54	4	29	2.6%
de Oliveria Melo 2012**	4	60	4	29	2.6%
Haakstad 2011	5	52	9	53	4.2%
Hui 2004	2	24	4	21	2.0%
Hui 2012	12	102	15	88	7.4%
Murtezani 2014	2	30	1	33	0.5%
Price 2012	6	31	4	31	1.7%
Ruiz 2013	8	335	14	352	7.0%
Stafne 2012	71	429	78	426	34.2%
Tomic 2013 Multiparous	3	91	11	108	5.1%
Tomic 2013 Nuliparous	7	75	10	60	5.3%
Subtotal	132	1659	177	1646	83.7%
Odds Ratio: 0.68 [0.54, 0.87], p=0.002, Heterog.: Chi^2=12.95, p=0.53, I^2=4%					
Gestational Diabetes					
Avery 1997	3	15	3	14	1.3%
Barakat 2013 GDM only	1	41	9	61	3.7%
Subtotal	4	56	12	75	5.0%
Odds Ratio: 0.35 [0.10, 1.21], p=0.10, Heterog.: Chi^2=1.79, p=0.18, I^2=44%					
Overweight and Obese					
Nascimento 2011	8	33	8	33	3.2%
Oostdam 2012	6	47	1	50	0.4%
Ruiz 2013	2	146	12	129	6.6%
Subtotal	16	226	21	212	10.2%
Odds Ratio: 0.71 [0.36, 1.41], p=0.33, Heterog.: Chi^2=9.35, p=0.009, I^2=79%					
Hypertension/Preeclampsia					
Kasawara 2013	5	55	2	53	1.2%
Subtotal	5	55	2	53	1.2%
Odds Ratio: 2.55 [0.47, 13.76], p=0.28, Heterog.: n/a					
Total	157	1996	212	1986	100.0%
Odds Ratio: 0.69 [0.55, 0.86], p=0.0009, Heterog.: Chi^2=26.83, p=0.14, I^2=25%					



Wiebe et al 2015

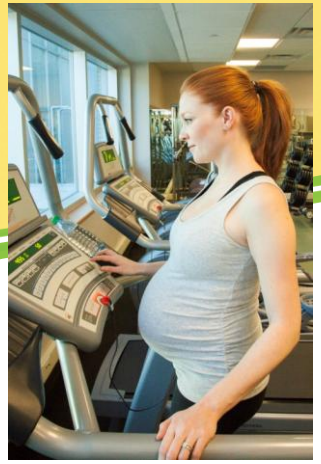


Exercise prevents/controls gestational diabetes.



Pre-pregnancy exercise ↓ 55%

Russo et al. Obstetrics and Gynecology 2015
Davenport et al APNM 2008
Tobias et al 2011

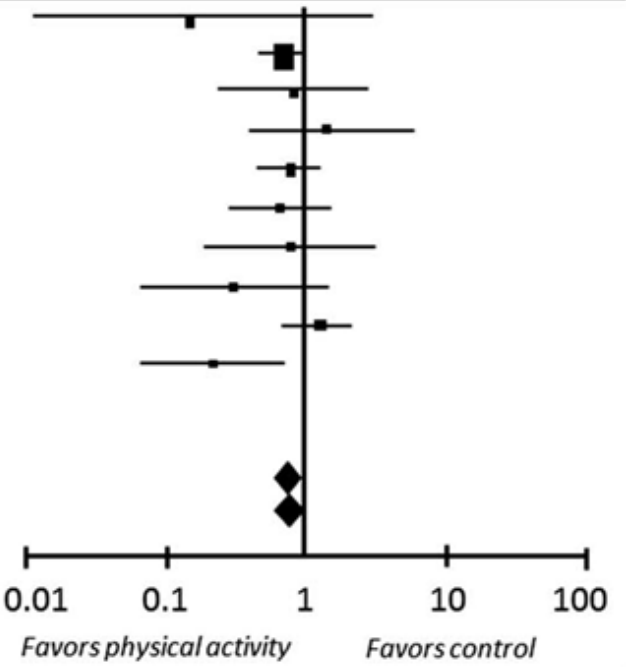


Exercise prevents/controls gestational diabetes.

