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Effects of exercise training during pregnancy on late pregnancy and postpartum cardiorespiratory fitness in overweight and obese women: A randomised controlled trial

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Introduction: Pregnant women who are overweight/obese have increased risk of excess gestational weight gain and postpartum weight retention. Along with low cardiorespiratory fitness, these risk factors are associated with subsequent development of diabetes risk. We examined if exercise training during pregnancy would prevent a decline in peak oxygen uptake (VO_2 peak) in women with a pre-pregnancy BMI $\geq$28 kg/m^2.

Methods: We included a sub-sample of 53 sedentary women (age: 31 ± 4 yr, BMI: 34.8 ± 4.3 kg/m^2) from a larger randomised controlled trial. The training group (n = 28) was offered three weekly sessions (35 min moderate-intensity endurance and 25 min strength training) from gestational week 12–18 to delivery. The control group (n = 25) received usual care only. Participants underwent testing for VO_2peak in gestational week 12–18 (baseline), in gestational week 34–37 (late pregnancy) and 3 months postpartum.

Results: Weight gain from baseline to late pregnancy was 8.7 ± 3.1 kg, with no change between baseline and postpartum, and no between-group difference. Relative VO_2 peak (mL/min/kg) decreased in both groups from baseline to late pregnancy (exercise: −3.7 ± 2.4, control: −4.8 ± 4.1, p < 0.001, between-group difference, p = 0.34), whereas absolute VO_2peak decreased only in the control group. Nineteen women were not physically able to undertake a VO_2peak test in late pregnancy. From baseline to postpartum, relative VO_2peak (mL/kg/min) increased by 13% (from 25.0 ± 4.1 to 27.7 ± 3.9, p = 0.002) in the exercise group and by 4% (from 25.7 ± 4.2 to 26.6 ± 4.4, p = 0.07) in the control group (between-group difference, p = 0.05). Absolute VO_2peak increased only in the exercise group (+0.2 ± 0.4 L/min) from baseline to postpartum (between-group difference, p = 0.04).

Conclusion: Overweight/obese women who received a supervised training program during pregnancy maintained their absolute VO_2 peak from early to late pregnancy and had a higher increase in postpartum VO_2 peak compared to women who received usual care. Supervised exercise training should be included as part of maternity care.

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Comparing two exercise training doses on body composition in adults with overweight/obesity and type 2 diabetes: a randomised controlled trial

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Introduction: Type 2 diabetes (T2D) and overweight/obesity frequently occur concomitantly, further increasing an individual's risk of developing complications such as cardiovascular disease. High-intensity interval training (HIIT) has been suggested as a viable alternative to moderate intensity continuous training (MICT) to improve exercise participation in adults with T2D. However, the effects of HIIT on body composition in T2D are not well known. We aimed to compare the effects of low-volume combined aerobic and resistance HIIT (C-HIIT) with combined aerobic and resistance MICT (C-MICT) on body composition in adults with T2D following 8-weeks of supervised training and 10-months of home-based training.

Methods: 50 individuals (age 60.0 ± 8.5y, BMI 34.1 ± 7.3 kg/m^2, 60% male) diagnosed with T2D (mean HbA_{1c} 7.7 ± 1.3%) were randomly allocated to 8-weeks of either supervised C-HIIT (1x4 min high intensity aerobic @ 85–95% HRpeak plus resistance training, 3 times/week), supervised C-MICT (52.5 min @ 55–65% HRpeak, 2 times/week; 22.5 min @ 55–65% HRpeak plus resistance training, 2 times/week) or control (usual care). Participants then completed 10-months of home-based training (same protocol), with once monthly supervised sessions. Body composition was assessed using dual energy x-ray absorptiometry and waist and hip circumference at baseline, 8-weeks and 12-months.

Results: There were no significant interaction or time effects. There were no significant differences in any body composition variables between C-HIIT and C-MICT at any time point. C-HIIT significantly decreased fat mass (p = .03) and increased lean mass (p = .003) compared to control after 8 weeks. C-MICT significantly increased lean mass (p = .036) compared to control after 8 weeks.

Conclusion: There were no differences between C-HIIT and C-MICT for changes in body composition in adults with T2D following 8-weeks of supervised exercise training and 10-months of home-based training. Both C-HIIT and C-MICT improved body composition compared to control. Therefore, C-HIIT is a time efficient alternative to C-MICT to improve body composition in T2D.

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Early infant feeding and body mass index trajectory in the first five years of life

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Background/objectives: Early nutrition plays an important role in the development of later obesity, but it is unclear how early infant feeding impacts body mass index (BMI) trajectory. The aim of this study was to examine the influences of breastfeeding duration and timing of solid introduction on BMI z-score (BMIz) trajectory in from age 9 months to 5 years.

