

Marina Ybarra^{1,2}; Prince K. Daniele^{1,5}; Andrea Van Hulst^{1,3}; Tracie A. Barnett^{1,2}; Olivier Drouin^{1,4}; Marie-Ève Mathieu^{1,4}; Lisa Kakinami⁵; Jean-Luc Bigras^{1,4}; Mélanie Henderson^{1,4}

(1) CHU Sainte Justine Research Center, Montréal (2) Armand Frappier Institute, Laval (3) McGill University, Montréal (4) Université de Montréal, Montréal (5) Concordia University, Montréal - Canada

BACKGROUND

Childhood obesity affects 13% of Canadian youth and it is the leading cause of cardiovascular disease in children

CIRCUIT (*Centre Pédiatrique d'Intervention en Prévention et en Réadaptation Cardiovasculaires*) is:

- A personalized 2 years intervention tailored to children's family, school and community resources, with the aim of increasing physical activity
- Its innovation lies in the use of GPS, accelerometry and other technologies to evaluate children's behavior
- Youth 4-18 y at risk of cardiovascular disease (CVD) are referred by their physician
- At least 8 visits are performed with the team

OBJECTIVE

Assess changes in cardiometabolic health outcomes among 106 participants who completed the 2-year CIRCUIT intervention between baseline and year 2

METHODS

All measures were obtained at baseline and years 1 and 2 for the participants who completed the program from 2011-2015:

- Body Mass Index (BMI) z-scores based on WHO reference norms
- Blood pressure (BP) z-scores based on CDC/NIH/NHLBI reference norms
- Adiposity (%body fat and %trunk fat by Tanita)
- Aerobic fitness (VO₂max)
- Anaerobic fitness (5m shuttle run test)
- Physical capacity: flexibility, push-ups, sit-ups, hand grip strength, leg power, balance and hand-eye coordination
- Fasting blood glucose and lipid profile (LDL, HDL, triglycerides)

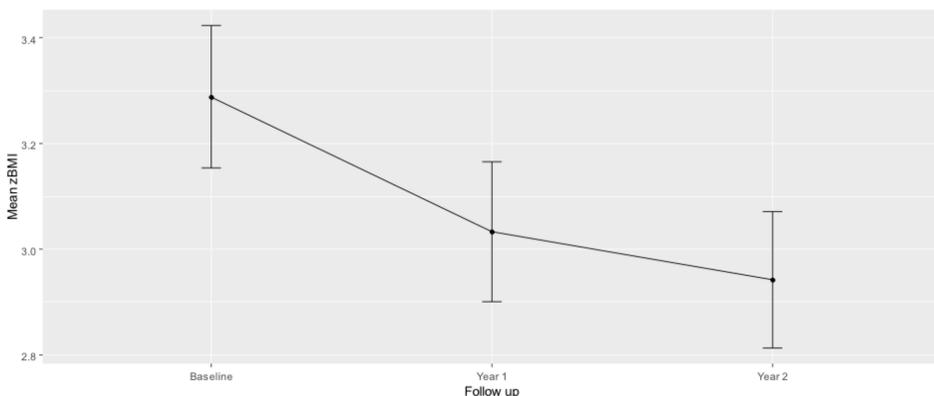
Analyses included:

- Paired t-tests (for age-sex standardized BMI and BP)
- Multivariable mixed effect models, adjusted for age and sex, for other outcomes

RESULTS

- 106 participants (50% males) completed the CIRCUIT program
- At baseline, the median age was 11 year-old [IQR: 9-13] 68,4% were Caucasian, and the mean zBMI was +3.3 (SD 1.4)
 - 97% overweight or obesity
 - 28% hypertension
 - 37% dyslipidemia
 - 12% type 2 diabetes

Figure 1: Means (SEs) of zBMI by follow-up visit



CONCLUSIONS

- After two years of intervention we saw:
 - significant **decreases** in zBMI and diastolic zBP
 - significant **improvements** in aerobic and anaerobic fitness and physical capacity
- These preliminary results suggest that the CIRCUIT program may be a promising intervention for children at risk of CVD
- Findings need to be confirmed in a large, randomized controlled trial

Table 1: Changes in CVD outcomes from baseline to year 2

Output	Baseline to Year 2	95% CI	p-value
Total Cholesterol (mmol/L)	-0.25	-0.47, -0.04	0.02
Triglycerides (mmol/L)	-0.18	-0.39, 0.04	0.11
HDL (mmol/L)	-0.05	-0.14, 0.05	0.32
LDL (mmol/L)	-0.20	-0.36, -0.03	0.02
Fasting Blood Sugar (mmol/L)	-0.17	-0.50, 0.16	0.31
% Body Fat	-1.93	-3.48, -0.38	0.01
% Trunk Fat	-2.00	-3.64, -0.37	0.02

Table 2: Changes in physical capacity and aerobic and anaerobic fitness from baseline to year 2

Outcomes	Baseline to Year 2	95% CI	p-value
Relative VO ₂ max (mL/min/kg)	3.55	2.08 - 5.02	<0.01
5-meter shuttle run test (sec)	-1.21	-1.66 - -0.77	<0.01
Sit and Reach test (cm)	1.37	-0.35 - 3.09	0.12
Right Grip (kg)	3.63	2.01 - 5.24	<0.01
Left Grip (kg)	2.99	1.49 - 4.48	<0.01
Sit-ups test (reps)	4.06	2.00 - 6.13	<0.01
Push-ups test (reps)	3.50	1.66 - 5.31	<0.01
Long-Jump test (cm)	9.71	4.20 - 15.23	<0.01
Balance test (sec)	3.92	-0.22 - 8.99	0.06
Throwing test (points)	0.80	0.11 - 1.49	0.02

Table 3: Changes in systolic and diastolic BP z-scores from baseline to year 2

Outcome (n=96)	Baseline to Year 2	SD	p-value
Systolic BP z-score	-0.06	1.12	0.62
Diastolic BP z-score	-0.43	0.94	<0.01

The authors declare no potential conflict of interest