Table D.1.c. Gestational hypertension/pre-eclampsia and physical activity, pregnant and postpartum women

Black font is from original GRADE Evidence Profile from the systematic review (Davenport 2018 *(5)*) to support the 2019 Canadian Guideline for Physical Activity Throughout Pregnancy. Red font denotes additions based on WHO update using review of existing systematic reviews. One systematic review was included that addressed the relationship between physical activity and gestational hypertension and pre-eclampsia *(16)*.

Quality assessment							№ of participants		Effect		Certainty	Importance
№ of studies * Review (AMSTAR 2 rating)	**Study design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Exercise**	**No exercise**	**Relative (95% CI)**	**Absolute (95% CI)**		
Association between exercise-only interventions and **gestational hypertension**												
24 (pooled estimate of effect, n =22 [a,b]; 2 studies synthesized narratively)	randomized trials	not serious [c]	not serious	not serious	not serious	none	61/2627 (2.3%)	105/2689 (3.9%)	**OR 0.61** (0.43 to 0.85)	**15 fewer per 1 000** (from 6 fewer to 22 fewer)	⊕⊕⊕⊕ HIGH	CRITICAL
							Narrative Synthesis: Two superiority trials were included (n=107). Yeo (2008) reported that GH incidence was 22 % in women randomized to a walking intervention (n=41) and 40% in those randomized to a stretching intervention (n=38). McAuley (2005) reported 2 cases of GH in both groups of women (aerobic and muscular exercise group [n=14] and muscular exercise group [n=14]).					
Du 2018 *(16)* Low 5 randomized trials		not serious	not serious	not serious	not serious	none	Among pregnant women with overweight or obesity, there was no significant difference in the incidence of **gestational hypertension** between physical activity intervention groups vs. standard antenatal care (RR = 0.63 [95% CI 0.38 to 1.05], 5 RCTs, n=671, I^2=0%).				⊕⊕⊕⊕ HIGH	CRITICAL
2 [d]	non-randomized intervention studies	serious [e]	not serious	not serious	not serious	none	Narrative Synthesis: Two studies were included (n=367). Narendran (2005) reported no difference in GH incidence between women who practiced yoga (n=169) and those who walked (n=166) during pregnancy (p=0.25). O'Connor (2011) reported one case of severe hypertension (among 32 women, 3%) during a strength training intervention (no control group).				⊕◯◯◯ VERY LOW	CRITICAL

Quality assessment							№ of participants		Effect		Certainty	Importance
№ of studies * Review (AMSTAR 2 rating)	**Study design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**Exercise**	**No exercise**	**Relative (95% CI)**	**Absolute (95% CI)**		
8 (pooled estimate of effect, n=5 [f]; 3 studies synthesized narratively)	cohort studies	serious [g]	not serious	not serious	serious [h]	none	199/3777 (5.3%)	133/1460 (9.1%)	**OR 0.86** (0.64 to 1.15)	**12 fewer per 1 000** (from 12 more to 31 fewer)	⊕◯◯◯ VERY LOW	CRITICAL
							Narrative Synthesis: Three cohort studies were included (n=76,260). 1/3 (n=1,749) reported 49% lower odds of GH with sports/exercise compared to no exercise (Currie, 2014). 2/3 (n=74,511) found no association between GH and prenatal exercise (Juhl, 2010; Chasan-Taber, 2015). Additional data from Vollebregt (2010) showed no effect of prenatal exercise on GH, regardless of how it was examined (total LTPA vs sport, weekly duration or percentiles). [i]					
5 (pooled estimate of effect, n=4 [j]; 1 study reported narratively)	cross-sectional studies	serious [k]	not serious	not serious	serious [h]	none	107/1575 (6.8%)	80/1090 (7.3%)	**OR 0.89** (0.66 to 1.21)	**8 fewer per 1 000** (from 14 more to 24 fewer)	⊕◯◯◯ VERY LOW	CRITICAL
							Narrative Summary: Martin (2010) reported lower odds of GH in women who were active at least once a week over the last 3 months of their pregnancy compared to those who were (n=3,348).					
4	Case-control studies	serious [l]	serious [m]	not serious	serious [h]	none	9037/20443 (44.2%)	27980/55331 (50.6%)	**OR 0.89** (0.68 to 1.16)	**29 fewer per 1 000** (from 37 more to 95 fewer)	⊕◯◯◯ VERY LOW	CRITICAL

Quality assessment							№ of participants		Effect		Certainty	Importance
№ of studies * Review (AMSTAR 2 rating)	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Exercise	No exercise	Relative (95% CI)	Absolute (95% CI)		
							Narrative Summary: Additional data from Marcoux (1989) (n=931) showed no association between LTPA during the first 20 weeks of pregnancy and GH, no matter the way LTPA was examined (hours/week, energy expenditure as kcal/min or kcal/week).[n]					
Association between exercise-only interventions and **preeclampsia**												
16 (pooled estimate of effect, n =15 [o,p]; 1 study reported narratively)	randomized trials	serious [q]	not serious	not serious	not serious	none	34/1719 (2.0%)	49/1603 (3.1%)	**OR 0.59** (0.37 to 0.94)	**12 fewer per 1 000** (from 2 fewer to 19 fewer)	⊕⊕⊕◯ MODERATE	CRITICAL
							Narrative Summary: Yeo (2008) reported that PE incidence was 14.6% in women randomized to a walking intervention (n=41) and 2.6% in those randomized to a stretching intervention (n=38).					
Du 2018 *(16)* Low 4 randomized trials		not serious	not serious	not serious	serious [h]	none	Among pregnant women with overweight or obesity, there was no significant difference in the incidence of **preeclampsia** between physical activity intervention groups vs. standard antenatal care (RR = 1.39 [95% CI, 0.66 to 2.93], 4 RCTs, n=596, I^2=0%).				⊕⊕⊕◯ MODERATE	CRITICAL
1 [r]	non-randomized intervention studies	serious [q]	serious [s]	not serious	not serious [t]	none	Narrative Summary: In the study by Dyck (1999) (supervised exercise intervention, n=7), one woman (14%) developed PE.				⊕◯◯◯ VERY LOW	CRITICAL
9 (pooled estimate of effect, n =6; 3 studies	cohort studies	serious [g]	not serious	not serious	not serious	none	1952/51843 (3.8%)	653/15639 (4.2%)	**OR 0.87** (0.78 to 0.97)	**5 fewer per 1 000** (from 1 fewer to 9 fewer)	⊕◯◯◯ LOW	CRITICAL