Methods: Data from the Melbourne InFANT Program ($n = 542$) on breastfeeding and solid introduction, along with repeated measures of BMIz until the age of five were used for these analyses. A mixed effect polynomial model was used to investigate the effects of infant feeding type on BMIz trajectory across early childhood.

Results: With adjustment for BMI at birth and maternal characteristics including country of birth, pre-pregnancy BMI, and education level, every one month increment in breastfeeding duration was associated with 0.02 unit decrease in mean BMIz from 9 months to 5 years ($P = 0.004$). The average mean BMIz from 9 months to 5 years of children breastfed for ≥6 months was 0.24 units lower (95%CI −0.40, −0.08 $P < 0.003$) than those who breastfeed for less than 6 months. Breastfeeding duration ≥ 6 months demonstrated similar protective effects on BMIz among children whose mothers were healthy weight or overweight/obese pre-pregnancy. No significant association was found for timing of solid introduction and BMIz.

Conclusion: Longer breastfeeding duration was associated with lower BMIz to five years of age. Breastfeeding duration ≥6 months showed similar beneficial effects on BMIz among children of mothers who were healthy weight or overweight/obese pre-pregnancy. The findings supports the current guidelines to prolong breastfeeding duration.

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A pilot primary school active break program (ACTI-BREAK): effects on academic and physical activity outcomes for students in Years 3 and 4

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Background: Active breaks are short bursts of physical activity done in the classroom as a break from learning. The ACTI-BREAK program was designed to address limitations of previous active break interventions, including lack of teacher involvement in development, use of long-term academic measures to assess short-term interventions, and lack of objective physical activity assessment. This study aimed to assess the feasibility and potential efficacy of ACTI-BREAK for improving achievement in mathematics and reading, classroom behaviour and physical activity.

Method: Year 3 and 4 students (74% response; $n = 374$) were recruited from six schools across Melbourne, Australia. Using a cluster randomised controlled trial design, schools were randomised to the 6-week ACTI-BREAK intervention ($n = 3$) or usual teaching practice ($n = 3$). The intervention involved teachers incorporating 3×5 min active breaks into their classroom routine daily. Academic achievement was assessed using 1-min tests in reading and mathematics; classroom behaviour was observed by teachers; physical activity was assessed using accelerometers. Multilevel mixed effects linear regression models were conducted using intention to treat analyses. Teacher (interviews) and student experience (survey and focus groups) were also assessed.

Results: Intervention effects for classroom behaviour were stronger for boys (B = 21.42; 95%CI: 10.34,32.49) than girls (B = 12.23; 95%CI: 1.52,22.92). No effect was found for reading, mathematics or physical activity. Teachers implemented on average two of the three prescribed active breaks daily. Barriers to implementation for teachers were perceived threats to classroom control and time constraints. Facilitators were program infrastructure, flexible delivery options and student enjoyment. Most students reported enjoying the program (94%), finding it easier to concentrate (66%) and that their school work improved (67%).

Conclusions: Implementing active breaks in the classroom may improve classroom behaviour, and had no detrimental effect on reading or mathematics scores. This may encourage classroom teachers to incorporate more physical activity into their classroom routine.

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Parental translation to practice of healthy eating and active play messages and the impact on childhood obesity: a mixed methods study

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Childhood obesity is proving difficult to prevent despite identification of modifiable risk factors related to healthy eating and active play. For parents in Victoria, Australia, the Maternal Child Health (MCH) service plays an important role in promoting child health behaviours through nurse consultations with parents at key ages from birth to 3.5 years.

Our study was based in the rural remote Yarriambiack Shire, which in 2014 had the highest overweight and obesity prevalence in the state (66.9% vs. 49.8%) but prevalence in children was unknown. Our aim was two-fold; firstly, to determine the weight status of children aged 0–3.5 years. Secondly, to explore the relationship between child weight status and translation of advice on healthy eating and active play recommendations.

Child anthropometrics taken by MCH nurses for all children 0–5 years old between November 2011–2016 ($n = 438$) were extracted and analysed for prevalence of overweight/obesity. Semistructured interviews were conducted with 15 parents of children aged 12 months – 5 years and the two MCH nurses.

Interviews confirmed a high level of engagement with the local MCH service. Parents saw MCH as a key information source for child health advice. Parents reported mostly following MCH healthy eating and active play advice, except screen time and fussy eating advice. Quantitative results showed local prevalence of overweight/obesity at 3.5 years was lower than the national average (11.4% vs. 20%). A significant trend towards obesity was noted starting from 12 months ($p \leq 0.001$), coinciding with a relaxation in parent attitudes towards healthy child behaviours.

Findings from this mixed method study showed that the Yarriambiack MCH service supports parents to raise healthy weight children until 3.5 years. However, there are warning signs that this support must continue throughout childhood and beyond if this cohort of children is to remain within a healthy weight range into adulthood.

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