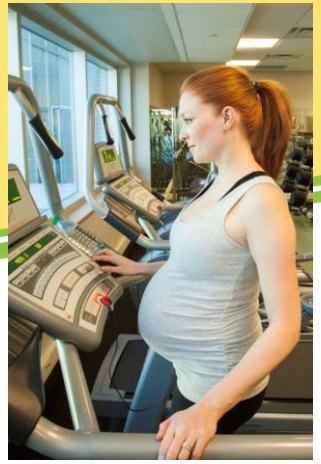
Exercise during pregnancy ↓ 28%

Study	Physical activity		Control		Weight	Risk ratio [95%CI]
1st author, year	Events	Total	Events	Total		
Barakat, 2012 (22)	0	40	3	43	2.1%	0.15 [0.01, 2.88]
Barakat, 2013a (23)	41	210	61	218	37.6%	0.70 [0.49, 0.99]
Barakat, 2013b (24)	5	106	5	90	3.4%	0.85 [0.25, 2.84]
Callaway, 2010 (25)	5	22	3	19	2.0%	1.44 [0.40, 5.24]
Ko, 2014 (26)	25	591	33	605	20.5%	0.78 [0.47, 1.29]
Oostdam, 2012 (27)	7	49	11	51	6.8%	0.66 [0.28, 1.57]
Price, 2011 (28)	3	31	4	31	2.5%	0.75 [0.18, 3.08]
Renault, 2014 (29)	2	125	7	134	4.2%	0.31 [0.06, 1.45]
Stafne, 2012 (30)	25	375	18	327	12.1%	1.21 [0.67, 2.18]
Tomic, 2013 (31)	3	166	14	168	8.7%	0.22 [0.06, 0.74]
Total	*116*	*1715*	*159*	*1686*	*100%*	
Fixed effect						0.72 [0.58, 0.91] (*P*=0.005)
Random effect						0.74 [0.57, 0.97] (*P*=0.027)

Heterogeneity: χ^2=10.21 (df=9), P=0.33; I^2=12%

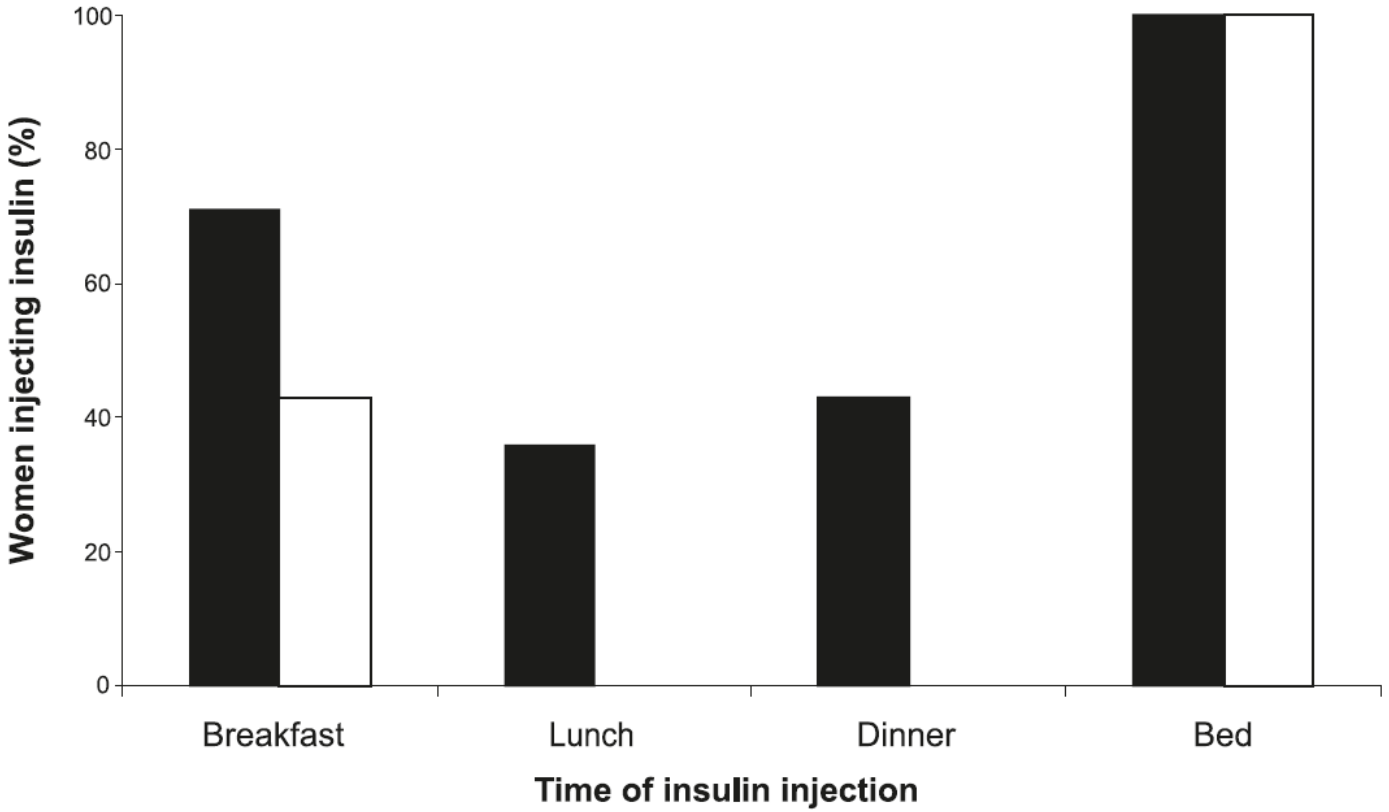


Russo et al. Obstetrics and Gynecology 2015
Davenport et al APNM 2008
Tobias et al 2011



Exercise prevents/controls gestational diabetes.