Quality assessment							№ of participants		Effect		Certainty	Importance
№ of studies * Review (AMSTAR 2 rating)	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Exercise	No exercise	Relative (95% CI)	Absolute (95% CI)		
synthesized narratively)							Narrative Synthesis: Three cohort studies were included (n=76,260) 3/3 found no association between prenatal exercise and PE, no matter the intensity or volume of exercise (Currie, 2014; Juhl, 2010; Chasan-Taber, 2015). Additional data from Rudra (2008) and Magnus (2008) indicated lower odds of PE with prenatal physical activity. However, additional data from Vollebregt (2010) showed no association between prenatal exercise and PE. [u]					
2	cross-sectional studies	serious [v]	not serious	not serious	serious [h]	none	45/1595 (2.8%)	32/1107 (2.9%)	**OR 0.64** (0.39 to 1.05)	**10 fewer per 1 000** (from 1 more to 17 fewer)	⊕◯◯◯ VERY LOW	CRITICAL
4	case-control studies	serious [w]	not serious	not serious	not serious	none	409/1464 (27.9%)	310/4154 (7.5%)	**OR 0.75** (0.59 to 0.99)	**18 fewer per 1 000** (from 1 fewer to 29 fewer)	⊕◯◯◯ VERY LOW	CRITICAL
							Narrative Summary: Additional data from Marcoux (1989) (n=931) indicated 47 to 43% lower odds of PE with heavy LTPA compared to light/moderate LTPA. [n]					

* Unless otherwise stated, all studies are included in the pooled estimate.

Abbreviations: CI = confidence interval; GH = gestational hypertension; LTPA = leisure time physical activity; OR = odds ratio., RCT = randomized clinical trial; RR = risk ratio

[a] Two superiority trials could not be pooled due to absence of a no-exercise control group; results were reported narratively.
[b] One study reported no cases of GH (not estimable result) and was not included in the pooled analysis.
[c] No serious risk of bias. Unclear risk of selection bias; it was unknown if allocation concealment was adequate.
[d] The two studies could not be pooled due to absence of a no-exercise control group; results were reported narratively.
[e] Serious risk of bias. High risk of performance bias. Unclear risk of attrition bias; attrition rate is unknown.
[f] Three studies could not be pooled due to incomplete reporting of results; results were reported narratively.
[g] Serious risk of bias. High risk of performance bias (potentially flawed measurement of the exposure; unknown validity of prospective and retrospective physical activity measure). Reporting bias was an issue in three studies; results were reported narratively.
[h] Serious imprecision. The 95% CI crossed the line of no effect, and was wide, such that interpretation of the data would be different if the true effect were at one end of the CI or the other.
[i] Vollebregt (2010) reported data that were included in the meta-analysis and data that were not (incomplete reporting of data; additional data were reported narratively).
[j] One study could not be pooled due to incomplete reporting of results; results were reported narratively.
[k] Serious risk of bias. High risk of performance bias (potentially flawed measurement of the exposure; unknown validity of prospective and retrospective physical activity measure). Reporting bias was an issue in one study (incomplete reporting of data such that it could not be included in the meta-analysis; results were reported narratively).
[l] Serious risk of bias. High risk of performance bias (potentially flawed measurement of the exposure; unknown validity of prospective and retrospective physical activity measure).
[m] Serious inconsistency. High heterogeneity (I2≥50%)
[n] Marcoux (1989) reported data that were included in the meta-analysis and data that were not (incomplete reporting of data; additional data were reported narratively).

[o] One superiority trial could not be pooled due to absence of a no-exercise control group; results were reported narratively.
[p] One study reported no cases of PE (not estimable result) and was not included in the pooled analysis.
[q] Serious risk of bias. High risk of performance bias.
[r] This study could not be included in the meta-analysis due to absence of a no-exercise control group; results were reported narratively.
[s] Serious inconsistency. Only one study was included.
[t] No serious imprecision; only one study but already downgraded for serious inconsistency for this reason.
[u] Rudra (2008), Magnus (2008) and Vollebregt (2010) reported data that were included in the meta-analysis and data that were not (incomplete reporting of data; additional data were reported narratively).
[v] Serious risk of bias. High risk of performance bias (potentially flawed measurement of the exposure; unknown validity of physical activity measure).
[w] Serious risk of bias. High risk of performance bias (potentially flawed measurement of the exposure; unknown validity of prospective and retrospective physical activity measure).