

7-year follow-up of mothers from a randomized controlled trial of exercise in pregnancy and their offspring

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Introduction and Objectives

- We have previously shown in a randomised controlled trial that moderate-intensity exercise over the last 20 weeks of gestation in healthy nulliparous women led to a birth weight reduction of approximately 250 g¹.
- Here, we assessed the long-term effects of exercise in pregnancy on anthropometry and body composition in mothers and their offspring 7 years after trial completion.
- We hypothesized that women who exercised in pregnancy would have lower adiposity than control mothers, and that children born to exercisers would be leaner than controls.

Methods

- The original study included 84 healthy women randomly assigned to exercisers (n=47) or controls (n=37). Regular aerobic exercise was performed using stationary cycle ergometer up to five 40-minute sessions per week from 20 to at least 36 weeks of gestation. Control participants were asked to continue their normal daily activities.
- Of the initial 84 women and their offspring, follow-up data were available on 57 mothers (33 exercisers, 24 controls) and 57 children approximately 7 years after the trial was completed.
- Assessments included measurement of maternal and children's anthropometry, blood pressure and body composition (DXA scans). Physical activity and food diaries were also collected. Blood samples were taken from children to measure plasma glucose and insulin levels.

Results

Table 1. Anthropometric and metabolic outcomes at follow-up among controls and exercisers. Age and height data are means ± SD; other data are means and 95% CI adjusted for confounding factors.

		Control (n=24)	Exercise (n=33)	P
Demography	Age (years)	37.9 ± 3.6	39.5 ± 3.4	0.07
	Ethnicity (NZ European)	84%	89%	0.52
Anthropometry	Height (kg)	166.7 ± 7.4	165.1 ± 6.5	0.27
	Weight (kg)	69.1 (66.4–71.9)	66.0 (63.7–68.3)	0.09
	BMI (kg/m ²)	25.0 (24.0–26.0)	23.8 (23.0–24.7)	0.09
Body composition	Total body fat (%)	33.7 (30.7–36.7)	31.9 (29.3–34.6)	0.39
	Total lean mass (%)	63.4 (60.5–66.2)	64.9 (62.3–67.5)	0.44
	Android/gynoid fat ratio	0.84 (0.76–0.91)	0.83 (0.76–0.90)	0.91
Cardiovascular	SBP (mmHg)	111 (106–115)	105 (101–109)	0.06
	DBP (mmHg)	67 (64–71)	65 (62–68)	0.37

References

- Hopkins SA, Baldi JC, Cutfield WS, McCowan L, Hofman PL (2010) Exercise training in pregnancy reduces offspring size without changes in maternal insulin sensitivity. *J Clin Endocrinol Metab* 95: 2080–2088.

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Results

Figure 1. Differences in anthropometry and body composition from delivery to follow-up at 7 years within control mothers (black) and those who exercised in pregnancy (grey). Data are expressed as the mean change from baseline (Δ) and SEM, adjusted for baseline BMI, age, and number of pregnancies since the trial. *p<0.05, **p<0.01, and ***p<0.001 vs baseline.

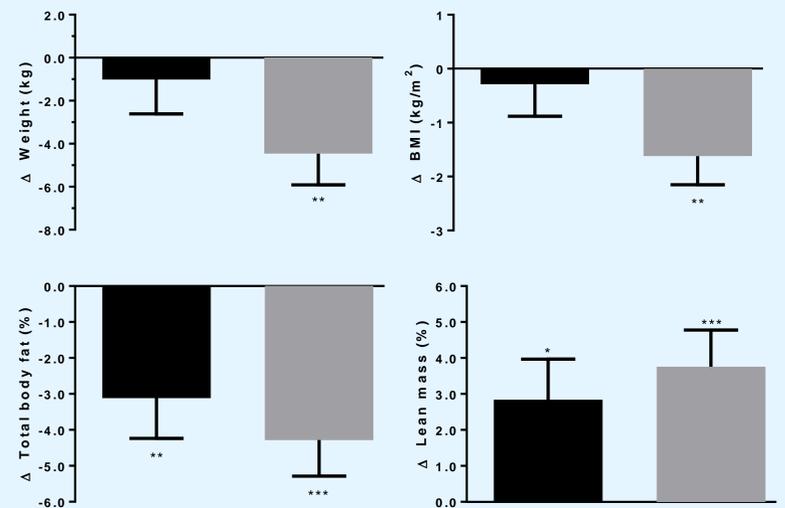


Table 2. Outcomes among boys born to controls or exercisers. Age data are means ± SD; other data are means and 95% CI adjusted for confounders.

		Control (n=10)	Exercise (n=21)	P
Demography	Age (years)	7.9 ± 0.8	7.6 ± 0.7	0.50
	Ethnicity (NZ European)	90%	86%	0.73
Anthropometry	Weight SDS	0.74 (0.21–1.28)	0.27 (-0.08–0.62)	0.15
	BMI SDS	0.17 (-0.32–0.65)	0.01 (-0.31–0.33)	0.59
Body composition	Total body fat (%)	13.6 (11.3–16.2)	14.2 (12.6–16.1)	0.67
	Total lean mass (%)	81.1 (78.8–83.4)	80.9 (79.3–82.5)	0.88
	Android/gynoid fat ratio	0.55 (0.45–0.65)	0.58 (0.51–0.64)	0.61
Glucose homeostasis	HOMA-IR	1.61 (0.84–3.07)	1.01 (0.67–1.53)	0.22
Cardiovascular	SBP (mmHg)	94.6 (86.5–102.7)	103.7 (98.3–109.2)	0.07
	DBP (mmHg)	53.7 (48.0–59.8)	61.6 (57.5–65.7)	0.041

Table 3. Outcomes among girls born to controls or exercisers. Age data are means ± SD; other data are means and 95% CI adjusted for confounders.

		Control (n=14)	Exercise (n=12)	P
Demography	Age (years)	7.6 ± 0.6	7.6 ± 0.7	0.96
	Ethnicity (NZ European)	93%	50%	0.026
Anthropometry	Weight SDS	0.21 (-0.10–0.51)	0.44 (0.11–0.77)	0.29
	BMI SDS	0.04 (-0.34–0.41)	0.24 (-0.17–0.64)	0.46
Body composition	Total body fat (%)	17.4 (15.2–20.0)	22.0 (18.9–25.6)	0.028
	Total lean mass (%)	77.6 (74.9–80.3)	72.8 (69.9–74.8)	0.024
	Android/gynoid fat ratio	0.62 (0.55–0.69)	0.74 (0.67–0.82)	0.019
Glucose homeostasis	HOMA-IR	1.27 (0.93–1.75)	1.54 (0.98–2.43)	0.50
Cardiovascular	SBP (mmHg)	94.1 (88.2–100.1)	97.5 (90.5–104.6)	0.45
	DBP (mmHg)	59.0 (55.2–62.7)	55.7 (51.2–60.2)	0.26

Conclusions

- There was a reduction in adiposity in both groups of mothers, but a positive effect was more marked amongst exercisers, who were also significantly lighter and leaner compared to pre-pregnancy.
- However, data suggest that exercise may be associated with adverse effects in the offspring of both sexes.