GDM ↑glycemic control with less insulin



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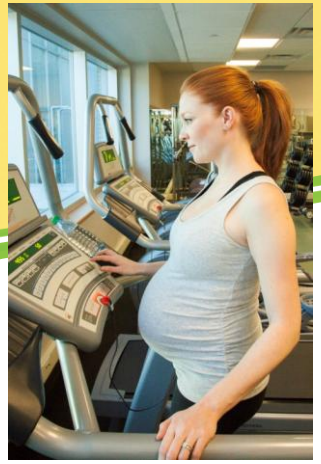
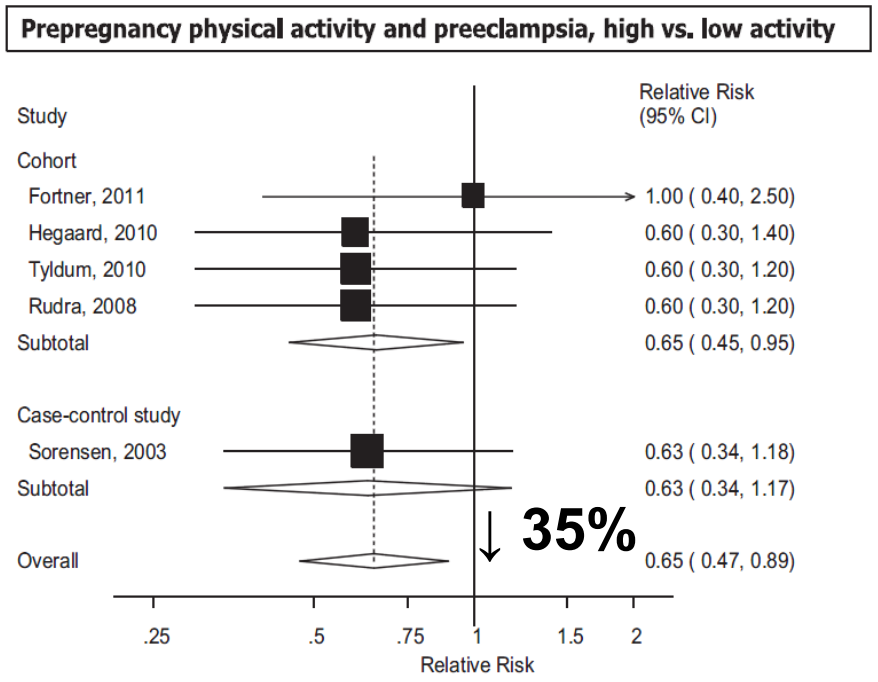
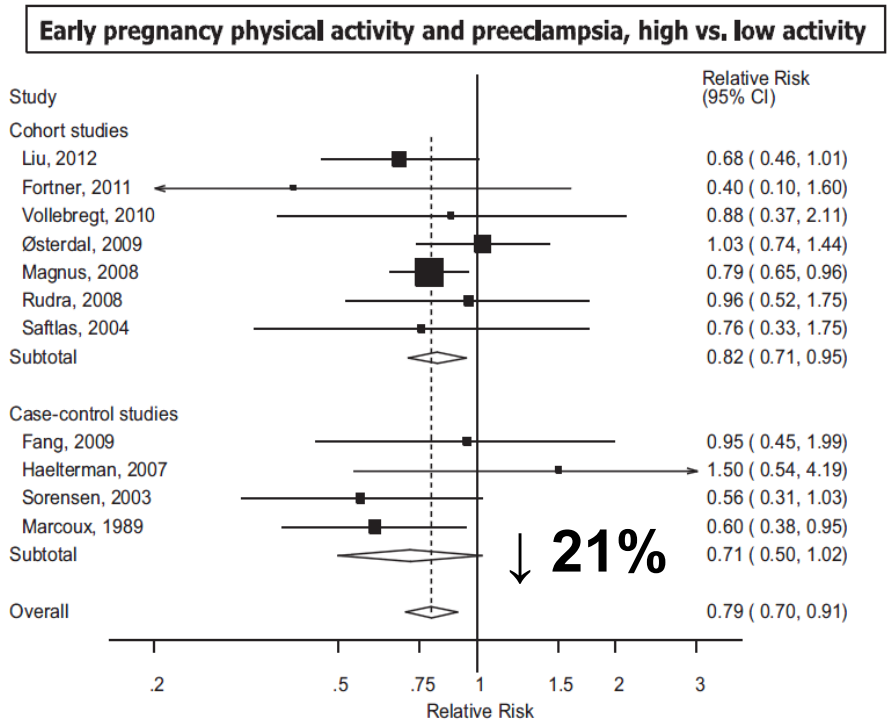
Russo et al. Obstetrics and Gynecology 2015
Davenport et al APNM 2008
Tobias et al 2011



Pre- or Early Pregnancy Prevents Preeclampsia. Later pregnancy minimal effect.





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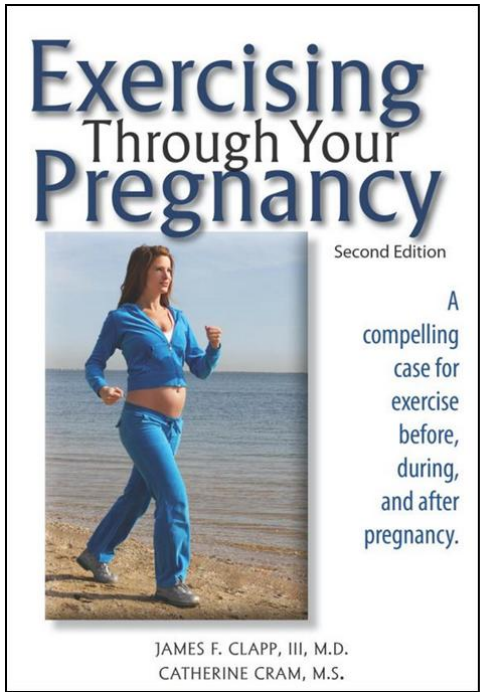
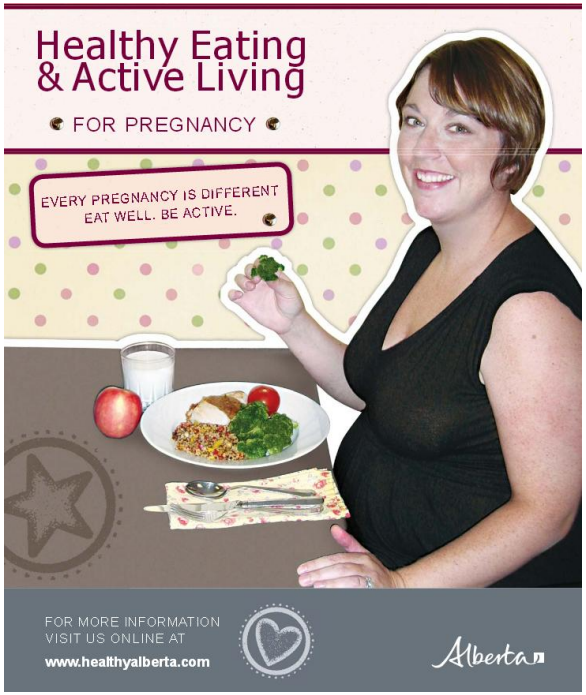
Aune et al 2014

Resources for more information





www.healthyalberta.com/HEALPregnancy-Sept2012.pdf

healthunit.com/physical-activity-pregnancy

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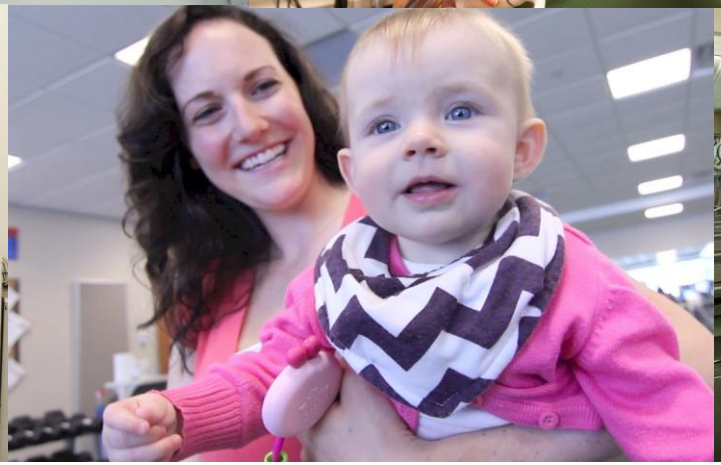
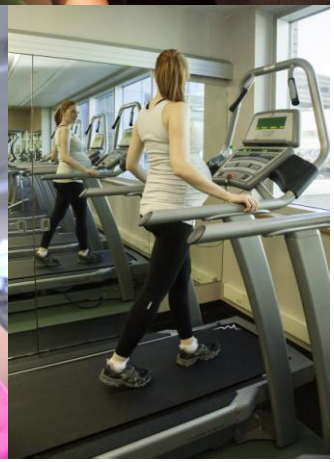

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